

FINAL

**INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN**

**JOINT EXPEDITIONARY BASE
LITTLE CREEK – FORT STORY**

VIRGINIA BEACH, VIRGINIA



**Prepared for:
Navy Region Mid-Atlantic
Naval Facilities Engineering Command**

Public Works Department Joint Expeditionary Base Little Creek-Fort Story

**Prepared by:
CH2M**

December 2017

FINAL
INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN

JOINT EXPEDITIONARY BASE LITTLE CREEK – FORT STORY
VIRGINIA BEACH, VIRGINIA

Prepared by:

CH2M

For:

Navy Region Mid-Atlantic
Naval Facilities Engineering Command Mid-Atlantic
Public Works Department Joint Expeditionary Base Little Creek-Fort Story

December 2017

**Integrated Natural Resources Management Plan
Joint Expeditionary Base Little Creek – Fort Story**

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1D. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Approving Official's Signature:

 CAPT

J.L. Frantzen
Captain, U.S. Navy
Commanding Officer
Joint Expeditionary Base Little Creek – Fort Story

7 Dec 2017
Date

**Integrated Natural Resources Management Plan
Joint Expeditionary Base Little Creek – Fort Story**

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1D. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Approving Official's Signature:

WALIGORA.SHARON.L.1016349182

Digitally signed by
WALIGORA.SHARON.L.1016349182
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=USN, cn=WALIGORA.SHARON.L.1016349182
Date: 2017.11.21 15:01:32 -05'00'

Sharon Waligora
Installation Environmental Program Director
Joint Expeditionary Base Little Creek – Fort Story

Date

RUSSELL.KYLE.BRANDON.1471158964

Digitally signed by
RUSSELL.KYLE.BRANDON.1471158964
DN: c=US, o=U.S. Government, ou=DoD,
ou=PKI, ou=USN,
cn=RUSSELL.KYLE.BRANDON.1471158964
Date: 2017.11.21 14:30:51 -05'00'

Kyle Russell
Installation Natural Resource Manager
Joint Expeditionary Base Little Creek – Fort Story


Date

**Integrated Natural Resources Management Plan
Joint Expeditionary Base Little Creek – Fort Story**

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC. 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1D. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Approving Official’s Signature:

CARAWAN.WILBUR.E.1229602760
9602760

 Digitally signed by CARAWAN.WILBUR.E.1229602760
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=USN, cn=CARAWAN.WILBUR.E.1229602760
Date: 2017.12.18 07:55:09 -05'00'

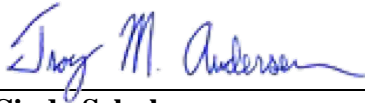
Emmett Carawan
Natural Resources Program Manager
Commander Navy Region Mid-Atlantic
Naval Facilities Engineering Command Mid-Atlantic

Date

**Integrated Natural Resources Management Plan
Joint Expeditionary Base Little Creek – Fort Story**

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1D. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Approving Official's Signature:



12/14/17

Cindy Schulz

Date

Field Supervisor

For

Virginia Ecological Services

United States Fish and Wildlife Service

Virginia Field Office

**Integrated Natural Resources Management Plan
Joint Expeditionary Base Little Creek – Fort Story**

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 U.S.C. 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1D. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration - National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Approving Official's Signature:

Robert Duncan

Date

Executive Director

Virginia Department of Game and Inland Fisheries

PLAN UPDATES

This Integrated Natural Resources Management Plan (INRMP) addresses future requirements and identifies projects to be implemented over the five-year duration for both the Joint Expeditionary Base (JEB) Little Creek and JEB Fort Story plan (2018–2023). This INRMP is a single document, fulfilling natural resource requirements for JEB Little Creek – Fort Story (JEBLCFS). Prior to this update, each location within the Joint Base structure had an independent INRMP. Sections of this document focus on each location because of the unique resource issues and management challenges involved at each property. The JEBLCFS Environmental Division, Natural Resources Program is responsible for both locations.

INRMPs should contain the most up-to-date natural resources information, and include updates and revisions necessary to maintain a proactive management plan. Natural resources managers are encouraged to use geographic information systems to supplement their INRMP and to incorporate the guidance and recommendations contained in “Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers” (Benton et al. 2008 and Chief of Naval Operations Operating Instruction [OPNAVINST] 5090.1D).

In accordance with the Integrated Natural Resources Management Program (32 Code of Federal Regulations Appendix to Part 190), the Sikes Act Improvement Act of 1997, and the Department of the Navy (Navy) Environmental Readiness Program Manual (OPNAVINST 5090.1D, Chapter 12), installations are required to perform an informal annual review to ensure INRMP information is current, and to evaluate the effectiveness of their INRMP.

The annual INRMP review must be completed in cooperation with the appropriate United States Fish and Wildlife Service (USFWS) and state fish and wildlife agency field-level offices. Measure of the success of the INRMP and identification of any issues associated with implementation of the INRMP will result from collaboration with cooperating partners (Department of the Navy 2006).

The annual review also provides an opportunity to incorporate changes in accepted environmental conservation practices and scientific advances associated with evaluation and implementation of natural resources management. If necessary, the annual review will include an update to the INRMP and an updated project list, documentation of significant changes to natural ecosystems, and updates to information contained in the INRMP appendices. Minor revisions to the INRMP should be completed annually to reduce the need for a costlier and more time-consuming revision following the formal five-year review. Annual reviews should be fully documented each year to provide each installation the option to use the annual review documentation to fulfill the formal review requirement whenever possible. Forms to document annual reviews are included in this document and should be used to record changes to the INRMP that will improve natural resources management. Each entry in the update form should reference the plan section and page number that is being updated to facilitate quick cross-referencing.

Installations are not required to revise their INRMP within a specified time interval; however, a formal review is required every five years in coordination with the USFWS and state fish and wildlife agency (Department of the Navy 2006). The formal review shall verify that all environmental compliance projects have been budgeted for and implemented on schedule; that all required natural resource positions are filled with trained staff, or are in the process of being filled; that projects and activities identified for the coming year are included in the INRMP; that all

required coordination has been conducted; and that all significant changes to the Installation's mission requirements, or its natural resources have been identified. If there have been no changes in conditions and both the USFWS and state fish and wildlife agency agree, the completed annual review forms may be used in lieu of a formal five-year review. If results of the formal review determine that the existing INRMP is effective, the INRMP need not be revised. Any revisions to the authorities and guidance documents driving plan update requirements would be implemented as appropriate during the annual or formal review periods.

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

Activities that may constitute an INRMP revision include:

- A change in mission requirements or intensity of land use
- A significant change in natural resources baseline conditions
- A determination that the old INRMP has proven to be inadequate, was not able to be implemented, or that its projects are ineffective in meeting natural resources management goals as evidenced from monitoring results
- Natural resources management goals have changed, or the planning horizon of the previous INRMP has expired
- Base realignment and closure actions have been put into effect

Any of these activities should be brought to the attention of the USFWS and VDGIF during the formal review process.

EXECUTIVE SUMMARY

The Department of Defense (DoD) manages approximately 30 million acres (approximately 12 million hectares) of land in the United States (DoD 2017). Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an INRMP. This INRMP update was prepared for JEBLCFS, Virginia Beach, Virginia, in accordance with the following authorities, which were current at the time the INRMP was updated. Revisions to the following authorities and guidance documents would replace the older version, and any necessary changes to the INRMP would be documented during the annual review or incorporated into the INRMP at the time it is updated.

- 32 Code of Federal Regulations Part 190, DoD Natural Resources Management Program, 01 July 2009
- DoD Instruction 4715.03, Natural Resources Conservation Program, 18 March 2011
- Chief of Naval Operations Operating Instruction 5090.1D, Department of the Navy (Navy) Environmental Readiness Program Manual, Environmental Readiness Program, Chapter 12 Natural Resources Conservation, 10 January 2014
- Naval Facilities Engineering Command Real Estate Operations and Natural Resources Management Procedural Manual P-73, Vol. II, 01 May 1987
- 16 United States Code §670 a-f, Sikes Act Improvement Act, 18 November 1997
- Federal Endangered Species Act of 1973 (16 USC §1531-1544, 87 Stat. 884), as amended

NATURAL RESOURCES PROGRAM GOALS

The overall goal of this INRMP established by the JEBLCFS Environmental Division is to implement an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission integrates and coordinates management activities; provides for sustainable multi-purpose use of natural resources; and provides public access for use of natural resources subject to safety and military security considerations. The overall management objectives are to integrate management of natural resources as practicable and consistent with the military mission and established land uses. The Environmental Division has identified a number of objectives necessary to achieve these goals:

- Provide realistic and healthy habitat in the training areas.
- Conduct a natural resources management program that uses the principles of ecosystem management.
- Use adaptive management techniques to provide the flexibility to adapt management strategies based on increased knowledge and data gained from monitoring programs and scientific literature.
- Seek to maintain or increase the level of biodiversity of native species.
- Protect forest resources from unacceptable damage and degradation resulting from insects and disease, invasive species, and wildfire, as well as manage the resources in a manner that supports the military mission.

- Prevent the degradation of water quality; protect wetland, aquatic and riparian habitats; and identify and restore degraded habitats.
- Protect soil resources from erosion and destabilization through prevention and restoration efforts.
- Protect and preserve cultural resources in accordance with state and federal laws.
- Provide special protection, conservation, and management for rare, threatened, and endangered plant and wildlife species.
- Protect sensitive and ecologically significant habitats located in conservation site areas on JEBLCFS.
- Manage wildlife and fisheries resources within the principles and guidelines of ecosystem management to maintain productive habitats and viable populations of native species.
- Provide outdoor recreational opportunities in consideration of military mission requirements.
- Provide a positive contribution to the community by offering informative and educational instruction and opportunities.

These objectives are reflected in the management actions and techniques described in **Section 4.0** and **Section 7.0** of this document. Implementation of projects (**Appendix A**) may require coordination with various organizations including United States Department of Agriculture Natural Resources Conservation Service, United States Army Corps of Engineers, United States Fish and Wildlife Service (USFWS), Virginia Department of Environmental Quality, Virginia Department of Game and Inland Fisheries (VDGIF), First Landing State Park, Virginia Department of Conservation and Recreation – Division of Natural Heritage, Virginia Marine Resources Commission, and other applicable agencies and organizations. The Installation and Regional Natural Resources Managers will oversee all management projects recommended in this INRMP. Management of natural resources is grouped within three management focuses: Urban and Training Areas Management, Natural Areas Management, and Beaches and Dunes Management.

ORGANIZATION OF DOCUMENT

This INRMP is organized into the following sections:

Section 1.0 – Introduction. This section provides a discussion of the purpose of the INRMP and the policies that drive it; the objectives of the INRMP; details regarding the location and regional setting; responsibilities and stakeholders; compliance and stewardship requirements; a brief overview of the location, history, and mission of JEBLCFS; an overview of natural resources management; natural resources constraints and opportunities related to implementation of the military mission; INRMP integration with other plans; encroachment and land use; partnerships and outreach; training of natural resources personnel; data management including geographic information system (GIS); and environmental planning.

Section 2.0 – Existing Conditions – JEB Little Creek. This section describes the existing physical and natural conditions at JEB Little Creek. Included are climate; physiography and soils; hydrology; environmental cleanup program; flora and fauna; rare, threatened, and endangered species; and conservation sites and dune protection areas.

Section 3.0 – Program Components – JEB Little Creek. The 12 natural resources program components and management issues that are relevant to JEB Little Creek are discussed in this section to help identify opportunities and potential conflicts with natural resources management.

Section 4.0 – Natural Resources Management – JEB Little Creek. This section provides discussion of natural resources management objectives and techniques for the 12 natural resources program components that have been identified at JEB Little Creek, and are grouped into three management focus areas: Urban, Natural, and Beaches and Dunes.

Section 5.0 – Existing Conditions – JEB Fort Story. This section describes the existing physical and natural conditions at JEB Fort Story. Included are climate; physiography and soils; hydrology; environmental cleanup program; flora and fauna; rare, threatened, and endangered species; and conservation sites and dune protection areas.

Section 6.0 – Program Components – JEB Fort Story. The 12 natural resources program components and management issues that are relevant to JEB Fort Story are discussed in this section to help identify opportunities and potential conflicts with natural resources management.

Section 7.0 – Natural Resources Management – JEB Fort Story. This section provides discussion of natural resources management objectives and techniques for the 12 natural resources program components that have been identified at JEB Fort Story, and are grouped into three management focus areas: Urban, Natural, and Beaches and Dunes.

Section 8.0 – Environmental Management Strategy, INRMP Implementation and Missions Sustainability – JEB Little Creek – Fort Story. This section identifies the requirements for INRMP implementation. This section describes achieving no net loss, National Environmental Policy Act compliance, project development and classification, funding sources, commitments, and use of cooperative agreements.

Section 9.0 – Management Recommendations JEB Little Creek – Fort Story. This section presents a summary of the management recommendations that were described for each of the JEBLCFS Management Units. The recommendations have been organized by Environmental Readiness Level (ERL), and then by natural resource management issues.

Section 10.0 – References. This section lists references and Internet resources that were used in the development of this document.

Appendix A – JEB Little Creek and JEB Fort Story Natural Resources Project Implementation Schedules. Appendix A includes the Natural Resources Project Implementation Schedules for the INRMP plan period.

Appendix B – Cross-Reference of INRMP to DoD INRMP Template. Appendix B includes a table with a cross-walk comparison of the INRMP sections with the DoD INRMP template requirements.

Appendix C – National Environment Policy Act Documentation. Appendix C contains digital copies of the Environmental Assessments, found on compact disc located inside the front cover of this document. The assessments cover the implementation of the original 2005–2009 INRMP for Little Creek and the 2004–2008 INRMP prepared for Fort Story and includes the Project Environmental Checklist that will be used by the Natural Resources Manager for implementing the natural resources management program.

Appendix D – Agency Correspondence. Appendix D includes copies of the cooperative agreements and mutual agreement letters that exist between JEBLCFS and the USFWS and VDGIF.

Appendix E – Chesapeake Bay Agreements and Documents. Appendix E contains three cooperative agreements between federal agencies concerning conservation of the Chesapeake Bay.

Appendix F – Wetlands Jurisdictional Determination, Permits, and Mitigation Plan. Appendix F includes the 2005 jurisdictional wetland determination received for the Installation-wide wetland delineation; the 2006 wetlands permit, mitigation plan, and related reports for the Small Arms Test and Evaluation Compound; and the 2006 wetlands permits for the Joint Logistics Over-The-Shore Pier Stabs. A copy of the most recent preliminary jurisdictional determination received from the United States Army Corps of Engineers (USACE) Norfolk District for JEB Little Creek (21 August 2015) and JEB Fort Story (29 February 2016) wetlands is also included in Appendix C.

Appendix G – Flora and Fauna Lists. Appendix G includes the flora and fauna lists for JEBLCFS.

Appendix H – JEB Little Creek Raptor Management Plan. Appendix H includes information related to the management of raptors at JEB Little Creek.

Appendix I – Native Plants for Virginia Coastal Plain. Appendix I provides a brochure listing recommended native plants for conservation, restoration, and landscaping in the coastal plain area of Virginia.

Appendix J – Migratory Birds Management. Appendix J includes the memorandum of understanding between the DoD and USFWS to promote the conservation of migratory birds.

Appendix K – Policy Letter Preventing Feral Cat and Dog Populations on Navy Property.

Appendix L – Marine Mammal and Sea Turtle Management. Appendix L includes information related to the management of marine mammals and sea turtles at JEBLCFS.

Appendix M – Fort Story Historic Determination of Eligibility Notification (2003). Appendix M includes a copy of the Department of the Interior Determination of Eligibility Notification for the National Register of Historic Places for the Fort Story Historic District

Appendix N – Invasive Species Management Plan for JEB Fort Story. Appendix N contains a copy of the Final Invasive Species Inventory and Control Plan for JEB Fort Story (2013).

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	XVII
1.0 INTRODUCTION.....	1-1
1.1 Purpose and Authority	1-1
1.2 Scope.....	1-1
1.3 Objectives	1-2
1.4 Responsibilities	1-2
1.4.1 Installation Stakeholders.....	1-3
1.4.2 External Stakeholders	1-4
1.4.3 Technical Assistance.....	1-5
1.5 Compliance and Stewardship.....	1-5
1.6 Encroachment and Adjacent Land Use.....	1-5
1.7 Training and Natural Resources Personnel.....	1-6
1.8 Geographic Information System Management, Data Integration, Access, and Reporting.....	1-8
1.9 Environmental Planning.....	1-9
1.10 Beneficial Partnership and Collaborative Resource Planning	1-10
1.11 State Wildlife Action Plan	1-10
1.12 Chesapeake Bay Program	1-10
2.0 EXISTING CONDITIONS – JOINT EXPEDITIONARY BASE LITTLE CREEK.....	2-1
2.1 Location and Regional Setting.....	2-1
2.2 Military Mission.....	2-1
2.2.1 Historical Overview and Military Mission	2-1
2.2.2 Mission Impacts on the Environment	2-2
2.3 Overview of Natural Resources Management Program	2-6
2.3.1 Wetlands and Water Quality Protection	2-6
2.3.2 Urban Forestry	2-6
2.3.3 Fish and Wildlife Management.....	2-6
2.3.4 Habitat Conservation and Restoration	2-9
2.3.5 Invasive Species and Pest Management	2-9
2.3.6 Natural Resources Management Units.....	2-9
2.4 Constraints and Opportunities.....	2-9
2.5 Climate.....	2-10
2.5.1 Climate Change.....	2-11
2.6 Physiography and Soils.....	2-11
2.7 Hydrology	2-19
2.7.1 Surface Water	2-19
2.7.2 Groundwater	2-23
2.7.3 Watersheds.....	2-24
2.7.4 Floodplains	2-24
2.7.5 Wetlands	2-27
2.7.6 Nearshore Environments.....	2-29

Table of Contents

2.8	Environmental Cleanup Program.....	2-29
2.8.1	Environmental Restoration Program Sites.....	2-29
2.8.2	Military Munitions Response Program.....	2-30
2.9	Flora.....	2-30
2.9.1	Mesic Mixed Pine-Hardwood Forest.....	2-33
2.9.2	Mesic Mixed Hardwood Forest.....	2-33
2.9.3	Pine Forest.....	2-34
2.9.4	Maritime Swamp Forest.....	2-34
2.9.5	Maritime Upland Forest.....	2-34
2.9.6	Maritime Dune Woodland.....	2-34
2.9.7	Maritime Dune Scrub.....	2-37
2.9.8	Maritime Dune Grassland.....	2-37
2.9.9	Interdune Swales and Ponds.....	2-38
2.9.10	Upper Beaches and Overwash Flats.....	2-38
2.9.11	Tidal Oligohaline Marsh.....	2-39
2.9.12	Coastal Plain Depression Wetlands.....	2-39
2.10	Fauna.....	2-40
2.10.1	Mammals.....	2-40
2.10.2	Marine Mammals.....	2-40
2.10.3	Birds.....	2-41
2.10.4	Fish.....	2-41
2.10.5	Reptiles and Amphibians.....	2-42
2.11	Rare, Threatened, and Endangered Species and Significant Ecological Communities.....	2-43
2.11.1	Piping Plover.....	2-47
2.11.2	Roseate Tern.....	2-48
2.11.3	Rufa Red Knot.....	2-49
2.11.4	Northern Long-eared Bat.....	2-50
2.11.5	Atlantic Sturgeon.....	2-51
2.11.6	Sea Turtles.....	2-52
2.11.7	Rusty-patched Bumble Bee.....	2-58
2.11.8	Yellow-banded Bumble Bee.....	2-59
2.12	Conservation Sites and Dune Protection Areas.....	2-59
3.0	PROGRAM COMPONENTS – JOINT EXPEDITIONARY BASE LITTLE CREEK....	3-1
3.1	Ecosystem Management.....	3-1
3.2	Land Management.....	3-2
3.2.1	Erosion and Sediment Control.....	3-2
3.2.2	Stormwater Quality.....	3-2
3.2.3	Coastal Zone Protection.....	3-3
3.2.4	Wetlands and Water Quality Protection.....	3-5
3.2.5	Floodplain Protection.....	3-6
3.2.6	Watershed Protection.....	3-6
3.3	Oil and Hazardous Substances.....	3-7
3.3.1	Oil and Hazardous Substance Spill Prevention and Protection.....	3-7
3.3.2	Oil and Hazardous Substance Spill Response.....	3-13
3.4	Urban Forestry Management.....	3-13
3.4.1	Beneficial Landscaping.....	3-14
3.4.2	Landscape Design and Installation.....	3-15

Table of Contents

3.4.3	Inventory and Maintenance	3-15
3.5	Wildlife and Marine Resources Management.....	3-15
3.5.1	Wildlife	3-16
3.5.2	Migratory Birds.....	3-18
3.5.3	Marine Resources Protection.....	3-25
3.5.4	Fisheries Management	3-27
3.5.5	Oyster Reef.....	3-28
3.6	Rare, Threatened, and Endangered Species Management.....	3-28
3.6.1	Federal and State Regulations.....	3-28
3.6.2	Rare, Threatened, and Endangered Species.....	3-29
3.7	Invasive Species and Pest Management	3-34
3.7.1	Invasive Plants and Wildlife.....	3-34
3.7.2	Pest Management.....	3-36
3.7.3	Feral Domestic Animals	3-36
3.7.4	Invasive Control Methods.....	3-39
3.7.5	Zika Virus	3-40
3.8	Habitat Conservation and Restoration	3-40
3.8.1	Dune Protection Area.....	3-40
3.8.2	Scout Island Special Interest Area	3-44
3.8.3	Heros Circle Nature Trail	3-44
3.8.4	Shoreline Protection and Restoration.....	3-45
3.9	Outdoor Recreation and Environmental Awareness.....	3-46
3.9.1	Outdoor Recreation.....	3-46
3.9.2	Environmental Awareness	3-49
3.10	Community Awareness.....	3-49
3.11	Cultural Resources Protection.....	3-50
3.12	Conservation Law Enforcement	3-50
4.0	NATURAL RESOURCES MANAGEMENT UNITS – JOINT EXPEDITIONARY BASE	
	LITTLE CREEK.....	4-1
4.1	Urban Areas Management Unit	4-1
4.1.1	Coastal Zone Protection.....	4-2
4.1.2	Wetland and Water Quality Protection	4-2
4.1.3	Oil and Hazardous Substance	4-5
4.1.4	Urban Forestry	4-5
4.1.5	Fish and Wildlife Management.....	4-6
4.1.6	Nuisance Wildlife	4-6
4.1.7	Outdoor Recreation and Environmental Awareness.....	4-7
4.1.8	Habitat Conservation and Restoration	4-7
4.1.9	Invasive Species and Pest Management	4-7
4.1.10	Cultural Resources Protection	4-8
4.1.11	Summary of Urban Areas Management Unit Actions.....	4-8
4.2	Natural Areas Management Unit	4-10
4.2.1	Coastal Zone Protection.....	4-10
4.2.2	Wetlands and Water Quality Protection	4-11
4.2.3	Urban Forestry	4-11
4.2.4	Fish and Wildlife Management.....	4-11
4.2.5	Nuisance Wildlife	4-12

Table of Contents

4.2.6	Outdoor Recreation and Environmental Awareness.....	4-12
4.2.7	Habitat Conservation and Restoration	4-12
4.2.8	Invasive Species Pest Management	4-13
4.2.9	Cultural Resources Protection	4-13
4.2.10	Summary of the Natural Areas Management Unit Actions	4-13
4.3	Beaches and Dunes Management Unit	4-15
4.3.1	Marine Resources Protection	4-15
4.3.2	Coastal Zone Protection	4-16
4.3.3	Wetlands and Water Quality Protection	4-16
4.3.4	Fish and Wildlife Management.....	4-17
4.3.5	Rare, Threatened, and Endangered Species Management	4-17
4.3.6	Habitat Conservation and Restoration	4-17
4.3.7	Outdoor Recreation and Environmental Awareness Management.....	4-18
4.3.8	Invasive Species and Pest Management	4-18
4.3.9	Summary of the Beaches and Dunes Management Unit Actions	4-18
5.0	EXISTING CONDITIONS – JOINT EXPEDITIONARY BASE FORT STORY	5-1
5.1	Location and Regional Settings	5-1
5.2	Military Mission.....	5-1
5.2.1	Historical Overview and Military Mission	5-1
5.2.2	Mission Impacts on the Environment	5-2
5.3	Overview of Natural Resources Management Program	5-9
5.3.1	Ecosystem Management	5-9
5.3.2	Marine Resources Protection	5-9
5.3.3	Chesapeake Bay Program	5-10
5.3.4	Land Management	5-10
5.3.5	Training Area Management.....	5-11
5.3.6	Wildlife and Fisheries Management.....	5-11
5.3.7	Rare, Threatened, and Endangered Species Mangement.....	5-11
5.3.8	Habitat Conservation and Restoration	5-12
5.3.9	Outdoor Recreation.....	5-12
5.3.10	Community Awareness.....	5-12
5.3.11	Cultural Resources Protection	5-13
5.3.12	Pest Management.....	5-13
5.4	Constraints and Opportunities.....	5-14
5.5	Climate.....	5-14
5.5.1	Climate Change.....	5-15
5.6	Physiography and Soils.....	5-16
5.7	Hydrology	5-19
5.7.1	Surface Water	5-21
5.7.2	Groundwater	5-21
5.7.3	Watersheds.....	5-22
5.7.4	Floodplains	5-22
5.7.5	Wetlands	5-24
5.7.6	Nearshore Environments.....	5-25
5.8	Environmental Cleanup Program.....	5-26
5.8.1	Environmental Restoration Program Sites.....	5-26
5.8.2	Military Munitions Response Program.....	5-26

Table of Contents

5.9	Flora	5-29
5.9.1	Maritime Forest	5-29
5.9.2	Forested Wetland	5-29
5.9.3	Sand Beach/Dune.....	5-29
5.9.4	Aquatic Habitat.....	5-30
5.9.5	Developed Areas.....	5-30
5.9.6	Invasive Plant Species	5-31
5.10	Fauna.....	5-31
5.10.1	Mammals	5-32
5.10.2	Marine Mammals.....	5-32
5.10.3	Birds.....	5-33
5.10.4	Fish	5-33
5.10.5	Reptiles and Amphibians	5-34
5.11	Rare, Threatened, and Endangered Species and Significant Ecological Communities	5-34
5.11.1	Piping Plover	5-37
5.11.2	Roseate Tern	5-38
5.11.3	Rufa Red Knot	5-39
5.11.4	Northern Long-eared Bat	5-40
5.11.5	Atlantic Sturgeon	5-41
5.11.6	Sea Turtles	5-42
5.11.7	Rusty-patched Bumble Bee	5-48
5.11.8	Yellow-banded Bumble Bee.....	5-49
5.12	Conservation Sites and Dune Protection Areas	5-50
6.0	PROGRAM COMPONENTS – JOINT EXPEDITIONARY BASE FORT STORY	6-1
6.1	Ecosystem Management	6-1
6.2	Land Management	6-2
6.2.1	Erosion and Sedimentation.....	6-2
6.2.2	Stormwater Management.....	6-2
6.2.3	Coastal Zone Protection and Climate Change	6-2
6.2.4	Wetlands and Water Quality Protection	6-4
6.2.5	Floodplains Management.....	6-6
6.3	Training Area Management	6-6
6.4	Urban Forestry	6-6
6.4.1	Beneficial Landscaping.....	6-6
6.4.2	Landscape Design and Installation	6-7
6.4.3	Inventory and Maintenance	6-7
6.5	Wildlife and Marine Resources Management.....	6-8
6.5.1	Wildlife	6-9
6.5.2	Migratory Birds.....	6-11
6.5.3	Marine Resources Protection	6-12
6.5.4	Fisheries Management	6-15
6.6	Rare, Threatened, and Endangered Species Management	6-15
6.6.1	Federal and State Regulations.....	6-15
6.6.2	Rare, Threatened, and Endangered Species.....	6-16
6.7	Invasive Species and Pest Management	6-21
6.7.1	Invasive Plant and Wildlife Species	6-22

Table of Contents

6.7.2	Pest Management.....	6-28
6.7.3	Feral Domestic Animals	6-28
6.7.4	Invasive Control Methods.....	6-28
6.7.5	Zika Virus	6-29
6.8	Habitat Conservation and Restoration	6-29
6.8.1	Dune Protection Area.....	6-30
6.8.2	Interior Dunes and Wetlands Conservation Site Area	6-31
6.8.3	East Gate Lake Conservation Site Area.....	6-31
6.9	Outdoor Recreation and Environmental Awareness.....	6-31
6.9.1	Outdoor Recreation.....	6-31
6.9.2	Environmental Awareness	6-32
6.10	Community Awareness.....	6-33
6.11	Cultural Resources Protection.....	6-34
6.12	Conservation Law Enforcement	6-34
7.0	NATURAL RESOURCES MANAGEMENT UNITS – JOINT EXPEDITIONARY BASE FORT STORY	7-1
7.1	Urban and Training Areas Management Unit.....	7-2
7.1.1	Land Management	7-2
7.1.2	Urban Forestry Management	7-6
7.1.3	Habitat Conservation and Restoration Management	7-7
7.1.4	Cultural Resources Management	7-7
7.1.5	Nuisance Wildlife	7-7
7.1.6	Invasive Species and Pest Management	7-8
7.1.7	Summary of Urban and Training Areas Management Objective	7-8
7.2	Natural Areas Management Unit	7-10
7.2.1	Land Management	7-10
7.2.2	Wildlife and Fisheries Management	7-10
7.2.3	Rare, Threatened, and Endangered Species Management	7-11
7.2.4	Nuisance Wildlife	7-13
7.2.5	Outdoor Recreation and Environmental Awareness Management	7-13
7.2.6	Invasive Species and Pest Management	7-14
7.2.7	Summary of Natural Areas Management Objective	7-14
7.3	Beaches and Dunes Management Unit	7-17
7.3.1	Marine Resources Management.....	7-17
7.3.2	Land Management	7-18
7.3.3	Wildlife and Fisheries Management.....	7-19
7.3.4	Rare, Threatened, and Endangered Species Management	7-19
7.3.5	Habitat Conservation and Restoration Management	7-19
7.3.6	Outdoor Recreation and Environmental Awareness Management	7-20
7.3.7	Invasive Species and Pest Management	7-21
7.3.8	Summary of Beaches and Dunes Management Objective	7-21
8.0	ENVIRONMENTAL MANAGEMENT STRATEGY, INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN IMPLEMENTATION, AND MISSION SUSTAINABILITY – JOINT EXPEDITIONARY BASE LITTLE CREEK – FORT STORY	8-1
8.1	Supporting Sustainability of the Military Mission and the Natural Environment ..	8-1

Table of Contents

8.1.1 Integrated Military Mission and Sustainable Use 8-1

8.1.2 Define Impact to Military Mission 8-2

8.1.3 Relationship to Other Operational Management Plans..... 8-2

8.2 Natural Resources Consultation Requirements 8-2

8.3 Achieving No Net Loss..... 8-5

8.4 National Environmental Policy Act Compliance..... 8-5

8.5 Project Development and Classification 8-7

8.5.1 Programming and Budgeting Classification 8-8

8.5.2 Project Classification 8-9

8.6 Funding Source 8-11

8.6.1 Operations and Maintenance, Navy Environmental Funds 8-11

8.6.2 Sikes Act Revenues 8-11

8.6.3 The Legacy Resource Management Program 8-11

8.6.4 Navy Forestry Revenues 8-12

8.6.5 Agriculture Outleases 8-13

8.6.6 Recycling Funds 8-13

8.6.7 Strategic Environmental Research and Development Funds 8-13

8.6.8 Non-Department of Defense Funds 8-13

8.7 Commitment 8-14

8.8 Use of Cooperative Agreements 8-14

8.9 Project Implementation Schedule 8-14

9.0 MANAGEMENT RECOMMENDATIONS – JOINT EXPEDITIONARY BASE LITTLE CREEK – FORT STORY 9-1

9.1 Joint Expeditionary Base Little Creek Management Recommendations 9-1

9.1.1 Environmental Readiness Level 4: Environmental Compliance 9-1

9.1.2 Environmental Readiness Level 3: Navy Pro-Active Involvement 9-3

9.1.3 Environmental Readiness Level 2: Navy or Department of Defense Policy Requirement..... 9-4

9.1.4 Environmental Readiness Level 1: Navy Environmental Stewardship 9-5

9.2 Joint Expeditionary Base Fort Story Management Recommendations 9-5

9.2.1 Environmental Readiness Level 4: Environmental Compliance 9-6

9.2.2 Environmental Readiness Level 3: Navy Pro-Active Involvement 9-7

9.2.3 Environmental Readiness Level 2: Navy or Department of Defense Policy Requirement..... 9-8

9.2.4 Environmental Readiness Level 1: Navy Environmental Stewardship 9-8

10.0 REFERENCES..... 10-1

APPENDIXES

Appendix A JEB Little Creek and JEB Fort Story Natural Resources Project Implementation Schedules

Appendix B Cross-Reference of INRMP to DoD INRMP Template

Appendix C National Environment Policy Act Documentation

Appendix D Agency Correspondence

Table of Contents

Appendix E	Chesapeake Bay Agreements and Documents
Appendix F	Wetlands Jurisdictional Determination, Permits, and Mitigation Plan
Appendix G	Flora and Fauna Lists
Appendix H	JEB Little Creek Raptor Management Plan
Appendix I	Native Plants for Virginia Coastal Plain
Appendix J	Migratory Birds Management
Appendix K	Policy Letter Preventing Feral Cat and Dog Populations on Navy Property
Appendix L	Marine Mammal and Sea Turtle Management
Appendix M	Fort Story Historic Determination of Eligibility Notification (2003)
Appendix N	Invasive Species Management Plan for JEB Fort Story

FIGURES

<u>Figure Number</u>	<u>Page</u>
2-1. GENERAL LOCATION OF JEB LITTLE CREEK	2-3
2-2. TRAINING FACILITIES OF JEB LITTLE CREEK.....	2-7
2-3. ELEVATION CONTOURS OF JEB LITTLE CREEK	2-13
2-4. SOILS OF JEB LITTLE CREEK	2-15
2-5. AQUATIC RESOURCES OF JEB LITTLE CREEK	2-21
2-6. FLOOD ZONES OF JEB LITTLE CREEK	2-25
2-7. ERP SITES OF JEB LITTLE CREEK	2-31
2-8. ECOLOGICAL COMMUNITIES OF JEB LITTLE CREEK.....	2-35
2-9. STATE RARE SPECIES LOCATIONS OF JEB LITTLE CREEK	2-45
3-1. RIPARIAN FOREST BUFFERS OF JEB LITTLE CREEK	3-9
3-2. REGIONAL ENVIRONMENTALLY SENSITIVE RESOURCES	3-11
3-3. NEST BOX AND FROG/TOAD SURVEY LOCATIONS OF JEB LITTLE CREEK.....	3-21
3-4. INVASIVE AND NONNATIVE PLANT LOCATIONS OF JEB LITTLE CREEK.	3-37
3-5. SPECIAL INTEREST AREAS OF JEB LITTLE CREEK.	3-41
3-6. EXISTING SHORELINE MANAGEMENT STRUCTURES OF JEB LITTLE CREEK.	3-47
4-1. NATURAL RESOURCES MANAGEMENT UNITS OF JEB LITTLE CREEK.....	4-3
5-1. VICINITY MAP OF JEB FORT STORY	5-3
5-2. INSTALLATION MAP OF JEB FORT STORY	5-5

Table of Contents

5-3. TRAINING AREAS OF JEB FORT STORY	5-7
5-4. SOILS OF JEB FORT STORY	5-19
5-5. AQUATIC RESOURCES OF JEB FORT STORY	5-23
5-6. ENVIRONMENTAL RESTORATION PROGRAM SITES OF JEB FORT STORY ...	5-27
5-7. CONSERVATION SITE AND DUNE PROTECTION AREAS OF JEB FORT STORY	5-51
5-8. DUNE PROTECTION AREA AND SPECIAL STATUS SPECIES LOCATIONS.....	5-53
6-1. STATE RARE SPECIES LOCATIONS OF JEB FORT STORY	6-23
6-2. INVASIVE AND NONNATIVE PLANT LOCATIONS OF JEB FORT STORY	6-25
6-3. HISTORIC DISTRICT OF JEB FORT STORY	6-35
7-1. NATURAL RESOURCES MANAGEMENT UNITS OF JEB FORT STORY	7-3

TABLES

<u>Table Number</u>	<u>Page</u>
1-1 STAKEHOLDERS OF JEB LITTLE CREEK – FORT STORY NATURAL RESOURCES.....	1-4
1-2 NATURAL RESOURCES TRAINING OPPORTUNITIES.	1-7
2-1 WEATHER DATA RECORDED AT NORFOLK INTERNATIONAL AIRPORT, 1946–2016.....	2-10
2-2 GENERAL CHARACTERISTICS OF JEB LITTLE CREEK SOILS.	2-17
2-3 JEB LITTLE CREEK STREAMS, CHANNELS, AND DITCHES.	2-20
2-4 JEB LITTLE CREEK PONDS AND LAKES.....	2-23
2-5 JEB LITTLE CREEK WETLANDS.....	2-27
2-6 STATE RARE SPECIES AND NATURAL COMMUNITIES OCCURRING AT JEB LITTLE CREEK.....	2-44
2-7 PIPING PLOVER CHARACTERISTICS.....	2-47
2-8 ROSEATE TERN CHARACTERISTICS.....	2-48
2-9 RUFA RED KNOT CHARACTERISTICS.....	2-49
2-10 NORTHERN LONG-EARED BAT CHARACTERISTICS.....	2-50
2-11 FEDERALLY LISTED SEA TURTLE SPECIES.	2-52
2-12 KEMP’S RIDLEY SEA TURTLE CHARACTERISTICS.	2-53
2-13 LOGGERHEAD SEA TURTLE CHARACTERISTICS.	2-54
2-14 LEATHERBACK SEA TURTLE CHARACTERISTICS.	2-55

Table of Contents

2-15	GREEN SEA TURTLE CHARACTERISTICS.	2-56
2-16	HAWKSBILL SEA TURTLE CHARACTERISTICS.	2-57
4-1	JEB LITTLE CREEK NATURAL RESOURCES MANAGEMENT UNITS.....	4-1
5-1.	WEATHER DATA RECORDED AT NORFOLK INTERNATIONAL AIRPORT, 1946–2016.	5-15
5-2	GENERAL CHARACTERISTICS OF JEB FORT STORY SOILS.....	5-18
5-3	AQUIFERS LOCATED IN THE JEB FORT STORY VICINITY.....	5-22
5-4	STATE RARE SPECIES AND NATURAL COMMUNITIES OCCURRING AT JEB FORT STORY.....	5-35
5-5	PIPING PLOVER CHARACTERISTICS.....	5-37
5-6	ROSEATE TERN CHARACTERISTICS.....	5-38
5-7	RUFA RED KNOT CHARACTERISTICS.....	5-39
5-8	NORTHERN LONG-EARED BAT CHARACTERISTICS.....	5-40
5-9	FEDERALLY LISTED SEA TURTLE SPECIES.	5-42
5-10	KEMP’S RIDLEY SEA TURTLE CHARACTERISTICS.	5-43
5-11	LOGGERHEAD SEA TURTLE CHARACTERISTICS.	5-44
5-12	LEATHERBACK SEA TURTLE CHARACTERISTICS.	5-45
5-13	GREEN SEA TURTLE CHARACTERISTICS.	5-46
5-14	HAWKSBILL SEA TURTLE CHARACTERISTICS.	5-47
7-1	JEB FORT STORY NATURAL RESOURCES MANAGEMENT UNITS.....	7-1

ACRONYMS AND ABBREVIATIONS

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
%	percent
ac	acre(s)
ANSI	American National Standards Institute
Army	Department of the Army
BBNWR	Back Bay National Wildlife Refuge
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BO	Biological Opinion
CBP	Chesapeake Bay Program
CBPAO	Chesapeake Bay Preservation Area Ordinance
CCD	Coastal Consistency Determination
CDO	Command Duty Officer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH2M	CH2M HILL, Inc.
cm	centimeter(s)
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRMA	Commander, Navy Region Mid-Atlantic
CRM	Cultural Resources Manager
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DoD	Department of Defense
DoDI	DoD Instruction
DOI	Department of the Interior
DPA	Dune Protection Area
DPS	distinct population segment
EA	Environmental Assessment
EFH	essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order

EPR-web	environmental program requirements network
ERL	Environmental Readiness Level
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAC	Federal Agencies Committee
FFA	Federal Facilities Agreement
FONSI	finding of no significant impact
FR	Federal Register
ft ²	square foot (feet)
FY	fiscal year
GIS	geographic information system
GPS	global positioning system
ha	hectare(s)
INRMP	Integrated Natural Resources Management Plan
IPM	integrated pest management
IPMP	Integrated Pest Management Plan
JEB	Joint Expeditionary Base
JEBLCFS	Joint Expeditionary Base Little Creek – Fort Story
JLOTS	Joint Logistics Over-The-Shore
km	kilometer(s)
km ²	square kilometer(s)
LCAC	landing craft air cushion
Legacy	Legacy Resource Management Program
m	meter(s)
m ²	square meter(s)
MBTA	Migratory Bird Treaty Act
MC	munitions constituents
mi	mile(s)
mi ²	square mile(s)
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOU	memorandum of understanding
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MWR	Morale, Welfare, and Recreation
NAS	Naval Air Station

NAVFAC	Naval Facilities Engineering Command
NAVPHIBASE	Naval Amphibious Base
NAVFAC MIDLANT	Naval Facilities Engineering Command Mid-Atlantic
Navy	Department of the Navy
n.d.	no date
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRM	Natural Resources Manager
NASO-DNA	Naval Air Station Oceana Dam Neck Annex
NTU	nephelometric turbidity unit
NWP	Nationwide Permit
O&MN	Operations and Maintenance, Navy
ODCP	Oil Discharge Contingency Plan
OHS	oil and hazardous substances
OPNAVINST	Chief of Naval Operations Operating Instruction
OSD	Office of the Secretary of Defense
PMD	Preventive Medicine Department
PT	Physical Training
PWD	Public Works Department
QRP	Qualified Recycling Program
RHPO	Regional Historic Preservation Officer
RSIP	Regional Shore Infrastructure Plan
SAV	submerged aquatic vegetation
SATEC	Small Arms Test and Evaluation Compound
SEAL	Sea, Air, Land
SERDP	Strategic Environmental Research and Development Program
SHPO	State Historic Preservation Officer
Sikes Act	Sikes Act Improvement Act
SMP	Site Management Plan
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWAP	State Wildlife Action Plan

SWP3	Stormwater Pollution Prevention Plan
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USDA NRCS	United States Department of Agriculture Natural Resources Conservation Service
USDA SCS	United States Department of Agriculture Soil Conservation Service
USDA WS	United States Department of Agriculture Wildlife Service
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
USMC	United States Marine Corps
VAC	Virginia Administrative Code
VDCR	Virginia Department of Conservation and Recreation
VDCR-DNH	Virginia Department of Conservation and Recreation – Division of Natural Heritage
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDOF	Virginia Division of Forestry
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VPDES	Virginia Pollutant Discharge Elimination System

1.0 INTRODUCTION

1.1 Purpose and Authority

In accordance with 32 Code of Federal Regulations (CFR) Part 190, Department of Defense Instruction (DoDI) 4715.03, Chief of Naval Operations (CNO) Operating Instruction (OPNAVINST) 5090.1D, Naval Facilities Engineering Command (NAVFAC) Real Estate Operations and Natural Resources Management Procedural Manual 73, and the Sikes Act Improvement Act of 1997 (16 United States Code [USC] §670a-f) (Sikes Act), the Department of the Navy (Navy) must implement and maintain a balanced and integrated program for the management of natural resources. To facilitate the natural resources management program, the Secretary of the Navy is further directed to prepare and implement an Integrated Natural Resources Management Plan (INRMP) for each military installation that has suitable natural resources. The INRMP must ensure that natural resources management practices comply with all pertinent laws and regulations and, in accordance with Navy policy, must incorporate ecosystem management as the basis for planning and management. In addition, the Sikes Act requires the INRMP to be prepared in cooperation with the Secretary of the Department of the Interior (DOI), acting through the Director of the United States Fish and Wildlife Service (USFWS), and the head of the Virginia Department of Game and Inland Fisheries (VDGIF). The INRMP must reflect the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources. Such mutual agreement and cooperation will support the principles of ecosystem management by improving the management of ecosystems that cross federal, state, and private boundaries. Under the Sikes Act, including all amendments, all new INRMPs must also be submitted for public review and comment before final acceptance. To fulfill this requirement, National Environmental Policy Act (NEPA) documentation has been prepared for the INRMP and is presented in **Appendix C**. Federal and state agency correspondence is included in **Appendix D**, and mutual agreement letters will be inserted into **Appendix D** upon receipt. The information included in this INRMP update does not represent a significant change, and does not require additional environmental review beyond what was covered by the Environmental Assessment (EA) prepared for the 2005–2009 INRMP for Little Creek and the Fort Story EA prepared for the 2004–2008 INRMP.

1.2 Scope

An INRMP's scope comprises all lands, ranges, nearshore areas, and leased areas: (1) owned by the United States (U.S.) Government and administered by the Navy; (2) used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility; or (3) withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility (Department of the Navy 2006).

This INRMP outlines conservation efforts and establishes procedures to ensure compliance with related environmental laws and regulations for the five-year INRMP implementation period. Development of this INRMP includes input from state and federal stakeholders. As required under the Sikes Act, this INRMP reflects mutual agreement of agencies concerned with the conservation, protection, and management of fish and wildlife resources, including the USFWS and the VDGIF. This INRMP provides the direction for natural resources management at Joint Expeditionary Base Little Creek – Fort Story (JEBLCFS); however, it does not replace or affect any federal laws or state responsibility and authority for protecting fish and wildlife resources (JEB Little Creek or

JEB Fort Story for specific sections, with “Installation” in reference to location of a particular section. **Sections 2 through 4** are in reference to JEB Little Creek, and **Sections 5 through 7** are in reference to JEB Fort Story).

JEBLCFS does not have any leased properties or agricultural outleases, and as such, this INRMP does not cover management of leased areas.

1.3 Objectives

The objectives of this INRMP are to ensure natural resources are managed in accordance with federal and state regulations and Navy policies and that environmental considerations are integrated with planning activities at JEBLCFS.

This INRMP is a long-term planning document that guides implementation of the natural resources management program in a manner that supports the Installation mission, while protecting and enhancing natural resources and providing a variety of outdoor recreational opportunities for Installation personnel. In accordance with 32 CFR 190, the Sikes Act, and OPNAVINST 5090.1D, this plan must provide for the following:

- Management of fish and wildlife, land, and forest resources
- Identification of fish- and wildlife-oriented recreational use activities and areas
- Enhancement or modification of fish and wildlife habitat
- Protection, enhancement, and restoration of wetlands where necessary for support of fish, wildlife, or plants
- Integration of, and consistency among, the various activities conducted under the INRMP
- Establishment of specific natural resources management goals and objectives, and time frames for proposed actions
- Sustainable use of natural resources by the public, consistent with the needs of fish and wildlife management and subject to Installation safety and security requirements
- Enforcement of natural resources laws and regulations
- Achieve no net loss in the capability of military lands to support the military mission of the Installation
- Annual review of this INRMP and its effects, and updated every five years if necessary as determined from the formal review

1.4 Responsibilities

The Sikes Act requires qualified professionals to implement environmental management programs. Implementation and management of the JEBLCFS INRMP is the responsibility of the JEBLCFS Commander. However, implementation of the INRMP at JEBLCFS is also the responsibility of all natural resources personnel at the Installation, including: the JEBLCFS Environmental Director, the Installation Natural Resources Manager (NRM), and the NAVFAC Mid-Atlantic (MIDLANT) Regional Natural Resources staff. The Commander has delegated the authority to the Environmental Director within the Environmental Division to implement natural resources management activities through the Installation’s natural resources staff. Other Installation personnel, such as security, grounds maintenance, Morale, Welfare, and Recreation

(MWR), housing, and safety, have functions overlapping the natural resources program. The NAVFAC MIDLANT Regional NRM also assists with natural resources management for Installations in the Mid-Atlantic Region, including JEBLCFS.

The Installation Commander’s Environmental Policy (Department of the Navy 2016a) has made certain commitments that include, but are not limited to:

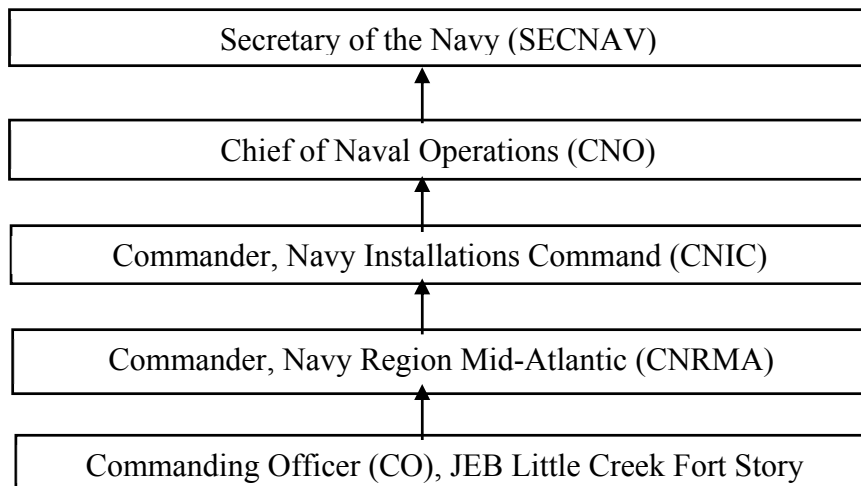
- Compliance with federal, state, and local environmental laws, regulations, and policies
- Pollution prevention at its source whenever possible
- Continual improvement of the Installation’s environmental performance

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

1.4.1 Installation Stakeholders

The organization chart (**Figure 1-1**) illustrates the Navy chain of command for JEBLCFS. OPNAVINST 5090.1D. **Section 1.4** provides a detailed description of environmental responsibilities associated with different positions within the Navy. To implement the INRMP while ensuring successful accomplishment of the military mission, the Commander, Navy Region Mid-Atlantic (CNRMA), acts as a trustee for JEBLCFS. At the Installation level, the JEBLCFS Commander and the Installation NRM are directly involved in implementation of this INRMP, while ensuring successful implementation of the military mission. The JEBLCFS Commander is responsible for ensuring that JEBLCFS personnel comply with the laws and requirements relevant to the conservation and management of natural resources. The NRM is responsible for the daily implementation and coordination of the INRMP, as well as ensuring this INRMP is reviewed annually and updated as necessary to reflect current natural resources conditions, and formally reviewed and updated every five years as required by the Sikes Act. The Regional NRM provides additional assistance to the Installation NRM for implementation of the INRMP.

Figure 1-1. Command Organization of JEB Little Creek – Fort Story.



Introduction

Although these positions hold the primary responsibilities, all personnel at the Installation—public works/civil engineering personnel, legal staff, the public affairs representative, the local fire department, and the waterfront security officers—play important roles in supporting the plans and objectives identified in this INRMP, including ensuring environmental compliance within military operations.

Other Installation stakeholders, including the Navy’s MWR Department, Environmental Division, Public Works Department (PWD), Navy contractors working at JEBLCFS and Installation commands are responsible for sustaining natural resources for economic and recreational purposes, and/or for management and protection. **Table 1-1** provides a list of stakeholders currently involved with natural resources management at JEBLCFS.

1.4.2 External Stakeholders

State and federal agencies, including the USFWS, VDGIF, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE) are the primary external stakeholders responsible for natural resources protection and preservation. The Sikes Act requires that this INRMP be prepared in cooperation with, and reflect mutual agreement of the USFWS and the VDGIF. This requirement affords them signatory authority as external stakeholders and approving officials of this INRMP. Cooperation and coordination with these agencies is an integral part of the Navy’s natural resources program.

Table 1-1. Stakeholders of JEB Little Creek – Fort Story Natural Resources.

Navy	
NAVFAC MIDLANT	Commander, JEBLCFS
JEBLCFS Environmental Division	Major Shore Commands of JEBLCFS
MWR Department	Navy Personnel
Federal, State, and Local Agencies	
USFWS	VDGIF
U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS)	USDA Wildlife Services (USDA WS)
U.S. Geological Survey (USGS)	USEPA
USACE	City of Virginia Beach
Virginia Beach County	
Non-Governmental Organizations and Individuals	
Department of Defense (DoD) Partners in Flight	Military Retirees
The Nature Conservancy of Virginia	Dependents of Navy Personnel
National Audubon Society	Virginia Native Plant Society
Virginia Institute of Marine Science (VIMS)	

Other external stakeholders for natural resources management at JEB Little Creek – Fort Story include: non-governmental organizations (NGOs), civilian groups, private conservation organizations, and individuals including residents of the surrounding communities who have access to, or are affected by, the condition of JEBLCFS natural resources.

JEBLCFS has established several partnerships with government agencies and NGOs. These are described in **Section 1.10** (Beneficial Partnership and Collaborative Resource Planning).

1.4.3 Technical Assistance

Technical assistance to implement this INRMP may be provided to the Commander and NRM from the Navy or by outside agencies. Assistance from outside agencies is normally provided through individual agency requests and formal cooperative agreements, whereas assistance from within the Navy is normally less formal. During the five-year management period of this INRMP, additional cooperative agreements may be implemented. Technical assistance from organizations outside the Navy may include USFWS, VDGIF, USDA NRCS, USDA Forest Service, USDA WS, and The Nature Conservancy. Technical assistance from within the Navy may be provided by staff from the JEBLCFS Environmental Division, NAVFAC biologists, foresters, soil scientists, and additional natural resource-based staff. Installation staffing responsible for the implementation of the INRMP is influenced by need, and subject to funding availability. Options for supplemental labor resources outside the Navy for implementation of this INRMP include volunteers from local organizations, and students from local schools, universities, and conservation groups. Options for supplemental labor resources would also be available from volunteer civilian and military personnel, and their dependents.

1.5 Compliance and Stewardship

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

Stewardship is an important component to the Navy Environmental Readiness Program, and requires the need to inventory, manage, conserve, protect, and enhance the natural resources in a way that respects the intrinsic value of those resources for the needs of present and future generations (OPNAVINST 5090.1D).

Conscious and active concern for the inherent value of natural resources must be considered in all Navy plans, actions, and programs (OPNAVINST 5090.1D). Installations are required to recognize and balance environmental stewardship with mission operations in retaining control and use of Navy land, sea, and air space for the purpose of maintaining the military mission. Stewardship projects and programs enhance the integrity of the Installation's natural resources, promotes proactive conservation measures, and supports investments that demonstrate Navy environmental leadership. Examples include education and public awareness projects, biological surveys, habitat protection for non-listed species, and execution of conservation-oriented partnership programs. Because stewardship projects can occur on an indefinite time-scale, these projects are prioritized after compliance projects.

1.6 Encroachment and Adjacent Land Use

The Department of Defense (DoD) has established an Encroachment Partnering program, which was authorized under 10 USC §2684a (Agreements to Limit Encroachments and other Constraints

on Military Training, Testing and Operations), and authorizes military services to enter into cost-sharing partnerships with states, their political subdivisions, and/or conservation-minded NGOs to acquire lands from willing sellers. This serves to limit development or use of the acquired property, or preservation of habitat that supports military readiness requirements. Undeveloped habitat areas that border JEBLCFS present ideal opportunities for the Navy to establish buffers to separate the Installation from encroaching development.

The DoD Readiness and Environmental Protection Initiative supports cost-sharing partnerships authorized by Congress (10 USC §2684a), between the military services, private conservation groups, and state and local governments to protect military test and training capabilities and conserve land (DoD Sustainable Ranges Initiative n.d.). This initiative enables the military to work with willing partners who help provide cost-sharing land conservation solutions to limit incompatible development and protect valuable open spaces and habitat around key test and training areas. The DoD Readiness and Environmental Protection Initiative provides funding for the military to work with state and local governments, NGOs, and willing land owners to help prevent encroachment. Successful projects have resulted in the expansion of easements and the preservation of land around DoD installations (DoD 2012a).

The City of Virginia Beach adopted a comprehensive plan in December 2009 that outlines how the physical development of the City of Virginia Beach should be directed for at least the next 20 years. As a primary employer in the City of Virginia Beach, the Navy has played an important role in the development of the city. It is critical that Navy representatives continue to participate in the joint decision-making process to ensure continued compatible land use around the numerous naval stations in the Virginia Beach region (City of Virginia Beach 2009). JEBLCFS has been successful in working with local, state, and federal authorities to deconflict encroachments and operational impediments that could impact military readiness (Secretary of Veteran Affairs and Homeland Security, no date [n.d.]).

1.7 Training and Natural Resources Personnel

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

The management of natural resources requires a specialized skill set on the part of personnel. In addition to holding science-based degrees, environmental personnel acquire skills by attending training through the Civil Engineer Corps Officers School, the Shipley Group, USFWS (National Conservation Training Center), USACE, The Wetland Institute, various university programs and Defense Environmental Network and Information Exchange. **Table 1-2** lists contact information for available training.

Table 1-2. Natural Resources Training Opportunities.

U.S. Government, DoD
<p>Defense Environmental Network and Information Exchange Training and Education Website: https://www.denix.osd.mil/conferences/</p>
<p>Navy Civil Engineer Corps Officers School Environmental Training Program 3502 Goodspeed Street, Suite 1 Port Hueneme, CA 93043-4336 Tel: 805-982-2895 DSN: 551-2895 Fax: 805-982-2918 Website: https://www.netc.navy.mil/centers/csfe/cecos/</p>
<p>Armed Forces Pest Management Board Training and Certification Website: http://www.afpmb.org/pubs/courses/courses.htm</p>
<p>United States Army Corps of Engineers Professional Development Support Center 550 Sparkman Drive; Huntsville, AL 35816 Tel: 256-895-7401 Fax: 256-895-7465 Website: http://pdsc.usace.army.mil/</p>
U.S. Government, non-DoD
<p>United States Fish and Wildlife Service National Conservation Training Center Route 1, Box 166; Shepherdstown, WV 25440 Division of Training Tel: 304-876-7472 Aquatic Resources Tel: 304-876-7445 Environmental Conservation Tel: 304-876-7475 Wildlife Tel: 304-876-7434 Technical (e.g., geographic information system [GIS]) Tel: 304-876-7456 Website: http://training.fws.gov/</p>
NGOs
<p>Wetland Training Institute, Inc. P.O. Box 31; Glennwood, NM 88039 Tel and Fax: 877-792-6482 Website: http://www.wetlandtraining.com/</p>
<p>The Shipley Group P.O. Box 908; Farmington, UT 84025 Tel: 888-270-2157 Website: http://www.shipleygroup.com</p>

Table 1-2. Natural Resources Training Opportunities.

Universities
Duke University Nicholas School of the Environment Box 90328; Durham, NC 27708-0328 Tel: 919-613-8082 Fax: 919-684-8741 Website: https://nicholas.duke.edu/
University of Wisconsin–Madison Gaylor Nelson Institute for Environmental Studies Science Hall, 550 North Park Street; Madison, WI 53706-1491 Tel: 608-263-1796 Website: http://www.nelson.wisc.edu/

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

1.8 Geographic Information System Management, Data Integration, Access, and Reporting

Geographic information system (GIS) management is an integral part of natural resources and environmental protection and planning. The CNRMA GeoReadiness Center is the single, authoritative source and distribution point for all geospatial information within the area of responsibility of the Navy Mid-Atlantic Region and is managed by the NAVFAC MIDLANT GIS Division. The GeoReadiness Center houses the most current geospatial information (including aerial photography) for the entire Navy Mid-Atlantic Region and provides access to the comprehensive data set and analysis tools to Regional and DoD decision makers/managers, sponsored contractors, and other sponsored individuals via a secure government Internet site. GIS data for JEBLCFS, including the environmental layers used for the development of this INRMP, can be accessed through the portal at:

<https://maps.navfac.navy.mil/RSIMS/MapView/Default.aspx?MapID=12975>

Baseline environmental data layers used to develop the figures for this INRMP include:

- Installation boundary and site details
- Installation training facilities
- Topography
- Soils

Introduction

- Aquatic resources
- Flood zones
- Ecological communities
- Rare, threatened, and endangered species and their habitats
- Regional environmentally sensitive resources
- Conservation site areas, including areas devoted to outdoor recreation
- Invasive and nonnative plant locations
 - State rare species locations
 - Riparian forest buffers
 - Regional environmentally sensitive resources
 - Nest box and frog/toad survey locations
 - Existing and proposed shoreline stabilization structures
 - Natural resources management units

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

1.9 Environmental Planning

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

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

A summary of laws relevant to natural resources management on Navy lands is located in OPNAVINST 5090.1D Ch-12 and at the Defense Environmental Network and Information Exchange website

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

- NEPA, 42 USC §4231 et seq.
- Sikes Act, 16 USC §670a-670o
- Clean Air Act, 42 USC §7401 et seq.
- Clean Water Act (CWA), 33 USC §1251-1387
- Migratory Bird Treaty Act (MBTA), 16 USC §703-712
- Coastal Zone Management Act (CZMA), 16 USC §1451 et seq.
- Endangered Species Act (ESA), 16 USC §1531 et seq.

1.10 Beneficial Partnership and Collaborative Resource Planning

Partnerships with federal, state, and local governments, and NGOs are one of the most valuable resources available to support the natural resources management program at JEBLCFS. The diversity of natural resources at JEBLCFS require a variety of expertise and assistance to accomplish established goals and objectives. Developing partnerships fosters good relationships and allows volunteers to become involved with local natural resources management activities. Partnering opportunities associated with implementation of this INRMP have been identified for the following organizations:

- Federal or state agency personnel (USFWS, USDA NRCS, National Oceanic and Atmospheric Administration [NOAA], USEPA, NOAA Fisheries, VDGIF)
- Virginia Beach and Norfolk Cities
- Local colleges and universities
- Local civilian volunteers (i.e., Student Conservation Association, Boy/Girl Scouts, and National Audubon Society)

1.11 State Wildlife Action Plan

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

The Virginia State Wildlife Action Plan (SWAP) was adopted in 2005. This SWAP includes an evaluation of the location and relative abundance of wildlife and the habitat required to support these species; an assessment of problems facing Virginia species and habitats; recommended conservation actions to address these problems; research and survey needs; and monitoring program and needs (VDGIF 2005).

The SWAP identified 925 species of greatest conservation need in Virginia, 60 percent of which are aquatic, 70 percent of which are invertebrates. These species are further grouped into four tiers of relative conservation need: critical (I), very high (II), high (III), and moderate (IV). The SWAP identifies the six ecoregions of Virginia, and identifies species for each ecoregion that are of greatest conservation need, outlines their life history, location and relative condition of habitat, specific threats and trends, conservation actions and strategies, and research and monitoring needs (VDGIF 2005). Natural resources management strategies and recommendations included in this INRMP also satisfy the goals and objectives of the Virginia SWAP in conserving the state's natural resources for future generations.

1.12 Chesapeake Bay Program

The Chesapeake Bay Program (CBP) established the Federal Agencies Committee (FAC) in 1984 which is chaired by the Director of the USEPA's CBP Office. The committee is composed primarily of representatives of federal agencies that own land in the watershed and/or have missions that impact the water quality or living resources of the Chesapeake Bay and its tributaries. FAC's mission is to enhance the coordinated federal stewardship of the Chesapeake Bay watershed, leading by example and guiding with ecosystem-based science. To date, 15 federal agencies have formal agreements with the USEPA, which have made them partners in the CBP.

The DoD is a signatory to the Cooperative Agreement between the DoD and USEPA Concerning Chesapeake Bay Activities (20 April 1990) and the Federal Agencies' Chesapeake Ecosystem Unified Plan Agreement (05 November 1998) (**Appendix E**). Executive Order (EO) 13508, *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* (12 May 2009), establishes a strategy to protect and restore the health, heritage, natural resources, and social and economic value of the Chesapeake Bay watershed. The strategy for restoring the Chesapeake Bay watershed includes sections on restoring clean water; conserving treasured places; restoring habitats, fish, and wildlife; and adapting to the impacts of climate change.

On 07 October 2005, the leaders of 17 federal agencies, including the DoD, signed the Resolution to Enhance Federal Cooperative Conservation in the CBP (**Appendix E**). They rededicated themselves to strengthen shared goals and performance measures within mutual strategic areas of Chesapeake Bay restoration under the Chesapeake 2000 agreement, cooperate with the Chesapeake Bay Watershed Assistance Network, convene an annual meeting of Federal Principles to advise the Executive Council, and broaden cooperative conservation and improve communication to enhance and integrate public and private watershed stewardship. Under this banner, the CBP and its partners developed the Chesapeake Action Plan in a 2008 report to the U.S. Congress. The purpose of the Chesapeake Action Plan is to strengthen and expand partnerships in the watershed, enhance coordination of restoration activities, and increase the collective accountability for protecting the Chesapeake Bay (USEPA 2008).

All military installations in the Chesapeake Bay watershed, including JEBLCFS, participate in the CBP. Although each installation conducts its own individual projects to benefit the Chesapeake Bay, the FAC meetings serve as a forum for the representatives to share their ideas and pursue joint projects and funding.

JEBLCFS is not regulated by the Chesapeake Bay Preservation Act, and local governments cannot formally designate Chesapeake Bay Preservation Areas (resource protection areas, resource management areas, or intensively developed areas) as described in the Chesapeake Bay Preservation Act on the Installation. However, the Navy attempts to demonstrate consistency with relevant pollution reduction goals that are the purpose for the Chesapeake Bay Preservation Act. In addition, the Navy must follow its own Low Impact Development Policy and Section 438 of the Energy Independence and Security Act of 2007 (Public Law 110-140) to control stormwater runoff and reduce environmental impacts from land disturbing activities. As well, the Navy is a signatory of the Chesapeake Bay Federal Facilities Agreement (FFA) and is committed to supporting the goals and initiatives to restore the Chesapeake Bay ecosystem. The Chesapeake Bay Preservation Act requires that all land use, development, and redevelopment within these areas meet performance criteria defined in the act (Chesapeake Bay Local Assistance Department 2002).

The Federal Chesapeake Bay Restoration Act of 2000 (33 USC §1267) provides further protection to the Chesapeake Bay watershed. This act made compliance with various Chesapeake Bay agreements mandatory by the DoD, including the 1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay, the 1998 Federal Agencies' Chesapeake Ecosystem Unified Plan, and the Chesapeake 2000 Agreement (**Appendix E**). These agreements identify goals and commitments aimed at the preservation and restoration of the Chesapeake Bay. Major goals of the Chesapeake Bay agreements are to:

- Reduce nutrient and toxin loads entering the bay
- Protect stream corridors

Introduction

- Enhance and protect wetlands
- Protect priority watersheds
- Identify and control invasive species on priority sites
- Expand conservation landscaping on federal facilities.

Appendix E contains the cooperative agreement between DoD and USEPA in regards to the Chesapeake Bay Agreement.

2.0 EXISTING CONDITIONS – JOINT EXPEDITIONARY BASE LITTLE CREEK

2.1 Location and Regional Setting

JEB Little Creek is located in the northwest corner of the City of Virginia Beach at the mouth of the Chesapeake Bay in the Tidewater area of Virginia. It encompasses approximately 2,380 acres (ac) (963.1 hectares [ha]), which includes the 470-ac (190-ha) Little Creek Harbor and over 2 miles (mi) (3.2 kilometers [km]) of shoreline along the bay. The Installation is bordered by the Chesapeake Bay to the north, Shore Drive to the south, Lake Bradford and Chubb Lake to the east, and the city limits of Norfolk to the west (**Figure 2-1**). The surrounding land area is primarily urban development, which includes residential, commercial, industrial, and recreational areas. Several other military installations including JEB Fort Story, Naval Air Station (NAS) Oceana, and the Fleet Combat Training Center Atlantic at NAS Oceana Dam Neck Annex are also located in the City of Virginia Beach. An additional remote training facility associated with JEB Little Creek is on Radio Island, North Carolina. Radio Island consists of a road and 10 ac (4 ha) of loading ramps used by the United States Marine Corps (USMC). No natural resources are present, and Radio Island is not included in the INRMP.

JEB Little Creek is ecologically significant to the region as it supports one of the few remaining tracts of undeveloped coastal dunes in the area. The Installation has 2.3 mi (3.7 km) of coastal primary and secondary sand dunes that support rare maritime forest plant communities and specimens of rare Virginia plants. Shorebirds and waterfowl also utilize these habitats.

2.2 Military Mission

2.2.1 Historical Overview and Military Mission

The development of JEB Little Creek began just prior to World War II with the purchase of a 500-ac (202-ha) tract of land known as “the Bradford Tract.” The land was in an area known as the Kempsville District of Princess Anne County. Included in the purchase was a section of the New York, Philadelphia, and Norfolk Railroad property, which contained a channel that passed through Little Creek Harbor into the Chesapeake Bay. The federal government purchased an additional 1,761 ac (713 ha) in 1942 for Navy use (Tazewell 1993). In the early years, four separate naval facilities operated in the area. The Amphibious Training Base was established in 1941 to train landing craft crews. In 1942, Camp Bradford and the Frontier Base were established. Camp Bradford served as a training area for Navy Seabees and the Frontier Base expanded the facilities used for training landing craft crews. Camp Shelton was established in 1943 as a Naval Armed Guard Training Center. In 1945, the separate activities were combined to form Naval Amphibious Base (NAVPHIBASE) Little Creek (NAVPHIBASE n.d.). In October 2009 NAVPHIBASE Little Creek was combined with Fort Story, a former Department of the Army (Army) installation, to form JEBLCFS, as part of the 2005 Base Realignment and Closure Commission plan. The resulting combined installation consists of the two distinct land parcels.

Additional land and facilities include the Army’s Coastal Defense System on the south side of Little Creek Cove acquired by the Navy in 1950, and a remaining strip of privately owned land along the east side of Little Creek Cove acquired in 1976. JEB Little Creek now serves as the major operating installation for Atlantic Fleet amphibious forces and supports 80 shore commands. The Installation provides on-Base logistics, facilities, and other support services, as required, to local commands, organizations, other U.S. and allied units, homeported ships, and commands of the operating forces. As host command, JEB Little Creek also supports 59 Navy piers where 18

Navy ships, 69 small crafts including landing craft air cushions (LCACs) and landing craft utilities, are homeported. The Installation employs approximately 10,204 military personnel and 4,275 civilians (NAVPHIBASE n.d. and NAVPHIBASE 2003). Navy, Army, and Marine Corps Reserve units train at the Installation because its woodland terrain and sandy beaches and mudflats provide realistic landscapes for combat. The training is coordinated through the Naval Marine Corps Reserve Readiness Center assigned to JEB Little Creek. Through this program, more than 4,500 Reservists are trained here annually.

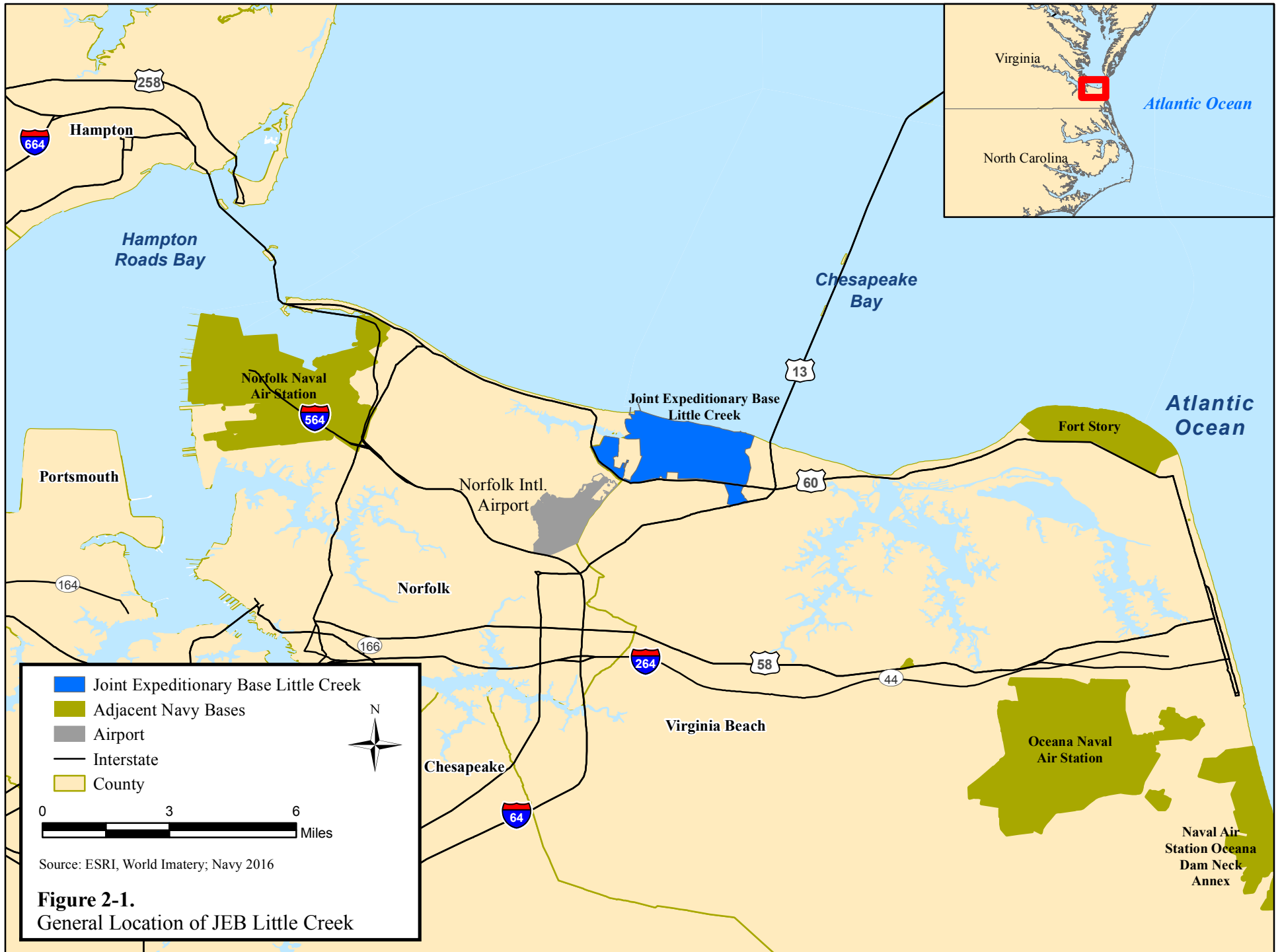
2.2.2 Mission Impacts on the Environment

The Navy recognizes that military training and other operational activities have the potential to impact the environment and require precautions to avoid or minimize degradation or harm to natural resources. Mission-related impacts are potentially greatest in the operational areas, including Little Creek Harbor and offshore, and at the training areas in the Beaches and Dunes Management Unit (see **Section 1.8** and **Section 4.3**). In Little Creek Harbor, impacts to water quality are a primary environmental concern. Due to the nature of the military mission at JEB Little Creek, naval vessels are continuously moored in the harbor, creating the potential for discharge of oil and other contaminants. The periodic maintenance dredging of Little Creek Harbor and its tributaries for safety and access presents another environmental concern in this area. Disposal of the dredge material is the primary issue associated with this action (Palermo et al. 1993).

Offshore impacts to marine resources are primarily associated with detonation of underwater explosives. This detonation is required as part of the JEB Little Creek explosive ordnance inspection and recertification program for the Explosive Ordnance Disposal unit. This activity may potentially result in the loss of fish and shellfish, or could result in the accidental take of marine mammals or sea turtles. Coordination with the Virginia Marine Resources Commission (VMRC) has been incorporated as a standard operating procedure to help ensure that mission impacts to fish and shellfish are avoided or minimized. In addition, NOAA's National Marine Fisheries Service (NMFS) oversees explosives test plans for JEB Little Creek to ensure that risk of incidental take of marine mammals or sea turtles is avoided or minimized.

Major impacts associated with training activities that occur in the beaches and dunes areas include accelerated beaches and dunes erosion and loss of rare maritime ecological communities. Primary training activities occurring at JEB Little Creek with the greatest potential to impact nearshore resources include:

- The Modular Elevated Causeway operations are major activities that involve constructing an elevated causeway from the beach to a maximum of 3,000 feet (914 meters [m]) offshore to facilitate mooring ships. The exercise includes the construction of a pier utilizing 20-inch-diameter (51-centimeter-[cm]-diameter) hollow pilings driven into the subaqueous bottom, and the excavation of a 30-foot by 30-foot by 5-foot (9.1-m by 9.1-m by 1.5-m) trench into the shoreline at the mean low water mark. This exercise requires NEPA documentation and permits from USACE, VMRC, and the City of Virginia Beach Wetlands Board.



This page intentionally left blank.

- Administrative (Floating) Pier/Beach Stabilizing Exercises on Anzio I and Anzio II consist of the construction of a floating pier up to 1,500 feet (457 m) seaward into the Chesapeake Bay. A 100- foot by 60- foot by 6-foot (30-m by 18-m by 1.8-m) trench is excavated into the shoreline from the mean low water mark inland. At high tide, a causeway section is pushed approximately 60 feet (18 m) onto the beach and anchored against wave action with bulldozers. This exercise also requires NEPA documentation and permits from USACE, VMRC, and the City of Virginia Beach Wetlands Board.
- Beach assaults that involve assault landing craft to transfer troops, heavy equipment, and supplies ashore are conducted on a weekly basis. The types of equipment and numbers of personnel vary depending on the unit conducting the assault. Tank landing ships, landing vehicle tractors, lighter amphibious resupply cargo, landing craft utilities, and LCACs that may be used in these exercises are restricted to the beach areas. Beach party teams and high mobility military vehicles that are part of the beach assault exercise operate in the beaches and dunes areas.
- Troop training exercises, including maneuvers and small troop assaults, occur on a weekly basis. The number of troops participating in these activities varies, ranging from less than 10 to several hundred troops. Exercises involve off-road use of high mobility military vehicles, foot patrols, the excavation of fighting positions, and bivouac activities. The use of small arms (blank ammunition) and pyrotechnics is authorized.
- Landing craft maneuver operations involving amphibious assault vehicles, LCACs, landing vehicle tractors, and other assault landing craft occur an average of two times per month. These maneuvers primarily take place offshore and on the beach. Vehicles may also approach the beach from the landward side, which necessitates the maintenance of roadways within the training areas and creates the potential for off-road travel.
- Troop physical training (PT) may occur on a daily basis along portions of Sicily and Normandy beaches. In comparison to other activities conducted on these beaches, such as land craft maneuvers and amphibious assault vehicle training, PT activities are considered to have a minor impact on nearshore resources.
- The Sea, Air, Land (SEAL) delivery vehicle team concentrates on deployment of mini-submarines. SEAL training consists of diving and beach operations and occurs on a weekly basis.
- The small arms ranges are operated on a daily basis and may include night firing. Small arms of .45 caliber or less are authorized for the pistol range. Small arms of 7.62 millimeter or less and all gauges of shotgun shells are authorized for the rifle range.

Training area and facility locations at JEB Little Creek are shown on **Figure 2-2**.

2.3 Overview of Natural Resources Management Program

A strong, proactive natural resources management program helps to preserve the integrity and prevent degradation of the natural resources while supporting the military mission and protecting real estate. JEB Little Creek has had a natural resources management program since hiring its first NRM in 1987. During the regional realignment of naval installations in 1998 and 1999, the natural resources management program became part of the Navy Region Mid-Atlantic Natural Resources Program.

The NRM is responsible for management of 2,380 ac (963 ha) of land and natural resources at JEB Little Creek, as well as oversight for natural resources management of 1.458 ac (590 ha) at JEB Fort Story. A primary function of the NRM is to ensure compliance with federal, state, and regional environmental regulations. Also, in accordance with 32 CFR Part 190, DoD Natural Resources Management Program, all current and planned mission activities, such as master planning, construction requests, site approval requests, and training exercise plans, must be effectively coordinated in a timely manner with the NRM and regional natural resources staff.

The natural resources management program is broadly responsible for stewardship of the Installation's forests, wetlands, beaches and dunes areas, and fish and wildlife resources and for implementation of an outdoor recreation program. Each of these areas of responsibility must be managed to balance potential conflicts between each other, the military mission, and other Installation activities. A brief overview of past and current activities within these program areas follows.

2.3.1 Wetlands and Water Quality Protection

A wetland delineation was conducted in 2015, which identified more than 70 ac (28.33 ha) meeting the criteria for designation as wetland (USACE 2015). Although this assessment is adequate for planning purposes, all proposed construction and land-disturbing activities that have the potential to impact wetlands must be reviewed on an individual basis. The NRM is responsible for reviewing site plans for any activity with the potential to disturb wetlands. When impacts to wetlands are unavoidable, federal and state laws require wetland mitigation. Efforts to protect wetlands and water quality at JEB Little Creek include the establishment of approximately 2,050 linear feet of riparian forest buffer over the past several years.

2.3.2 Urban Forestry

Forest resources at JEB Little Creek are limited and are mainly characterized as urban forest. Maintaining a healthy, vigorous urban forest provides benefits to Installation personnel who enjoy the recreational trails and parks, creates habitat for native wildlife species, and improves environmental conditions. Improving species and structural diversity and tree health are urban forest management goals.

2.3.3 Fish and Wildlife Management

A variety of fish and wildlife species occur in the varied habitats of JEB Little Creek. Fish and wildlife management goals are to maintain healthy and viable populations through proper ecosystem management and to improve habitat in developed areas. The natural resources management program maintains a number of osprey platforms, bluebird boxes, mallard boxes, and wood duck boxes to enhance migratory bird nesting opportunities throughout the Installation.

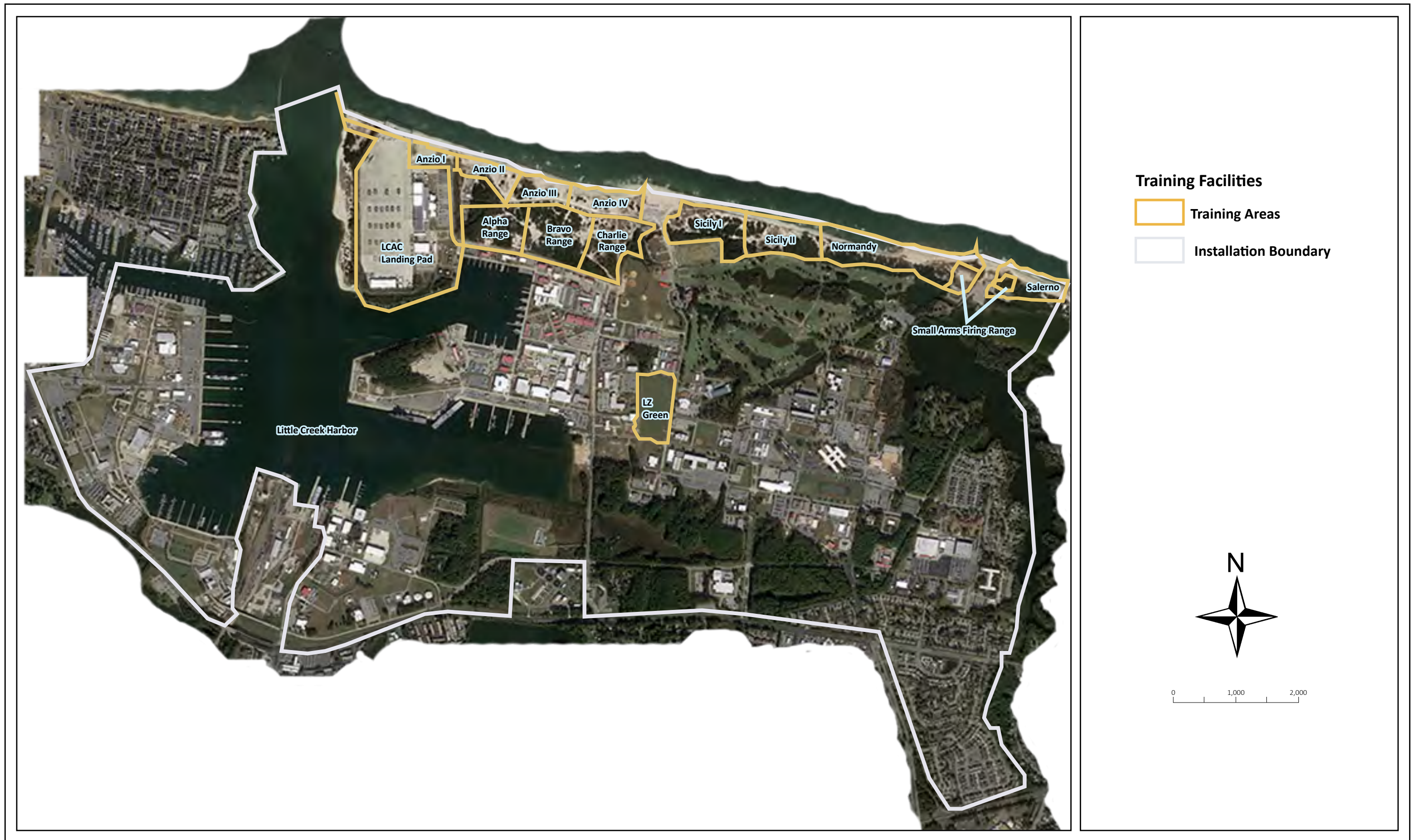


Figure 2-2
Training Facilities of JEB Little Creek

This page intentionally left blank.

2.3.4 Habitat Conservation and Restoration

The conservation and restoration of significant natural habitats at JEB Little Creek are a primary focus of the natural resources management program. Efforts to protect and stabilize the beaches and primary dune system have produced visible improvements over the years with evidence of buildup in certain areas. Areas that were severely eroding have begun to revegetate and threatened dunes have begun the process of accretion. However, beach erosion is an issue that requires monitoring, as these areas are also subject to damage from storm surges and storms such as hurricanes. Dunes are subject to training activities, and numerous small dune restoration projects, such as installation of sand fencing and recycled Christmas trees, have been implemented to reduce erosion and improve sand accretion. Although the protected areas in the back dunes where training activities are prohibited are relatively small, evidence of dune rebuilding is present in these areas.

2.3.5 Invasive Species and Pest Management

Invasive, nonnative species, feral animals, and insect pests are growing environmental concerns nationwide and are the primary pest problems associated with natural resources management at JEB Little Creek. Control efforts for these pests are ongoing and include integrated pest management (IPM) practices, which are detailed in the 2016 JEBLCFS Integrated Pest Management Plan, in the Navy's policy letter for control of feral animals (dated 10 January 2002), and in pest management programs (OPNAVINST 6250.4C dated 11 April 2012). The Armed Forces Pest Management Board also provides guidance on management of feral animals in *Integrated Management of Stray Animals on Military Installations* (Technical Guide No. 37 dated 25 May 2012).

2.3.6 Natural Resources Management Units

For natural resources management purposes, land and water resources at JEB Little Creek may be divided into three management areas based on ecological and land use considerations: Urban Areas Management Unit, Natural Areas Management Unit, and Beaches and Dunes Management Unit (see **Table 4-1** and **Figure 4-1**). Management procedures and actions tailored to meet the specific constraints of each unit are described in **Section 4.0**.

2.4 Constraints and Opportunities

Due to the urban landscape of the Installation, traditional natural resources management (such as forestry, wildlife management, and outdoor recreation) is limited throughout the majority of the Installation. However, there are opportunities for habitat improvement, wetlands and water quality protection, and urban tree care. Natural resources constraints on training or other mission-related activities at JEB Little Creek are minor, though access to portions of the beaches and dunes is restricted during rifle range live firing exercises. Natural resources management, development, and most other land uses are also constrained by explosive safety quantity distance arcs.

Natural resources management issues and requirements pose the following constraints to JEB Little Creek's military mission and to the further development of facility land:

- Limitation on new construction in surface waters, wetlands, floodplains, and riparian buffer areas (**Figure 2-5** and **Figure 2-6**)
- Ecological communities (**Figure 2-8**), conservation and encouragement of protected flora and fauna species habitat (**Figure 2-9**), forest buffers (**Figure 3-1**), and special interest areas (**Figure 3-5**)

- Restrictions on allowable uses of the beaches and dunes habitat, especially habitat conservation and restoration areas

Opportunity areas include existing training areas (**Figure 2-2**) and developed areas of the Installation, as well as non-specialized habitat areas. Furthermore, there are possible opportunities for the Navy to leverage undeveloped habitat outside of the Installation boundaries in support of the military mission via encroachment partnering (see **Section 1.10**).

2.5 Climate

An understanding of general climate patterns is important to the planning and success of natural resources management and construction activities. JEB Little Creek is an area where temperature extremes are moderated by the Atlantic Ocean. The average yearly temperature is 60 degrees Fahrenheit (°F) (16 degrees Celsius [°C]). January is the coldest month with an average low of 32.5 °F (0.27 °C) and July is the warmest month with an average high of 87.4 °F (30.78 °C). The average growing season (daily minimum temperatures higher than 40 °F for a light frost) lasts approximately 250 days from the middle of March to late November. The average annual precipitation is approximately 45.95 inches (117 cm) and is generally concentrated in the late summer. The prevailing wind is from the southwest in summer and northeast in winter at an average speed of 10 mi (16 km) per hour. During hurricane events that typically occur during June through September, torrential rainfall may accompany winds greater than 75 mi (121 km) per hour. The average relative humidity is 62 percent. The climate summary in **Table 2-1** includes data recorded at the Southeast Regional Climate Center at the Norfolk International Airport from 1946 to 2016.

Table 2-1. Weather Data Recorded at Norfolk International Airport, 1946–2016.

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average Max Temp (°F) ^a	48.9	50.8	58.3	68.2	76.0	83.7	87.4	85.6	80.1	70.4	61.3	52.7	68.6
Average Min Temp (°F) ^b	32.5	33.5	40.1	48.6	57.8	66.4	71.1	70.2	64.9	53.7	43.8	36.0	51.6
Mean Average Temp (°F) ^c	40.7	42.1	49.2	58.4	66.9	75.0	79.3	77.9	72.5	62.1	52.6	44.4	60.1
Average Precip. (in.) ^d	3.49	3.20	3.62	3.16	3.67	3.93	5.55	5.39	4.60	3.45	3.03	3.19	46.27

Source: NOAA 2016a, NOAA 2016b, NOAA 2016c, and NOAA 2016d

2.5.1 Climate Change

DoDI 4715.03 requires the Navy to consider climate change in the development of INRMPs to help mitigate impacts on military installations. Impacts that must be considered include shifts in species' ranges and distributions, changes in phenology, rising sea levels, and variations in ecological processes such as drought, fire, and flood (DoD 2011).

In May 2014, the U.S. Global Climate Research Program released its *Third National Climate Assessment*, which was written under the authority of the Federal Advisory Committee Act. The report identified several trends and project impacts related to climate change throughout the U.S. as well as within specific regions of the country. The annual average temperature in the southeastern U.S. has risen 1.5 °F (0.8 °C) since 1880 (through 2012). Temperature fluctuation is primarily due to the effects of El Niños, La Niñas, and volcanic eruptions. There has been a 27 percent increase of heavy rain events from 1958 to 2012 over almost the entire region. Additionally, the power of North Atlantic hurricanes has increased since the early 1980s, associated with an increase in sea surface temperature. Continued warming is projected with a lower emission scenario projecting a 3 °F to 5 °F (-16 °C to -15 °C) increase in average annual temperatures and a 5 °F to 10 °F (-15 °C to -12 °C) increase in temperatures for the higher emissions scenarios. Sea-level rise is also projected to increase, as will the associated threats of coastal flooding, shoreline retreat, and higher intensity hurricanes (Melillo et al. 2014).

The impacts of these projected increases include more heat-related illness, declines in forest growth and agricultural crop production, declines in cattle production, increased buckling of pavements and railways, and reduced oxygen levels in streams and lakes causing fish kills and declines in aquatic species diversity. The report indicates that sea-level rise and increases in hurricane intensity will be among the most serious consequences of climate change, especially for low-lying areas along the Atlantic coast (Melillo et al. 2014).

Sea level rise has the potential to affect existing coastal infrastructure critical to the DoD. On the Installation, protection of dunes and wetlands is important to combat sea level rise. DoD facilities located on the coast, such as JEB Little Creek, are expected to experience significant changes to environmental resources and human-made infrastructure. The DoD's Strategic Environmental Research and Development Program (SERDP) is currently pursuing a number of areas of investigation to address the information and decision support needs of DoD coastal installations under the threat of climate change. Project RC-1701 will develop integrated, multi-criteria, multi-hazard risk assessment framework that will be used to evaluate changes in risks to coastal military installations and mission capabilities in the Hampton Roads region due to global climate change (SERDP n.d.).

2.6 Physiography and Soils

JEB Little Creek is in the lowland subprovince of Virginia's Middle Atlantic Coastal Plain. The topography of the Coastal Plain region is a terraced landscape that stair-steps down to the coast and to the major rivers (College of William and Mary, Department of Geology n.d.). Elevations at the Installation range from mean sea level along the beaches and tidal marshes, to approximately 12 feet (3.7 m) above mean sea level in the inland/developed areas. The greatest change in elevation occurs on the golf course and in the dunes along the Chesapeake Bay where elevations reach 30 feet (9.1 m) or more and slopes approach 30 percent (**Figure 2-3**).

A review of USDA soil survey data from 1985 indicates that 19 soil mapping units occur onsite (Tetra Tech 2010) (see **Table 2-2**). Of these soils, three are identified as hydric and nine are characterized as containing hydric inclusions. Hydric soils form under conditions of saturation, flooding, or ponding that last long enough during the growing season to develop anaerobic conditions in the upper soil layers, and may indicate the presence of a wetland. The three hydric soils at JEB Little Creek are Duckston fine sand; Nawney silt loam; and Rappahannock mucky peat, strongly saline (Tetra Tech 2010). The nine soils characterized as containing hydric inclusions, but not classified as hydric are (Tetra Tech 2010):

- Augusta loam
- Augusta-Urban land complex
- Corolla fine sand
- Newhan fine sand
- Newhan-Corolla fine sand
- Psamments
- Udorthents, loamy
- Udorthents-Urban land complex
- Urban land

The following soil types also are present at JEB Little Creek (Tetra Tech 2010):

- Beaches
- Psamments-Urban land complex
- Rumford fine sandy loam
- State loam
- State-Urban land complex
- Tetotum loam
- Tetotum-Urban land complex

A large percentage of the soils (63.8 percent) at JEB Little Creek are mapped as Udorthents, Psamments, or Urban Land, including complexes associated with these soil types (USDA SCS 1988 and USDA NRCS 2009). The Udorthents and Udorthent complexes occur in areas that were once natural tributaries to Little Creek Harbor. These areas were drained and filled during the early development of the Installation. The Psamments are primarily disturbed dunes that occur throughout the golf course and recreational beach areas. Urban Land occurs in developed areas where more than 80 percent of the area is covered by impermeable surface. It occurs in the administrative and operational areas (see **Figure 2-4**).

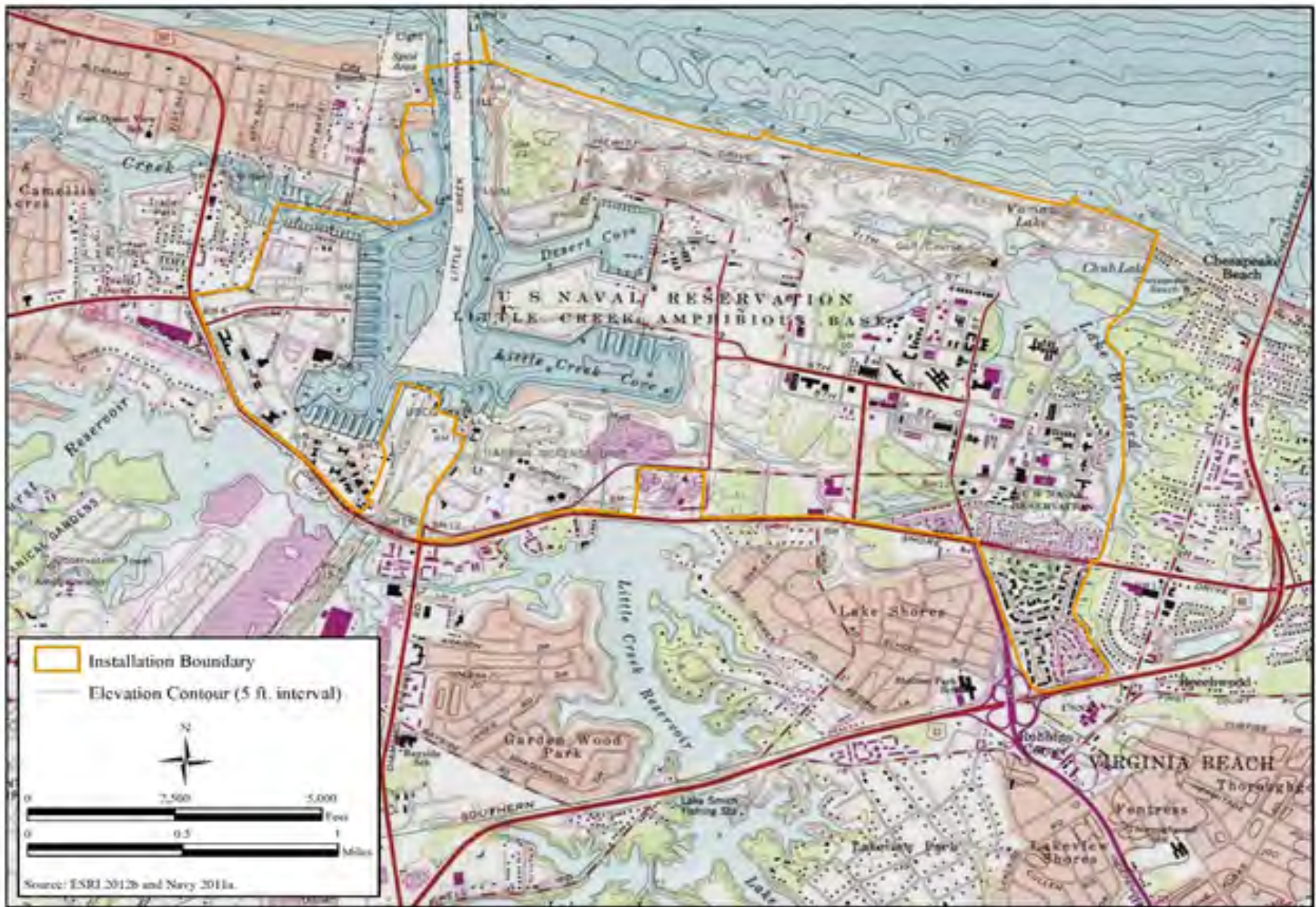


Figure 2-3
Elevation Contours of JEB Little Creek

This page intentionally left blank.



Soil Types

3	Augusta loam
4	Augusta-urban land complex
6	Beaches
10	Corolla fine sand
15	Duckston fine sand*
21	Nawney silt loam*
22E	Newhan fine sand
23C	Newhan-corolla fine sand
29	Portsmouth loam
30	Psammets, undulating
31	Psammets-urban land complex
32	Rappahannock mucky peat, strongly saline*
34A	State loam, 0 to 2 percent slope
35	State-urban land complex
36	Tetotum loam
37	Tetotum-urban land complex
40	Udorthents, loamy
41	Udorthents-urban land complex
42	Urban land
W	Water
—	Installation Boundary

* hydric soil

0 1,500 3,000
Feet

0 0.3 0.6
Miles

Source: ESRI, World Imagery; Navy 2016

Figure 2-4.
Soils of JEB Little Creek

This page intentionally left blank.

Table 2-2. General Characteristics of JEB Little Creek Soils.

Soil Series	Map Unit	Acres	General Description	Hydric	Hydric Inclusions	Drainage Class	Erosion Potential
Augusta loam, 0–2% slopes	3	4.6	Deep, nearly level on low inland ridges and side slopes; low fertility, moderate available water, moderate permeability, slow surface runoff	No	Yes	Somewhat poorly drained	Slight
Augusta-Urban land complex, 0–2% slopes	4	28.5	Augusta soils and areas covered by parking lots, buildings, and other structures on low inland ridges and side slopes	No	Yes	Somewhat poorly drained	Slight
Beaches, 0–10% slopes	6	44.8	Long narrow areas adjacent to the Chesapeake Bay; mostly sandy material deposited by wave action and flooded daily by tides	Below high tide	n/a	n/a	Wind and wav action
Corolla fine sand, 0–4% slopes	10	26.0	Deep, nearly level to gently sloping on low coastal dunes and flats; low fertility, low available water, rapid permeability, slow surface runoff	No	Yes	Moderately well to somewhat poorly drained	Moderate by wind
Duckston fine sand, 0–2% slopes	15	7.5	Deep, nearly level in shallow depressions between dunes and on low flats between dunes and marshes; low fertility, low available water, very rapid permeability, slow surface runoff and frequently flooded	Yes	n/a	Poorly drained	Slight
Nawney silt loam, 0–2% slopes	21	0.3	Very deep, poorly drained soil formed in loamy marine and fluvial sediments; associated with coastal plains and floodplains; moderate permeability; slow surface runoff	Yes	n/a	Poorly drained	Slight
Newhan fine sand, 2–30% slopes	22E	180.7	Deep, undulating to steep on grass- and shrub-covered high sand dunes in coastal areas; low fertility, very low available water, very rapid permeability, slow surface runoff	No	Yes	Excessively drained	Severe by wind
Newhan-Corolla fine sands, 0–15% slopes	23C	22.2	Deep soils in coastal areas mostly behind the primary foredune; Newhan soils occur on low sand dunes and Corolla soils on flats and low knolls	No	Yes	Moderately well drained to somewhat poorly drained	Severe
Psamments, 0–25% slopes	30	139.9	Deep sandy material, mostly in coastal areas where sand dunes have been disturbed or where dredging has occurred; low available water, very rapid permeability, slow surface runoff	No	Yes	Well drained and moderately well drained	Severe on steep unvegetated slopes
Psamments-Urban land complex, 0–2% slopes	31	21.0	Sandy fill, containing hydric soils, slow surface runoff	No	No	Moderately well drained	Slight

Table 2-2. General Characteristics of JEB Little Creek Soils.

Soil Series	Map Unit	Acres	General Description	Hydric	Hydric Inclusions	Drainage Class	Erosion Potential
Rappahannock mucky peat, strongly saline, 0–1% slopes	32	9.5	Deep, nearly level organic soil in tidal marshes flooded daily by saltwater; very high available water (saline), moderate permeability	Yes	n/a	Very poorly drained	Slight
Rumford fine sandy loam, 6–35% slope	33E	0.5	Deep, loamy sand, loamy fine sand or fine loamy sand, on marine terraces	No	No	Well drained or somewhat excessively drained	Slight
State loam, 0–2% slopes	34A	142.4	Deep, nearly level on broad inland ridges and side slopes; low fertility, moderate available water, moderate permeability, slow surface runoff	No	No	Well drained	Slight
State-Urban land complex, 0–2% slopes	35	32.6	State soils and areas covered by parking lots, buildings, and other structures on broad ridges and side slopes	No	No	Well drained	Slight
Tetotum loam, 0–2% slopes	36	133.7	Deep, nearly level on low ridges and side slopes; low fertility, moderate available water, moderate permeability, slow surface runoff	No	No	Moderately well drained	Slight
Tetotum-Urban land complex, 0–2% slopes	37	18.6	Tetotum soils and areas covered by parking lots, buildings, and other structures on low ridges and side slopes	No	No	Moderately well drained	Slight
Udorthents, loamy, 0–25% slopes	40	493.8	Deep soil material altered by excavation or covered by earthy fill occurring mostly in and near urban areas, canals; available water and permeability variable, rapid surface runoff	No	Yes	Moderately well drained	Severe on steep unvegetated slopes
Udorthents-Urban land complex, 0–2% slopes	41	200.3	Deep, nearly level in areas altered by excavation or covered by earthy fill or areas covered by parking lots, buildings, and other structures; available water and permeability variable	No	Yes	Well drained and moderately well drained	Slight
Urban Land, 0–2% slopes	42	294.7	More than 80% of the surface covered by parking lots, buildings, and other impermeable surfaces; Udorthents are included in this unit	No	Yes	Needs site determination	Needs site determination

Source: USDA NRCS 2009 and Tetra Tech 2010

% = percent

The natural soil types at JEB Little Creek include Augusta loam, Corolla fine sand, Duckston fine sand, Newhan fine sand, Rappahannock mucky peat, State loam, Tetotum loam, and complexes containing two or more of these soil types. Of these soils, the Augusta loam, State loam, and Tetotum loam are designated as prime farmland (USDA SCS 1988) and are regulated under the Farmland Protection Policy Act (7 USC §4201 et seq.). The Farmland Protection Policy Act restricts actions of the federal government that would cause the irreversible conversion of prime and unique farmland to nonagricultural uses. Portions of these soils that are already built-up are not considered prime farmland.

The list of hydric soils in Virginia is available on the USDA Natural Resources Conservation Service website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>.

2.7 Hydrology

2.7.1 Surface Water

Surface water represents an important natural resource at JEB Little Creek as approximately 670 ac (271 ha) of the Installation are covered by water. The primary surface water resources at JEB Little Creek are Little Creek Harbor, Lake Bradford, Chubb Lake, Varian Lake, and several golf course ponds. Little Creek Harbor is discussed in Nearshore Environment (**Section 2.7.6**).

Nontidal surface water resources at JEB Little Creek include several freshwater lakes and ponds in the central and eastern portions of the Installation. Lake Bradford is the largest body of freshwater, equaling approximately 73 ac (30 ha). Chubb Lake is the next largest lake, covering approximately 22 ac (8.9 ha). Varian Lake and the golf course ponds are smaller, 5.42 ac (2.2 ha) and 24.53 ac (9.93 ha) in size, respectively. The lakes and ponds on JEB Little Creek provide habitat for a variety of wildlife species as well as recreational opportunities for Installation employees and their families. Park and picnic areas and freshwater fisheries are associated with the lakes and ponds. **Figure 2-5** provides an overview of the aquatic resources present at JEB Little Creek.

Specific methods for characterizing and evaluating the soils, vegetation, and hydrologic indicators are described in the wetland delineation report (Tetra Tech 2010). As part of the wetland delineation, survey data were collected for the streams, channels, ditches, ponds, lakes, and Little Creek Cove. The data collected for these surface water features are summarized in **Table 2-3** and **Table 2-4** and depicted in **Figure 2-5**.

Of the 20 waterways identified on the Installation, eight were identified as perennial and 12 as intermittent (**Table 2-3**). Although the majority, if not all, of the waterways have been manipulated in some way, some reaches are beginning to exhibit characteristics of more natural streams. Waterways were designated as streams if they possessed more natural characteristics (e.g., sinuosity, undisturbed banks, adjacent wetlands), whereas channels were designated for waterways that were once natural streams that continue to exhibit characteristics of channelization (e.g., lack of sinuosity, steep banks, spoil). Ditches were defined as waters that appear to be constructed in upland areas for the purpose of stormwater management. All of these conveyances drain to or through adjacent wetlands or waterbodies, eventually discharging into Little Creek Cove. Stream S-2 and Channel C7 are the primary drainage features on the Installation (Tetra Tech 2010).

Three lakes and five ponds were identified and surveyed as part of the wetland delineation (**Figure 2-5**). The three lake areas represent a total coverage of approximately 100 ac (40 ha) located along the eastern boundary, and extending outside the Installation boundary. Varian Lake covers 5.42 ac (2.2 ha) and is associated with the golf course. Chubb Lake and Lake Bradford abut the eastern boundary, and are hydrologically connected via a 10-foot (3-m)-wide bulkheaded channel located at the foot bridge crossing. Chubb Lake is closest to the dune and beach area adjacent to the Chesapeake Bay, with 5.42 ac (2.19 ha) of this waterbody located within the Installation boundary. Lake Bradford is the largest JEB Little Creek waterbody at 72.97 ac (29.5 ha), and occupies a majority of the eastern Installation boundary. Lake Bradford receives hydrological inputs from streams, wetlands, and upland areas on the eastern side of the Installation. One primary output from Lake Bradford is Channel C7 that begins at the end of Osprey Point Road. Channel C7 flows through uplands, wetland areas and crosses beneath several roadways before draining into Little Creek Cove. All five ponds are located within the area of the golf course and were historically constructed to serve as visual features for the course, as course obstacles, and for providing irrigation (Tetra Tech 2010).

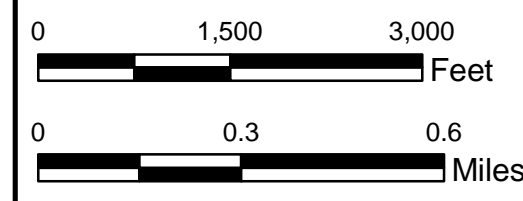
Table 2-3. JEB Little Creek Streams, Channels, and Ditches.

Stream Label	Name	Flow Regime	Direction of Flow	Comment
Stream S1	Unnamed	Perennial	East	Flows into Stream S2.
Stream S2	Unnamed	Perennial	North	Flows into Little Creek Cove, intertidal.
Stream S3	Unnamed	Intermittent	East	Flows into Stream S1.
Channel C4	Unnamed	Intermittent	Northeast	Flows into Stream S2.
Stream S5	Unnamed	Intermittent	West	Flows through Wetland W8 then into Little Creek Cove.
Stream S6	Unnamed	Intermittent	South	Flows into Wetland W13.
Channel C7	Unnamed	Perennial	Southwest to northwest	Flows adjacent to Wetland W13, through Wetlands W25 and W12 then into Little Creek Cove.
Stream S8	Unnamed	Intermittent	Southeast	Flows into Wetland W18.
Stream S9	Unnamed	Intermittent	North	Flows into Wetland W20.
Channel C10	Unnamed	Intermittent	East	Flows into Wetland W22.
Stream S11	Unnamed	Perennial	South	Flows into Wetland W12.
Stream S12	Unnamed	Perennial	North	Flows through Wetland W10 into Stream S2.
Stream S13	Unnamed	Perennial	South	Flows into Wetland W12.
Stream S14	Unnamed	Intermittent	Southeast	Flows into Stream S13.
Stream S15	Unnamed	Perennial	East	Flows into Wetland W12.
Stream S16	Unnamed	Perennial	West	Flows into Stream S2.
Stream S17	Unnamed	Perennial	Southwest	Flows into Stream S2.
Ditch D1	Unnamed	Intermittent	South	Drains Wetland W9.
Ditch D2	Unnamed	Intermittent	South	Constructed in uplands, flows into Wetland W13.
Ditch D3	Unnamed	Intermittent	West	Constructed in uplands, flows into Wetland W13.

Source: Tetra Tech 2010



- Legend**
- Delineated Streams/Channels
 - Delineated Wetlands
 - Delineated Ponds and Lakes
 - Delineated Stream/Channels Lines
 - Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 2-5.
Aquatic Resources of JEB Little Creek

This page intentionally left blank.

Table 2-4. JEB Little Creek Ponds and Lakes.

Pond/Lake	Name	On Base Area (acre)	Comment
Pond P1	Unnamed	9.15	Constructed golf course pond.
Pond P2	Unnamed	4.01	Constructed golf course pond.
Pond P3	Unnamed	0.65	Constructed golf course pond.
Pond P4	Unnamed	1.50	Constructed golf course pond.
Pond P5	Unnamed	9.22	Constructed golf course pond.
Lake L1	Lake Bradford	72.97	Largest designated freshwater area supports several associated wetlands and undeveloped upland areas.
Lake L2	Varian Lake	5.42	Named golf course lake.
Lake L3	Chubb Lake	21.83	Largely an undeveloped shoreline. Connected to Lake Bradford at foot bridge.

Source: Tetra Tech 2010

2.7.2 Groundwater

The shallow aquifer system of the City of Virginia Beach comprises the Columbia aquifer, the Yorktown confining unit, and the Yorktown-Eastover aquifer. The Columbia aquifer is predominantly composed of sandy surficial deposits that lie above the Yorktown confining unit. The Yorktown confining unit is composed of a series of very fine sandy to silty clay units at or near the top of the Yorktown Formation. The Yorktown-Eastover aquifer is predominantly composed of sandy deposits of the Yorktown Formation and the upper part of the Eastover Formation. The shallow aquifer system is separated from deeper units by the continuous St. Mary’s confining unit.

Domestic supplies of groundwater in the City of Virginia Beach are available from depths generally less than 200 feet (60 m) deep. In some places, however, the taste of groundwater is unpleasant or unpalatable because of naturally high concentrations of dissolved iron, manganese, and chloride. Contamination of the shallow aquifers is also possible from nitrates, pesticides, herbicides, fertilizers, heavy metals, and trace amounts of hydrocarbons or other toxic compounds. The potential also exists for contamination of the shallow aquifers by the intrusion of saltwater. Water from depths greater than approximately 200 feet (60 m) is generally too saline to drink.

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

Potable water supply for JEB Little Creek comes from the municipal water supply, which is obtained from the following sources: Lake Gaston, a reservoir 76 mi (122 km) away in Brunswick

County; the City of Norfolk system, which is supplied primarily from Lake Prince and Western Branch Reservoir in Suffolk, and Lake Burnt Mills in Isle of Wight; and several in-town supplemental reservoirs. During extended dry periods, these sources are supplemented with water from four deep wells located around the lakes, or with water from the Blackwater and Nottoway rivers. Several of the supplemental reservoirs, including Lake Wright, Lake Whitehurst, Lake Smith, Lake Lawson, Stumpy Lake, and Little Creek Reservoir, lie immediately south of the Installation (City of Virginia Beach 2012a).

2.7.3 Watersheds

JEB Little Creek lies entirely within the Chesapeake Bay watershed. The major tributary to the bay from JEB Little Creek is Little Creek Harbor, which directly or indirectly drains all but the beach area. The eastern half of the Installation drains to Lake Bradford or Chubb Lake, with these waterbodies draining to Little Creek Harbor via a canal. Flow from these two lakes is artificially controlled by a weir on the canal near Nider Boulevard. The golf course area drains to the golf course ponds, which are connected to Chubb Lake through pipes and channels. The municipal reservoirs Lake Whitehurst and Little Creek Reservoir also have overflow channels that discharge into the harbor from the south.

2.7.4 Floodplains

Federal Emergency Management Agency flood insurance rate maps show that a large portion of the Installation lies within the 100-year or 500-year floodplain associated with the Chesapeake Bay; Little Creek Harbor; and Installation lakes, ponds, and channels (**Figure 2-6**).

The Federal Emergency Management Agency defines the 100-year floodplain as an area that has a one percent chance of being equaled or exceeded in any given year. The 500-year floodplain is an area that has a 0.2 percent chance of a flood in a year. Both the 100-year and 500-year floodplain are the standard used by federal agencies for floodplain management. Because floodplains cover much of the Installation, several buildings, large portions of infrastructure, and developed areas occur within the 100- and 500-year floodplains.



Legend

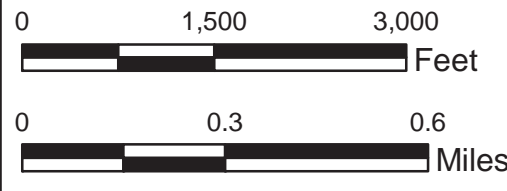
Zone AE - Area inundated by 1% annual chance flooding (100-year floodplain), for which BFEs* have been determined.

Zone AE - Area inundated by 1% annual chance flooding (100-year floodplain) with velocity hazard (wave action); BFEs* have been

Zone X - Area inundated by 0.2% annual chance flooding: an area inundated by 1% annual chance flooding (500-year floodplain) with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 1% annual chance flooding

Installation Boundary

*BFE = Base Flood Elevation



Source: ESRI, World Imagery; Navy 2016

Figure 2-6.
Flood Zones of JEB Little Creek

This page intentionally left blank.

2.7.5 Wetlands

In support of this INRMP, a comprehensive Installation-wide wetland delineation was completed in 2010, which identified approximately 76 ac (31 ha) of wetlands (**Table 2-5** and **Figure 2-5**) (Tetra Tech 2010). Field delineation (i.e., determination and boundary flagging) of all wetlands, open water areas (e.g., Bradford Lake, Varian Lake), and linear features (i.e., streams) was performed for all potentially jurisdictional waters of the U.S. regulated by Section 404 of the CWA. The entire Installation was evaluated for the presence and extent of wetlands using the routine wetland delineation methods described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE 2012). USFWS National Wetlands Inventory (USFWS 2003), United States Geological Survey (USGS) 7.5 minute topographic maps, and digital soil maps were used to support the delineation effort. Identified wetlands were classified by wetland type in accordance with *Classification of Wetlands and Deepwater Habitats of the United States*, which groups wetlands into five major systems: marine, estuarine, riverine, lacustrine, and palustrine (Cowardin et al. 1979). A wetland report and jurisdictional determination request were submitted to the USACE, Norfolk District and preliminary jurisdictional determination for the aquatic resources identified by the 2010 survey and presented in **Figure 2-5** was received in August 2015. A copy of the determination received from the USACE, Norfolk District is provided in **Appendix F**.

Wetland types occurring within the JEB Little Creek boundary are limited to estuarine and palustrine wetlands. The largest wetland areas are located along the southeast boundary of Little Creek Cove, and north of Amphibious Drive (**Table 2-5** and **Figure 2-5**). Estuarine wetlands are the most dominant wetland type at JEB Little Creek, accounting for approximately 75 percent of the wetlands, and are primarily associated with Little Creek Cove. Palustrine emergent wetlands, including wetland types that are predominantly palustrine emergent, make up approximately 13 percent of the wetlands, and are scattered throughout the Installation. Palustrine forested wetlands and wetlands that are classified as predominantly palustrine forested make up approximately 12 percent of Installation wetlands, and are located along pond edges and in other areas scattered throughout the Installation. Palustrine scrub-shrub wetlands make up less than 1 percent of Installation wetlands, and are located north of Varian Lake and south of Lake Bradford.

Table 2-5. JEB Little Creek Wetlands.

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
Wetland W1	PEM1E	0.3	Depressional, isolated near northern shoreline within stable, coastal dune community.
Wetland W2	PEM1C	0.4	Depressional, isolated located within stable, coastal dune community.
Wetland W3	PEM1E/PFO4E	< 0.1	Depressional, isolated near northern shoreline within stable, coastal dune community.
Wetland W4	PSS1J	0.1	Linear feature directly abutting Varian Lake.
Wetland W5	PFO1Eh	0.2	Depressional, impounded located within southwestern area of property. Paved surface encircles wetland. Drains to Stream S1.

Table 2-5. JEB Little Creek Wetlands.

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
Wetland W6	PFO1C	2.8	Directly abuts the south shore of Chubb Lake with a small portion abutting Lake Bradford.
Wetland W7	E2EM1P/PSS1S	15.5	Estuarine, intertidal directly abutting the south shore Little Creek Cove.
Wetland W8	E2EM1P	0.1	Estuarine, intertidal directly abutting the eastern shore of Little Creek Cove.
Wetland W9	E2EM1P	2.6	Estuarine, intertidal directly abutting the east shore of Little Creek Cove.
Wetland W10	E2EM1P	13.2	Estuarine, intertidal directly abutting the south shore of Little Creek Cove.
Wetland W11	PEM1E	0.1	Depressional, emergent area adjacent to Amphibious Drive. Drains into Stream S2.
Wetland W12	E2EM1P	25.7	Estuarine, intertidal area located east of Helicopter Road and north of Amphibious Drive. Drains into Little Creek Cove.
Wetland W13	PEM1Eh/PFO1Gh/PSS1Gh	5.7	East of Nider Boulevard. Drains into Stream C7.
Wetland W14	PFO1E	< 0.1	Depressional adjacent to Wetland W13.
Wetland W15	PEM1E	< 0.1	Linear, depressional north of Chubb Lake.
Wetland W16	PFO1E/PSS1E/PEM1E	0.1	Directly abuts Varian Lake.
Wetland W17	PFO1E/PSS1E/PEM1E	0.3	Directly abuts Lake Bradford.
Wetland W18	PFO1E/PSS1E/PEM1E	0.6	Depressional area. Drains to Pond P5.
Wetland W19	PFO1E/PSS1E/PEM1E	0.3	Directly abuts Lake Bradford.
Wetland W20	PFO1E/PSS1E/PEM1E	0.7	Directly abuts Lake Bradford.
Wetland W21	PSS1C	0.1	Appears to be created as a catch-basin.
Wetland W22	PFO1C/PSS1C	0.5	Directly abuts southern end of Lake Bradford.
Wetland W23	PEM1E	0.1	Impounded emergent area.
Wetland W24	PEM1Ch	0.9	Impounded emergent area.
Wetland W25	PEM1E	0.7	Directly abuts Channel C7.
Wetland W26	PFO1E/PSS1E/PEM1E	0.8	Impounded area, surrounded by developed areas.
Wetland W27	PFO1E/POW	0.5	Depressional, south of Chubb Lake near W6.
Wetland W28	PEM1E	1.8	Connected to Streams S2 and S16.
Wetland W29	PFO6E/PEM1E	2.1	Hydrologically connected to Stream S2.
	TOTAL	76.2	

¹ Field classification based on Cowardin et al. 1979

Source: Tetra Tech 2010

2.7.6 Nearshore Environments

The nearshore environment is generally defined as the area encompassing the transition from the subtidal marine habitats to associated upland systems. The Virginia Institute of Marine Science (VIMS) defines the nearshore environment in the Chesapeake Bay as the habitats from the marine riparian zone to the shallow subtidal waters, approximately 6.6 feet (2 m) in depth. Nearshore habitats are highly vulnerable to impacts from development and climate change. Significant stressors in the Chesapeake Bay include sea level rise, shoreline hardening, land development, and nutrient enhancement (VIMS 2013).

Little Creek Harbor is a 470-ac (190-ha) tidal estuary of the Chesapeake Bay. Desert Cove, Little Creek Cove, Fisherman’s Cove, and Little Creek Channel make up the main area of the harbor. Except for an area of saltmarsh fringe on Little Creek Cove and an undeveloped beach along and east of the LCAC landing pad, the shoreline consists almost entirely of bulkhead, riprap, and quay walls.

Little Creek Harbor is part of the Chesapeake Bay watershed; one of the most important and productive estuarine ecosystems in the world. **Section 2.7.3** provides a detailed description of the Chesapeake Bay watershed, and **Section 3.2.6** and **Section 4.1.2** provide information on watershed protection at JEB Little Creek.

Some of the sediments in Little Creek Harbor have been found to contain excessive amounts of heavy metals, such as lead and copper, and volatile/semivolatile organic compounds (NAVPHIBASE 1992). Shellfishing is precluded in the harbor due to fecal coliform levels. Commercial fishing is not allowed by the state although sport fishing is common in the western portion of the harbor. Little Creek is the major tributary that flows into the harbor from the west through Fisherman’s Cove.

2.8 Environmental Cleanup Program

2.8.1 Environmental Restoration Program Sites

The Installation recognizes that adverse impacts to natural resources may result from the release of hazardous substances, pollutants, and contaminants into the environment. The Navy Environmental Restoration Program (ERP) is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) releases, considering risks and assessing impacts to human health and the environment (including impacts to endangered species, migratory birds and biotic communities), as well as developing and selecting response actions when it is likely that a release could result in an unacceptable risk to human health and the environment. This assessment must consider endangered species, migratory birds, and biotic communities. The ERP must develop and select response actions when it is likely that a release could result in an unacceptable risk to human health or the environment. When appropriate, the JEB Little Creek NRM helps the ERP Remedial Project Manager identify potential impacts to natural resources caused by the release of contaminants and participates, as appropriate, in the decision-making process. CERCLA and the Superfund Amendments and Reauthorization Act are the primary legal authorities governing environmental restoration activities at DoD installations. Under CERCLA, the Navy has entered into an FFA with USEPA and VDEQ to address environmental contamination. The FFA specifies how and when CERCLA activities will occur at JEB Little Creek.

The Site Management Plan (SMP) for JEB Little Creek provides detailed descriptions of ERP sites including relative risks to be used in planning, scheduling, and setting priorities for environmental

remedial response activities at JEB Little Creek (CH2M 2016). An initial assessment was conducted in 1984, and on 10 May 1999 JEB Little Creek was placed on the USEPA National Priorities List giving USEPA regulatory and technical oversight of JEB Little Creek's ERP. The SMP identifies the current or potential ERP sites at the Installation. **Figure 2-7** depicts the ERP Sites of JEB Little Creek.

2.8.2 Military Munitions Response Program

The Military Munitions Response Program (MMRP) was initiated in 2001 to address environmental health and safety hazards associated with unexploded ordnance and discarded military munitions as a component of the ERP. The initial requirement under MMRP was completion of an inventory of former training ranges and munitions sites eligible for MMRP in 2003. The Anti-Aircraft Target Rifle Range, Chemical Defense Area, Depth Charge Testing Area, 1942 Pistol Range, 1944 Pistol Range, 1953 Pistol Range, the MWR Skeet Range, and six other then-operational ranges were identified at JEB Little Creek (CH2M 2016). All areas have been removed from further study based on a consensus agreement following the review of the preliminary assessment (CH2M 2016).

2.9 Flora

The majority of the land area at JEB Little Creek is developed, with vegetation types primarily consisting of mowed lawn, shade trees, and ornamental trees and shrubs. The areas that are undeveloped, however, have a diverse vegetation community, including a number of natural ecological communities. Based upon the Virginia classification of ecological communities (Fleming and Patterson 2017), 10 community types (seven upland communities and three wetland communities) exist at JEB Little Creek. Forested areas consist of mesic mixed hardwood, live oak (*Quercus virginiana*), mesic mixed pine and hardwood, and pine forests, which also are common forest types associated with the region. The beaches and dunes areas comprise vegetated primary and secondary dune systems and the beaches in front of them.

Several natural ecological communities occur in this area including mesic mixed pine-hardwood forests, mesic mixed hardwood forests, pine forests, maritime swamp forests, maritime upland forests, maritime dune woodlands, maritime dune scrub, maritime dune grassland, interdune maritime wetland (swales and ponds), upper beaches and overwash flats, tidal oligohaline marsh, and Coastal Plain depression wetlands. Several of these habitats are considered rare by the Virginia Department of Conservation and Recreation – Division of Natural Heritage (VDCR-DNH), including maritime upland forests, maritime mixed forests, maritime dune woodlands, and interdune ponds, which are ranked as critically imperiled (S1) in the state, and maritime dune grasslands and maritime swamp forests, which are ranked as imperiled (S2) in the state (Fleming and Patterson 2017).

The dune survey conducted at JEB Little Creek in 2012 identified potential problem areas and restoration opportunities, and included an ecological assessment of the Dune Protection Area (DPA), and a dune restoration and protection plan. The survey identified a high level of anthropomorphic disturbance within the Beaches and Dunes Management Unit, including multiple beach access routes oriented perpendicular to shore, training routes that meander throughout dunes, and large-scale excavations. Erosion of the numerous beach access routes have resulted in numerous dune fragments within the DPA, particularly in the western portion of the DPA. The



- Legend**
- Installation Boundary
 - Environmental Restoration Program Site



Source: ESRI, World Imagery; Navy 2016

Figure 2-7.
ERP Sites of JEB Little Creek

This page intentionally left blank.

meandering training routes and excavations in the eastern portion of the DPA have resulted in an atypical dune surface, patchy vegetation, and large areas of bare sand. Plantings and fencing have been added to remove perpendicular access routes and breaks in the dunes (Department of the Navy 2012a).

The DPA at JEB Little Creek encompasses 58 ac (23 ha) including 17 ac (6.9 ha) of primary dune, 21 ac (8.5 ha) of secondary dune, and 20 ac (8.1 ha) of secondary dune field. Dunes were documented along 91 percent of the shoreline at the Installation (Department of the Navy 2012a). The following sections describe the ecological communities that occur at JEB Little Creek, and **Figure 2-8** identifies the locations of these communities. A cumulative list of plant species identified during vegetation surveys of the Installation are provided in **Appendix G** (Department of the Navy 1997, Department of the Navy 2000a, and Department of the Navy 2012b).

The two wetland ecosystems described in **Section 2.9.11** (tidal oligohaline marsh) and **Section 2.9.12** (Coastal Plain depression wetlands) are based on data collected during the 2015 wetland delineation survey and jurisdictional determination, and provide a representation of vegetation types expected to occur in these habitats. Several methodologies were used in designating ecological communities at JEB Little Creek; the ecological community classifications identified in **Figure 2-8** are representative of the different community classifications applied during the different surveys.

2.9.1 Mesic Mixed Pine-Hardwood Forest

The mesic mixed pine-hardwood forest vegetation type encompasses 79.54 acres of JEB Little Creek. Mesic mixed pine-hardwood forests are species-rich, closed canopy stands of mesophytic species. Canopy dominants include loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), water oak (*Quercus nigra*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). The midstory primarily consists of sourwood (*Oxydendrum arboreum*), American holly (*Ilex opaca* var. *opaca*), flowering dogwood (*Cornus florida*), and American hornbeam (*Carpinus caroliniana*). The tall shrub layer may be abundant and consist of redbay (*Persea borbonia*), sweet pepperbush (*Clethra alnifolia*), common sweetleaf (*Symplocos tinctoria*), and, on some sites, pawpaw (*Asimina triloba*). Partridgeberry (*Mitchella repens*) and various ferns such as Christmas fern (*Polystichum acrostichoides*) and common ladyfern (*Athyrium filix-femina*) form a patchy herbaceous layer. Evening trumpetflower (*Gelsemium sempervirens*), muscadine (*Vitis rotundifolia*), Virginia creeper (*Parthenocissus quinquefolia*), roundleaf greenbrier (*Smilax rotundifolia*), and eastern poison ivy (*Toxicodendron radicans*) are typical vines associated with this community type.

2.9.2 Mesic Mixed Hardwood Forest

Mesic mixed hardwood forests occur on level ridgetops, mesic uplands, and lower slopes on acidic, relatively poor soils. This forest type has a closed canopy dominated by various oak species such as southern red oak (*Quercus falcata*) and post oak (*Quercus stellata*), sweetgum, loblolly pine, and tuliptree (*Liriodendron tulipifera*). Lesser amounts of red maple and hickories (*Carya* spp.) also occur. Understory composition of saplings and shrubs is characterized by eastern red cedar (*Juniperus virginiana*), blackgum (*Nyssa sylvatica*), sweetgum, black cherry (*Prunus serotina* var. *serotina*), southern magnolia (*Magnolia grandiflora*), small wax myrtle (*Morella cerifera*), northern bayberry (*Morella pensylvanica*), highbush blueberry (*Vaccinium corymbosum*), Canadian serviceberry (*Amelanchier canadensis*), mountain laurel (*Kalmia latifolia*), American holly, and roundleaf greenbrier. The herbaceous layer is generally sparse to absent, but patches of Christmas fern, bracken fern (*Pteridium aquilinum*), or evening trumpetflower may occur. Dense

patches of muscadine may also occur. The mesic mixed hardwood forest vegetation type encompasses 96.85 acres of JEB Little Creek. This forest type is commonly referred to as southern mixed hardwood forest and is the most common hardwood community at the Installation.

2.9.3 Pine Forest

The pine forest vegetation type encompasses 73.61 acres of JEB Little Creek. The planted pine tracts are dominated by loblolly pine, with a scattering of sapling hardwoods in the midstory. The understory is generally very sparse and primarily includes tangles of greenbrier (*Smilax* sp.) and Japanese honeysuckle (*Lonicera japonica*).

2.9.4 Maritime Swamp Forest

The maritime swamp forest vegetation type encompasses 0.59 acres of JEB Little Creek. Maritime swamp forests are seasonally flooded, or less frequently saturated, maritime wetland forests that occur in large, protected, interdune swales or along sluggish streams just inland from the estuarine zone. Dominant overstory trees include blackgum, red maple, southern red oak, American sycamore (*Platanus occidentalis*), sweetgum, sweetbay (*Magnolia virginiana*), and black willow (*Salix nigra*). Shrubs are diverse and include highbush blueberries, common buttonbush (*Cephalanthus occidentalis*), northern bayberry, small wax myrtle, greenbriers, sweet pepperbush, and redbay. The herbaceous layer has several ferns including Virginia chain fern (*Woodwardia virginica*), netted chain fern (*Woodwardia areolata*), eastern poison ivy, stickywilly (*Galium aparine*), Virginia creeper, swamp dock (*Rumex verticillatus*), blackberry (*Rubus* sp.), common reed (*Phragmites australis*), seaside goldenrod (*Solidago sempervirens*), swamp loosestrife (*Decodon verticillatus*), evening trumpetflower, partridgeberry, pickerelweed (*Pontederia cordata*), and Canadian rush (*Juncus canadensis*).

2.9.5 Maritime Upland Forest

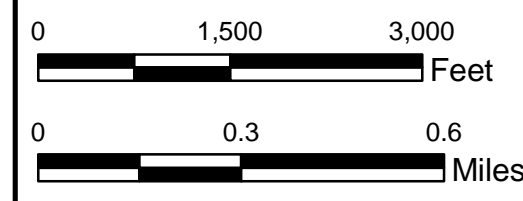
The maritime upland or evergreen forest vegetation type encompasses 50.41 ac (20.4 ha) of JEB Little Creek. As part of the 2017 update to ecological classifications (Fleming and Patterson 2017) maritime loblolly pine forests, maritime mixed deciduous forests, and maritime live oak forests were combined into the maritime upland forests ecological group. This group contains species-poor evergreen and mixed coastal forests of sheltered, oceanside and bayside dunes and sandflats that are generally protected from salt spray. Forest overstories consist of live oak, loblolly pine, water oak, southern red oak, post oak, black oak (*Quercus velutina*), cherrybark oak (*Quercus pagoda*), hickories, and black cherry. The understory contains American holly, common sweetleaf, devilwood (*Osmanthus americanus*), American beautyberry (*Callicarpa americana*), small wax myrtle, redbay, wild olive (*Osmanthus americanus*), and privet (*Ligustrum sinense*). Greenbrier and muscadine grape (*Vitis rotundifolia*) are common vine species, and the herbaceous layer is usually sparse and contains species such as Virginia creeper and occasionally dense patches of English ivy (*Hedera helix*). Maritime live oak forest is a critically imperiled (S1) natural community in Virginia (Section 2.11).

2.9.6 Maritime Dune Woodland

Maritime dune woodlands are deciduous, coniferous, and broadleaf evergreen woodlands that form on backdunes that are protected from regular salt spray. Live oak and sassafras (*Sassafras albidum*) dominate these stands, with loblolly pine, black cherry, bluejack oak (*Quercus incana*), water oak (*Quercus nigra*) and Hercules' club (*Zanthoxylum clava-herculis*) representing less abundant associate species. Herbaceous plants that are scattered within this woodland type include fescue



- Ecological Communities**
- Beach
 - Interdunal Wetland
 - Maritime Dune Grassland
 - Maritime Dune Woodland
 - Maritime Evergreen Forest
 - Maritime Scrub
 - Maritime Swamp Forest
 - Mesic Mixed Hardwood Forest
 - Mesic Mixed Pine Hardwood Forest
 - Overwash Flats
 - Pine Forest
 - Sand
 - Tidal Marsh
 - Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 2-8.
Ecological Communities of
JEB Little Creek

This page intentionally left blank.

grass (*Festuca* spp.), seabeach threeawn (*Aristida tuberculosa*), cottony goldenaster (*Chrysopsis gossypina* spp. *cruiseana*), yellow thistle (*Cirsium horridulum*), coastal bedstraw (*Galium hispidulum*), longbranch frostweed (*Helianthemum canadense*), woolly ragwort (*Packera tomentosa*), Walter's groundcherry (*Physalis walteri*), and coastal jointweed (*Polygonella articulata*). The herbaceous layer is sparse in most of these communities, with scattered clumps of graminoids such as shore little bluestem (*Schizachyrium littorale*) and panicgrasses (*Dichanthelium* spp. and *Panicum* spp.) as well as greenbrier and evening trumpetflower.

The maritime dune woodland vegetation type encompasses 13.53 ac (5.4 ha) of JEB Little Creek. The majority of mapped maritime dune woodlands occur as discrete patches within highly disturbed areas of the JEB Little Creek DPA and resemble the live oak-bluejack oak woodlands sub-community type (Department of the Navy 2012b). This sub-community type is considered critically imperiled (S1) within the state (**Section 2.11**).

2.9.7 Maritime Dune Scrub

Maritime dune scrub communities occupy somewhat protected maritime backdunes and leeward dune slopes that are generally located along the inland edge of dune systems in zones that are sheltered from constant salt spray. Maritime dune scrub vegetation type encompasses 7.53 acres of JEB Little Creek. At JEB Little Creek, the maritime dune scrub community is located in recently disturbed areas in the Beaches and Dunes Management Unit. Strong winds and salt spray have sculpted dense wedge-shaped canopies. The toxic effect of salt spray kills the tender terminal buds, but the more protected lateral buds survive and develop to form the characteristic wind-swept shape. The most common species observed within this community type are live oak. Other tree and shrub species include black cherry, common persimmon (*Diospyros virginiana*), northern bayberry, and woolly beach heather (*Hudsonia tomentosa*). Common grasses, forbs, and vines observed within this community include shore little bluestem, Gray's flatsedge (*Cyperus grayi*), seaside goldenrod, greenbrier, wisteria (*Wisteria* spp.), evening trumpetflower, coral honeysuckle (*Lonicera sempervirens*), and the nonnative and invasive Japanese honeysuckle. The shrub canopy height reaches only 15 feet (4.6 m). Vines such as eastern poison ivy, Virginia creeper, muscadine, and greenbrier intertwine with the shrubby vegetation. Migrating sand periodically buries or exposes the shrub community. Deep sand and dry conditions also prevent the succession of shrubs to tree communities.

Maritime dune scrub communities that are dominated by live oak are classified as live oak dune scrub. This sub-community type is considered critically imperiled (S1) in Virginia (**Section 2.11**). Maritime dune scrub communities dominated by northern bayberry growing in association with stunted individuals of black cherry and persimmon are classified as northern bayberry dune scrub communities. This sub-community type is considered imperiled (S2) but there is uncertainty about the rank in the range of 1 in either direction on the 1-5 scale (**Section 2.11**) (Department of the Navy 2012b).

2.9.8 Maritime Dune Grassland

Maritime dune grasslands occur along primary dunes and in the dunes and swales inland of the primary dunes. Salt spray limits the vegetation to salt-tolerant species including saltmeadow cordgrass (*Spartina patens*), bitter panicgrass (*Panicum amarum* var. *amarum*), coastal panicgrass (*Panicum amarum* var. *amarulum*), sea oats (*Uniola paniculata*), seaside goldenrod, and seacoast marsh elder (*Iva imbricata*), American beachgrass (*Ammophila breviligulata*) and shore little bluestem. Vertical rhizomes, as deep as 30 feet (9.1 m) below the top of the dune, may develop in some grass species in response to sand burial. Seaside goldenrod is a common non-grass species

of the dune grasslands that is particularly important to migrating monarch butterflies (*Danaus plexippus*). Blowouts, overwash, and onshore winds directly influence this community. Other common species observed include woolly beach heather, dune bean (*Strophostyles helvola*), dusty miller (*Artemisia stelleriana*), poorjoe (*Diodia teres*), Japanese sedge (*Carex kobomugi*), dune sandbur (*Cenchrus tribuloides*), seabeach evening primrose (*Oenothera humifusa*), sea rocket (*Cakile edentula*), and camphorweed (*Heterotheca subaxillaris*).

The maritime dune grassland vegetation type encompasses 24.25 acres (9.8 ha) of JEB Little Creek. The maritime dune grasslands in the JEB Little Creek DPA can be further classified as North Atlantic mixed dune grassland. This sub-community type is dominated by American beachgrass, seaside goldenrod, bitter panicgrass, and seabeach evening primrose (Department of the Navy 2012b). North Atlantic mixed dune grassland is considered imperiled (S2) within the state (**Section 2.11**).

2.9.9 Interdune Swales and Ponds

Interdune ponds are wetland depressions in active or relict dunes that are seasonally to semipermanently flooded by groundwater or rainwater. They are protected from salt spray and wind shear by adjacent dunes, and support a greater variety of plants and animals than the dry dunes. Except for precipitation, these wetlands are often the only source of freshwater in the coastal environment and support major groups of animals such as frogs, salamanders, water snakes, turtles, aquatic birds, and aquatic mammals. Amphibians are directly dependent on the freshwater wetland habitat. Emergent aquatic vegetation includes several species of bulrushes (*Scirpus* spp.), grasses (*Panicum* spp.), saltmeadow cordgrass, or squarestem spikerush (*Eleocharis quadrangulata*). Herbaceous species include seaside goldenrod, swamp smartweed (*Polygonum hydropiperoides*), and Pennsylvania smartweed (*Polygonum pensylvanicum*). Common scrub-shrub species include groundsel tree (*Baccharis halimifolia*), black willow, and multiflora rose (*Rosa multiflora*).

The interdune wetland vegetation type encompasses 0.98 acre (.39 ha) of JEB Little Creek. The 2012 survey of the dune habitats also identified loblolly pine and several shrub species including southern bayberry (*Morella cerifera*), groundsel tree, swamp rose (*Rosa palustris*), and Jesuit's bark (*Iva frutescens*) within the wetland areas associated with this community type. Swamp rose mallow (*Hibiscus moscheutos*), swamp dock, and climbing hempvine (*Mikania scandens*) were also identified in the herbaceous layer. Based on the dominant species within the tree and herbaceous strata, the interdunal wetlands at JEB Little Creek appear to be part maritime wet loblolly pine forest or maritime swamp forest (black willow type), and part interdune swale (saltmeadow cordgrass brackish type) community types (Department of the Navy 2012b). These sub-communities are ranked imperiled (S2) in Virginia but there is uncertainty about the rank in the range of 1 in either direction on the 1-5 scale (**Section 2.11**).

The slightly larger wetland to the east is dominated by shrub species including black willow, groundsel tree and swamp rose as well as saltmeadow cordgrass, swamp rose mallow, and swamp dock. This sub-community type appears to be intermediate between maritime swamp forest (black willow type) and interdune swale (saltmeadow cordgrass brackish type). Maritime swamp forest (black willow type) is considered unrankable (SU) due to lack of information or substantially conflicting information about status or trends (**Section 2.11**).

2.9.10 Upper Beaches and Overwash Flats

The beach vegetation type encompasses 23.84 ac (9.65 ha) and sand land type encompasses an additional 9.09 ac (3.67 ha) of JEB Little Creek. Upper beach habitat is located just above the

mean high tide limit, but is flooded by high spring tides and storm surges. The upper limit of the beach is usually marked by flotsam deposited by storm-lashed surf and spring tides. Fragments of vegetation, driftwood, and other debris form the wrack line. Vegetation is limited to pioneering, salt-tolerant, succulent annuals, such as American searocket, or Russian thistle (*Salsola kali*), but scattered representatives of slender seapurslane (*Sesuvium maritimum*), seaside knotweed (*Polygonum glaucum*), small bushy knotweed (*Polygonum ramosissimum* var. *prolificum*), annual seepweed (*Suaeda linearis*), herbaceous seepweed (*S. maritima* ssp. *maritima*), and crested saltbush (*Atriplex cristata*) may occur.

The overwash flats vegetation type encompasses 2.3 ac (.93 ha) of JEB Little Creek. An overwash flat community occurs west of the Officer's Beach, off the end of a rock revetment. Storm surges are funneled through breaches in the primary dunes and around the revetment associated with the Officer's Beach groin. Coastal panicgrass, saltgrass, and saltmeadow cordgrass are predominant species and form dense ground cover in patches. Vegetation in the overwash community is determined by tidal range and periodicity, depth of the water table, salt spray, blowing sand, and oceanic overwash.

Upper beach/overwash flat habitats are critical in support of several globally rare, federally listed species. These are described in **Section 2.11** (Rare, Threatened, and Endangered Species, and Significant Ecological Communities).

2.9.11 Tidal Oligohaline Marsh

The tidal marsh vegetation type encompasses 26.35 ac (10.66 ha) of JEB Little Creek. Tidal oligohaline marsh habitat is primarily a graminoid-dominated type of wetland located within slightly brackish zones along tidal rivers and streams of the Coastal Plain. A variety of species are common within the tidal oligohaline marsh habitat, but this habitat type is typically dominated by big cordgrass (*Spartina cynosuroides*), forming extensive, tall stands along edges of main tidal channels. Associated species include saltmeadow cordgrass, saltgrass (*Distichlis spicata*), smooth cordgrass (*Spartina alterniflora*), seaside goldenrod, chairmaker's bulrush (*Schoenoplectus americanus*), Virginia glasswort (*Salicornia depressa*), Jesuit's bark, and common reed.

2.9.12 Coastal Plain Depression Wetlands

Coastal Plain depression wetlands are poorly drained wetlands that are characteristic of Coastal Plain terraces that have fluctuating, seasonally perched water tables. Vegetation ranges from nearly forested to entirely herbaceous. Common species include black willow, bald cypress (*Taxodium distichum*), eastern baccharis, swamp rose, and wax myrtle. The herbaceous stratum is dominated by royal fern (*Osmunda regalis*), panicgrass (*Panicum* spp.), foxtail clubmoss (*Lycopodiella alopecuroides*), shore little bluestem, winter bentgrass (*Agrostis hyemalis*), broomsedge bluestem (*Andropogon virginicus*), common reed, narrowleaf cat-tail (*Typha angustifolia*), common rush (*Juncus effusus*), woolgrass (*Scirpus cyperinus*), narrowleaf plantain (*Plantago lanceolata*), grape (*Vitis* spp.), and slender lespedeza (*Lespedeza virginica*). Other species that may occur include American holly, swamp rose mallow, and climbing hempvine.

The coastal plain depression wetland is not a community included in the Virginia Ecological Community Classification, but is a type of wetland that (1) occurs on Installation; (2) can be characterized by multiple Virginia Ecological Communities; and (3) is observed as a type of wetland according to delineation criteria.

2.10 Fauna

Though JEB Little Creek has a diverse array of ecosystems that provide habitat for a number of faunal species native to Chesapeake Bay and Tidewater area, the Installation is largely developed and therefore primarily supports fauna typical of urban environments. JEB Little Creek has documented fauna occurring on the Installation through multiple assessments, studies, and projects. A list of fish, reptile, amphibian, and other wildlife species was compiled from these studies and records and is provided in **Appendix G**.

2.10.1 Mammals

The urban environment and lack of large forested areas at JEB Little Creek and surrounding community limit the number of mammals that are likely to occur. Those that do occur are generally species adapted to urban and open habitats. Common large to medium-sized mammals include gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), and muskrat (*Ondatra zibethicus*). Smaller insectivores include the southern short-tailed shrew (*Blarina carolinensis*), eastern mole (*Scalopus aquaticus*), Norway rat (*Rattus norvegicus*), hispid cotton rat (*Sigmodon hispidus*), and several species of mice including the house mouse (*Mus musculus*) and white-footed mouse (*Peromyscus nuttalli leucopus*).

A mammal survey was conducted within the dune habitats in 2012 using pitfall and live traps, with limited results (Department of the Navy 2012c). The low number of species identified during this survey is probably partially attributed to the February timeframe of the survey, when a decrease in small mammal activity would be expected. The results of the study suggested that *Mus* and *Sigmodon* preferred habitats consisting of well-developed grass communities, whereas *Peromyscus* preferred scrub and maritime forest communities. The primary dune system lining the beaches of JEB Little Creek comprises mixed grass, such as coastal little bluestem (*Schizachyrium littorale*), providing preferred habitat for *Mus* and *Sigmodon*. The secondary dune system of JEB Little Creek comprises a mixture of grass, scrub, and maritime dune forest, dominated by live oak, providing preferred habitat for *Peromyscus*. A list of mammal species identified in surveys or incidental observation at JEB Little Creek is included in **Appendix G**.

As part of the Navy regional contract effort, the Installation is currently conducting acoustic and mist net surveys to identify all bat species present and, specifically, to determine if the northern long-eared bat occurs on the Installation. Analysis of acoustic data and study results from a survey of Fort Story in 2016 resulted in detection of northern long-eared bats. Surveys to collect baseline information on the species richness and occurrence of bats is scheduled to begin at JEB Little Creek with the funding granted for fiscal year (FY) 2018. In the interim, and future, surveys will be conducted of any natural sites proposed for construction or disturbance through the Environmental Checklist Process, to determine potential impacts to wildlife and their habitat, including bats. As always, first priority for sites with potential impacts to listed species will be avoidance of those areas. Where safe, snags are left as habitat for wildlife.

2.10.2 Marine Mammals

Marine mammals include dolphins, porpoises, whales, manatees, and seals, of which various species occur in the Chesapeake Bay and offshore from JEB Little Creek. Little Creek does not have routine conservation tasks concerning these species because these organisms are generally associated with pelagic habitat. Of the marine mammals that are likely to utilize the waters adjacent to JEB Little Creek, the bottlenose dolphin (*Tursiops truncatus*) is the most common. The harbor

porpoise (*Phocoena phocoena*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalis*), and West Indian manatee (*Trichechus manatus*) are known to occur, though less frequently. Dolphins may be present in the bay from April through December but are most common in June. Whales are most common during the winter months (Department of the Navy 1998). Occasionally, dead or stranded marine mammals or sea turtles are found on the JEB Little Creek shoreline. Protocol for dealing with stranded marine mammals or sea turtles is discussed in **Section 3.5.2** and **Section 4.3.1**.

2.10.3 Birds

The avifaunal community is the most diverse faunal community present at the Installation. In 2013–2014, a bird species richness survey was conducted at JEB Little Creek. A list of 222 bird species that had the potential to occur at JEB Little Creek was generated based on literature review and past observational studies. Of these 222 species, 212 were confirmed through visual or auditory observation. The study identified 16 taxonomic orders, Passeriformes (perching birds) containing the most species and Charadriiformes with the second-most (VDCR-DNH 1990, DoD Partners in Flight n.d., and Department of the Navy 2000a) (**Appendix G**). The largest diversity was recorded during the breeding season with 86 species, and the lowest was in the fall with 58 species. (Tetra Tech 2014). The latest bird survey conducted at JEB Little Creek was the annual Audubon Christmas Bird Count in December 2016. During this count 75 species of birds were identified.

One of the largest bird groups occurring at JEB Little Creek is the Passeriformes, which utilize forested, open grounds, and other terrestrial areas. Several other migratory seabirds and shorebirds are associated with the shoreline habitats during different times of the year. Common seabirds include pelican (*Pelecanus occidentalis*), loons (*Gavia* spp.), grebes (*Podiceps auritus* and *Podilymbus podiceps*), and cormorants (*Phalacrocorax* spp.). Common shorebirds include plovers (*Charadrius semipalmatus* and *Pluvialis squatarola*) and sandpiper (*Actitis macularia*). Several species of gulls (*Larus* spp.), terns (*Sterna* spp.), ducks (*Anas* spp.), and geese (*Branta* spp.) are common offshore and in beach areas. The lakes and ponds of the Installation support a number of waterfowl, including resident and migratory ducks and geese, and wading birds such as herons, egrets, and rails.

Osprey (*Pandion haliaetus*) nest on natural and human-made structures throughout the Installation. Bald eagles (*Haliaeetus leucocephalus*) have been documented at JEB Little Creek, but no confirmed nesting activity has been observed to date. A Raptor Management Plan has been prepared to manage raptor and owl species that occur at JEB Little Creek (Department of the Navy 2011) (**Appendix H**).

2.10.4 Fish

The ichthyofauna of JEB Little Creek can be divided into freshwater and estuarine fish species. Freshwater fish are residents of the lakes, ponds, and nontidal ditches. Surveys of Lake Bradford indicate at least 19 species of fish occur in the lake (VDCR-DNH 1990, Swihart and Galvez 1996, and Galvez and Swihart 2000). Important sport fish occurring on the Installation include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), black crappie (*Pomoxis nigromaculatus*), white perch (*Morone americana*), and yellow perch (*Perca flavescens*). Common carp (*Cyprinus carpio*), American eel (*Anguilla rostrata*), bowfin (*Amia calva*), and gizzard shad (*Dorosoma cepedianum*) are the dominant nonsport fish that occur at the Installation.

Estuarine fish may occur in tidal creeks, Little Creek Harbor, and the adjacent waters of the Chesapeake Bay. These estuarine fish species are primarily migratory; however, some species are year-round residents. A 2016 nearshore study of JEB Little Creek detected multiple species of fish occurring near JEB Little Creek by trawling, including bay anchovy (*Anchoa mitchilli*), threadfin shad (*Dorosoma petenense*), Atlantic croaker (*Micropogonias undulatus*), black seabass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), American butterfish (*Peprilus triacanthus*), and summer flounder (*Paralichthys dentatus*). Atlantic sturgeon (*Acipenser oxyrinchus*) were detected in nearshore habitat of JEB Little Creek through receiver array surveys (Hager 2017). The nearshore study conducted at JEB Little Creek involved several types of survey methods to develop a baseline of the nearshore habitat existing conditions (Tetra Tech 2016a). Additional telemetry studies were conducted to examine the occupancy and migration patterns of the Atlantic sturgeon in the Lower Chesapeake Bay (Hager 2017). **Appendix G** lists freshwater and estuarine fish species that are known or expected to occur in the Installation area.

2.10.5 Reptiles and Amphibians

Due in part to its large number of wetlands, streams, ponds, lakes, and estuarine communities, JEB Little Creek supports a diverse group of herpetofauna. Thirteen amphibian species and 22 reptile species are known or have the potential to occur on the Installation. Species known to occur, as identified in **Appendix G**, include species identified during a 2009 frog and toad call survey and a 2012 amphibian and reptile survey of dune habitats. The 2012 survey involved detection of species within the DPA, through visual reconnaissance, minnow traps set in aquatic and terrestrial habitats, and frog call surveys to evaluate the presence of amphibians and reptiles. Four amphibian species and six reptile species were detected during this study (Department of the Navy 2012d).

Four species of federally listed sea turtles also are known to occur within adjacent waters associated with the Chesapeake Bay during the warmer months of the year, including the green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and the leatherback sea turtle (*Dermochelys coriacea*). Federally listed sea turtles that are known to occur in the adjacent waters of the Chesapeake Bay and those species that have been observed at JEB Little Creek are described in **Section 2.11** (Rare, Threatened, and Endangered Species and Significant Ecological Communities).

Common herpetofauna known to occur around lakes, ponds, streams, and large wetland complexes include reptiles such as eastern snapping turtle (*Chelydra serpentina serpentina*), yellow-bellied slider (*Trachemys scripta scripta*), eastern mud turtle (*Kinosternon subrubrum*), and northern watersnake (*Nerodia sipedon sipedon*). Common amphibians associated with these areas include American bullfrog (*Lithobates catesbeianus*), northern green frog (*Lithobates clamitans melanota*), and southern leopard frog (*Lithobates sphenoccephalus*). Species occurring in forested areas adjacent to temporary or isolated wetlands include the eastern red-backed salamander (*Plethodon cinereus*), Atlantic coast slimy salamander (*Plethodon chlorobryonis*), Cope's gray treefrog (*Hyla chrysocelis*), green treefrog (*Hyla cinerea*), southern toad (*Anaxyrus terrestris*), Fowler's toad (*Anaxyrus fowleri*), and eastern box turtle (*Terrapene carolina*). Upland species are generally composed of reptile species, including eastern gartersnake (*Thamnophis sirtalis sirtalis*), black rat snake (*Elaphe obsoleta*), common five-lined skink (*Plestidon fasciatus*), and the little brown skink (*Scincella lateralis*). The red-eared slider (*Trachemys scripta elegans*) may also occur in wetland habitats (see also **Section 3.11.3** [Invasive Plant and Wildlife Species]).

The DoD Partners in Amphibian and Reptile Conservation program is currently updating herpetofauna species lists for the approximately 80 Navy installations that have INRMPs

(NAVFAC MIDLANT 2013). To date, Navy installations within the NAVFAC Field Engineering Command Washington, Mid-Atlantic, Mid-West, and Northwest areas of responsibility have been updated. Once all the updated species lists are completed, they will be entered into a database on the Navy Environmental Portal (<https://conservation.dandp.com/nr/#/login>). The database will serve to fill numerous needs in the community. Many of the installations lack an accurate and up-to-date list of amphibian and reptile species. With data calls, INRMP updates, and other relevant planning documents needed to support Navy projects and missions, it is essential that the most accurate species occurrence data be available on which to base natural resource management decisions. This database was reviewed during the development of this INRMP update.

2.11 Rare, Threatened, and Endangered Species and Significant Ecological Communities

The upper beach/overwash flat habitats at JEB Little Creek include habitat with the potential to support several federally listed species, such as the federally threatened loggerhead sea turtle, and the federally threatened northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) and seabeach amaranth (*Amaranthus pumilus*). Additionally, the intertidal zone at JEB Little Creek provides habitat that has the potential to support the threatened rufa red knot (*Calidris canutus rufa*).

The VDCR-DNH conducted a survey in 1989 for rare, threatened, and endangered species at JEB Little Creek (VDCR-DNH 1990). No federally or state-listed species were identified at JEB Little Creek during the survey; however, three plants considered rare in Virginia were identified. Virginia beach pinweed (*Lechea maritima* var. *virginica*), classified as vulnerable (S3), was found on the primary and secondary dunes in the open herbaceous and scrub zones between the maritime forest and the beach. Bluejack oak occurs in the maritime forests of the secondary dunes, and Spanish moss (*Tillandsia usneoides*) was identified at Scout Island. Bluejack oak and Spanish moss are currently considered imperiled (S2) in Virginia. Subsequent surveys have identified additional rare species at JEB Little Creek. Wild olive (*Osmanthus americanus* var. *americanus*) is ranked as S1 in Virginia and was recorded during a vegetation survey of the administrative area (Department of the Navy 1997). Tall yellow-eyed grass (*Xyris platylepis*), another imperiled (S2) species in Virginia, also has been identified within the Beaches and Dunes Management Unit (Department of the Navy 2000a). A recent survey of the dune habitat at JEB Little Creek identified seacoast marsh elder (S1/S2) and bluejack oak (S2) on the northern and eastern perimeters of the Installation; both are considered species of conservation concern in Virginia (Department of the Navy 2012a and 2012b). **Figure 2-9** shows the locations for the rare species observed at JEB Little Creek, except for wild olive, as the location of this rare species at JEB Little Creek is unknown.

Table 2-6 lists the state ranks and status of the rare species known to occur at JEB Little Creek. State ranks for sensitive species and ecological communities in Virginia are assigned through a consensus of natural heritage program representatives, scientific experts, and The Nature Conservancy to designate a rarity rank based on the status of a species or variety within the political boundaries of the state. Factors considered include number of occurrences, number of individuals, and severity of threats (Townsend 2012). State rarity codes, including those identified in **Table 2-6**, are available on the Virginia Department of Conservation and Recreation (VDCR) website.

Several of the natural ecological communities described for JEB Little Creek in **Section 2.9** are also considered state or globally rare (**Table 2-6**). Of these communities, the maritime mixed forests, live oak-bluejack oak woodlands, and live oak dune scrub are ranked as critically imperiled (S1). North Atlantic mixed dune grassland is ranked as imperiled (S2). Northern bayberry dune

scrub, interdune swale, and maritime wet loblolly pine forest are also ranked imperiled (S2) (Department of the Navy 2012b and Fleming and Patterson 2017).

Table 2-6. State Rare Species and Natural Communities Occurring at JEB Little Creek.

Common Name	State Rank	State Status
Birds		
Bald eagle (<i>Haliaeetus leucocephalus</i>)	S3S4B/S3S4N	–
Least tern (<i>Sterna antillarum</i>)	S2B	SC
Peregrine falcon (<i>Falco peregrinus</i>)	S1B/S2B	ST
Roseate Tern (<i>Sterna dougallii</i> ssp. <i>dougallii</i>)	-	SE
Red Knot (<i>Calidris canutus</i> ssp. <i>rufa</i>)	S1	ST
Plants		
Bluejack oak (<i>Quercus incana</i>)	S1	
Virginia beach pinweed (<i>Lechea maritima</i> var. <i>virginica</i>)	S2	–
Tall yellow-eyed grass (<i>Xyris platylepis</i>)	S3	–
Wild olive (<i>Osmanthus americanus</i> var. <i>americanus</i>)	S2	–
Spanish moss (<i>Tillandsia usneoides</i>)	S1	–
Seacoast marsh elder (<i>Iva imbricate</i>)	S2	–
Natural Communities	S1/S2	–
Maritime upland forests Maritime live oak forest	S1	–
Maritime dune woodland Live oak-bluejack oak woodlands	S1	-
Maritime dune grassland North Atlantic mixed dune grassland	S2	–
Maritime dune scrub Northern bayberry dune scrub Live oak dune scrub	S2? S1	–
Interdune swales and ponds/maritime swamps Interdune swale (saltmeadow cordgrass brackish type) Maritime wet loblolly pine forest Maritime swamp forest (black willow type)	S2? S1	–

State Rank

B – Breeding populations

N – Non-breeding populations

S1 – Critically imperiled due to extreme rarity or other factors making it especially vulnerable to extirpation; typically five or fewer occurrences, or very few remaining individuals (<1,000)

S2 – Imperiled because of rarity or other factors making it vulnerable to extirpation; typically 6–20 occurrences or few remaining individuals (1,000–3,000)

S3 – Vulnerable because rare or uncommon, or occurring only in a restricted range (even if abundant in some locations), or because of other factors making it vulnerable to extirpation; typically 21–100 occurrences, or between 3,000 and 10,000 individuals

S4 – Apparently Secure - uncommon but not rare, and usually widespread. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals

SU – Unrankable due to lack of information or substantially conflicting information about status or trends

S#S# – Range rank; a numeric range rank used to indicate the range of uncertainty about the exact status of the species.

Ranges cannot skip more than one rank

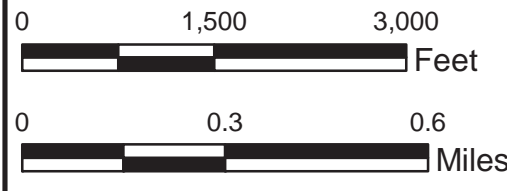
State Status

SC – Species of special concern

ST – State threatened



- Rare Species**
- Blue Jack Oak
 - Seacoast Marsh Elder
 - Spurge Species
 - Seacoast marsh elder
 - Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 2-9.
State Rare Species Locations of
JEB Little Creek

This page intentionally left blank.

2.11.1 Piping Plover

Piping plover (*Charadrius melodus*) is a federally threatened species that has the potential to occur at JEB Little Creek. Piping plover is a small shorebird that inhabits open sandy beaches and salt flats. The Atlantic coast population of piping plover was estimated at 1,782 pairs in 2010 (USFWS 2011a). Piping plovers are not known to occur at JEB Little Creek, and the species was not documented during the 2013 bird survey for the Installation. A review of survey data collected in 2011 by VDGIF indicated that the closest population of piping plover occurs at Fisherman Island, approximately 17 mi (27 km) northeast of the Installation, where several nesting pairs have been observed (VDGIF 2012). General characteristics of the piping plover are provided in **Table 2-7**.

Table 2-7. Piping Plover Characteristics.

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

Source: USFWS 2012a

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



Piping plover (*Charadrius melodus*)

Source: Wikipedia Commons 2013b

2.11.2 Roseate Tern

The roseate tern (*Sterna dougallii dougallii*) is both federally and state-endangered, and has the potential to occur at JEB Little Creek. Roseate tern is a medium-sized bird that nests on small barrier islands and spends most of its life offshore and along the Atlantic coast. The species migrates in late August to early September to the waters off Trinidad and northern South America. Roseate tern populations declined greatly due to hunting in the late 19th century. Currently populations remain in the low range of 2,500–3,300. Primary threats to roseate tern include habitat disruption and development along sensitive barrier island habitats the species relies on for nesting (USFWS 2011b). A roseate tern survey was completed in 2014 at JEB Little Creek and no roseate terns were observed. General characteristics of roseate tern are provided in **Table 2-8**.

Table 2-8. Roseate Tern Characteristics.

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

Source: USFWS 2011b and 2012b



Roseate tern (*Sterna dougallii dougallii*)

Source: Wikipedia Commons 2013a

2.11.3 Rufa Red Knot

The rufa red knot is a federally and state-threatened species that has not been observed at JEB Little Creek (VDGIF 2017). The rufa red knot is a medium-sized shorebird that inhabits intertidal habitats, particularly those located near coastal inlets and bays. Flocks of red knot converge on staging areas along the entire Atlantic coast and are faithful to specific sites, returning to the same location year after year. The spring migration is timed with the release of horseshoe crab eggs. One of the primary threats to the red knot population is the increased take of horseshoe crabs for bait in commercial fisheries and habitat degradation along their migratory route.

Incidental sightings and National Audubon Society Christmas Bird Count records (National Audubon Society 2012) indicate that rufa red knot could be observed in the tidewater area only to rest or forage during the fall or spring migration. Rufa red knot were not detected during the 2013 bird survey at Little Creek, and have not been documented since. General characteristics of rufa red knot are provided in **Table 2-9**.

*More information on the rufa red knot is available from USFWS at:
<http://www.fws.gov/northeast/redknot/>.*

Table 2-9. Rufa Red Knot Characteristics.

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

Source: USFWS 2012c



Rufa Red knot (*Calidris canutus rufa*)

Source: Wikipedia Commons 2013c

2.11.4 Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is a federally and state-threatened species that has been documented near JEB Little Creek (VDGIF 2017). Individuals were acoustically detected at JEB Fort Story, and an individual was mist-netted at Naval Station Activity Northwest Annex. This medium-sized bat occupies several types of habitats. The preferred winter habitat is mines and caves used as hibernacula (USFWS 2015a). This species favors small cavities or crevices in live and dead trees, and is adaptable in selecting roots. It is rarely known to occur in barns and sheds (USFWS 2015a).

Reproduction begins in late summer or early fall through a process call delayed fertilization. During the hibernation period, the females store sperm until spring. After they emerge from hibernation the females ovulate and the stored sperm fertilizes the eggs. The females will roost in small colonies where they will birth one pup (USFWS 2015a).

A severe threat to the northern long-eared bat is the presence of the fungal disease, white-nose syndrome (USFWS 2015a). General characteristics of the northern long-eared bat are provided in **Table 2-10**.

Table 2-10. Northern Long-eared Bat Characteristics.

Attribute	Description
Size	Approximately 3–3.7 inches (7.62–9.4 cm) in length
Identification	Adult fur is medium to dark brown on the back and tawny to pale-brown on the underside.
Roosting	After fertilization, pregnant females roost in small colonies. Most give birth around May or early June to late July.

Source: USFWS 2015a



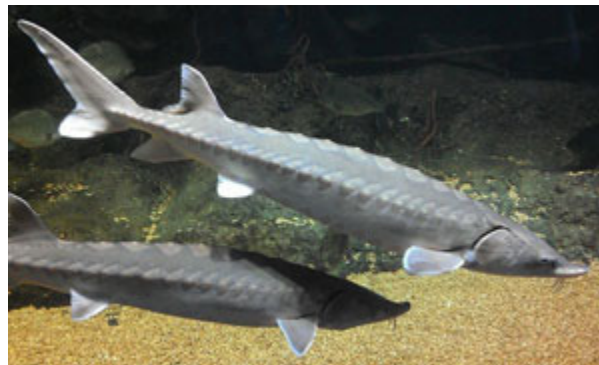
Northern Long-eared Bat (*Myotis septentrionalis*)

Source: USFWS 2015a

2.11.5 Atlantic Sturgeon

The Atlantic sturgeon is a federally and state-endangered species that has been documented in the nearshore habitat of JEB Little Creek (VDGIF 2017). It is anadromous, meaning it spawns in freshwater but adults spend most of their time in marine and estuarine waters. A fall spawning population was documented in Virginia (Hager et al. 2014 and Kahn et al. 2014). Males migrate into freshwater one month before females, in March and April. Females lay between one million and 2.5 million eggs in flowing water up to 60 feet deep (USFWS 2017a). Hatchlings remain in their freshwater nursery habitats for approximately one year. As juveniles age, their range extends farther downriver. The age at which juveniles transition to coastal wandering habitat varies (NAVFAC 2014). Once the fish transitions, it will remain a coastal migrant using various coastal estuaries and rivers seasonally until maturity, which is reached between ages 11 and 18. Sturgeon's diet consists of worms, snails, shellfish, crustaceans, and small fish which they acquire using their snouts and barbels to root around in bottom sediments, vacuuming up organisms (USFWS 2017a).

The Navy funded a tracking study of the Atlantic sturgeon in order to determine the fish's use of the Chesapeake Bay near installations. Around JEB Little Creek, seven receivers were deployed. Atlantic sturgeon were detected year-round around the installation, peaking in spring and fall (Hagar 2017).



Atlantic Sturgeon (*Acipenser oxyrinchus*)

Source: NOAA 2017a

2.11.6 Sea Turtles

Sea turtles are known to occur in the Chesapeake Bay during the warm months, with peak abundance in mid-June (Lutcavage and Musick 1985). Sea turtles are known to come into the Chesapeake Bay to feed.

The federally and state-endangered Kemp’s ridley sea turtle and the federally threatened loggerhead sea turtle are the most abundant sea turtle species in offshore areas of JEB Little Creek, followed by the federally endangered leatherback sea turtle and the federally threatened green sea turtle. **Table 2-11** lists federally listed sea turtle species that may occur on the Installation. There is no evidence of use of JEB Little Creek beaches by sea turtles for nesting (Department of the Navy 2012d). It is believed the current condition of the shoreline habitats is not favored by any of the federally listed sea turtle species occurring in the area.

Table 2-11. Federally Listed Sea Turtle Species.

	Scientific Name	ESA Status
Order Testudines, Suborder Cryptodira		
Family Cheloniidae		
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened ¹
Green sea turtle	<i>Chelonia mydas</i>	Threatened ²
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Kemp’s ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Family Dermochelyidae		
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered

¹ Four distinct population segments (DPSs) of the loggerhead turtle are designated as threatened, while five DPSs are designated as endangered under the ESA. The Northwest Atlantic Ocean DPS, which occurs in Virginia, is designated as threatened.

² Although this species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle are listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations.

Kemp’s Ridley Sea Turtle

The Kemp’s ridley sea turtle is a federally and state-endangered species that has been documented at JEB Little Creek (VDGIF 2017). The Chesapeake Bay area has been reported as a nesting area for the Kemp’s ridley sea turtle. Two nests have been reported in Virginia – one in 2012 on Naval Air Station Oceana Dam Neck Annex (NASO-DNA) and one in 2014 on False Cape State Park near the North Carolina-Virginia border. Between 2001 and 2013, more than 500 strandings were recorded in the area. Numerous strandings have been recorded on JEB Little Creek (NAVFAC MIDLANT 2016). No Kemp’s ridley turtle nests or false crawls have been recorded on this Installation and it is unlikely but possible that nesting would occur (Department of the Navy 2016b).

The Kemp’s ridley sea turtle is small with adults reaching two feet in length and weighing approximately 100 pounds. The carapace is oval in shape and is olive-gray in color with five pairs of costal scutes. The head is triangular with a hooked beak with a large crushing surface and two pairs of prefrontal scales. The nesting habitat is very different from its primary habitat of the nearshore and inshore waters of the northern Gulf of Mexico (USFWS 2015b). General characteristics of the Kemp’s ridley sea turtle are provided in **Table 2-12**.

Table 2-12. Kemp’s Ridley Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 24 inches (61 cm) in length
Identification	Coloration is olive-gray. The carapace is oval with five pairs of costal scutes, four inframarginal scutes with each perforated by a pore. The head is triangular with a hooked beak with a large crushing surface and two pairs of prefrontal scales.
Nesting	Nesting occurs from April into July with clutch sizes averaging 100 eggs per nest. The Kemp’s ridley nests during daylight hours an average of 2.55 times per season.

Source: USFWS 2015b



Kemp’s Ridley Sea Turtle (*Lepidochelys kempii*)

Source: NOAA 2017b

Loggerhead Sea Turtle

The loggerhead sea turtle is a federally and state-threatened species that has been documented at JEB Little Creek (VDGIF 2017). The loggerhead sea turtle is one of the only sea turtle species that is known to regularly nest along Virginia’s beaches. Along the ocean-facing beaches of Virginia, five to 15 nests are reported annually (VDGIF 2017). Virginia has reported an average of 178 loggerhead strandings per year for the last decade (VAQF 2014). Numerous strandings have been recorded on JEB Little Creek (NAVFAC MIDLANT 2016). No nests or false crawls have been reported at JEB Little Creek. It is possible loggerhead sea turtles would nest at the Installation due to reported nestings nearby in the past as previously described (VDGIF 2017).

The loggerhead sea turtle is medium in size, averaging three feet in length and weighing 200 pounds. The flippers and the shell are reddish-brown in color and the underside of the loggerhead is yellow. The loggerhead carapace is intricate with five pairs of costal scutes, the first of which touches the nuchal scute. This species has a blunt jaw with a large head (USFWS 2015c). General characteristics of the loggerhead sea turtle are provided in **Table 2-13**.

Table 2-13. Loggerhead Sea Turtle Characteristics.

Attribute	Description
Size	Average 36 inches (91 cm) in length
Identification	Coloration is reddish brown/brown with a yellow underside. Carapace has five pairs of costal scutes, the first touches the nuchal scute. On each of the bridges between the underside and the shell are three large inframarginal scutes.
Nesting	Nesting occurs from April through September. The highest frequency of nesting occurs between June and July. Nesting occurs primarily at night one to seven times a nesting season. The average clutch size is 100–126 eggs per nest.

Source: USFWS 2015c



Loggerhead Sea Turtle (*Caretta caretta*)

Source: Wikipedia Commons 2017a

Leatherback Sea Turtle

The leatherback sea turtle is a federally and state endangered species that has been documented at JEB Little Creek (VDGIF 2017). A total of 92 leatherbacks strandings occurred in Virginia from 2001 to 2013. Three leatherback turtle strandings have been recorded on JEB Little Creek (NAVFAC MIDLANT 2016). No leatherback nests or false crawls have been recorded on this Installation and it is unlikely but possible nesting would occur (Department of the Navy 2016b).

The leatherback sea turtle is a large species with adults reaching 8 feet in length and weighing 500 to 2,000 pounds. The shell is composed of small bones covered by rubbery, firm skin with seven longitudinal ridges. The skin is black with different pale spots with a pink spot on the dorsal surface of adult heads. The upper jaw is gray with a toothlike cusp on each side and the lower jaw is hooked anteriorly. The fins are paddle-like with pale spotting and white margins. The preferred habitat is open ocean. Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas (USFWS 2015d). General characteristics of the leatherback sea turtle are provided in **Table 2-14**.

Table 2-14. Leatherback Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 48–96 inches (122–244 cm) in length
Identification	Coloration is black with pale spotting. The upper jaw is gray with a toothlike cusp on each side and the lower jaw is hooked anteriorly. The fins are clawless and paddle-like with pale spotting and white margins.
Nesting	Nesting occurs from March to July with clutch sizes averaging 80–85 yolked eggs per nest. Female leatherbacks nest at night an average of 5–7 times in a nesting season.

Source: USFWS 2015d



Leatherback Sea Turtle (*Dermochelys coriacea*)

Source: NOAA 2016e

Green Sea Turtle

The green sea turtle is a federally and state threatened species that has been documented near JEB Little Creek (VDGIF 2017). Several green turtle strandings have been recorded near the installation since 2004, and one has been documented on JEB Little Creek (VAQF 2014 and NAVFAC MIDLANT 2016). No green sea turtle nests or false crawls have been recorded on this Installation and is unlikely but possible nesting would occur (Department of the Navy 2016b).

The green sea turtle commonly occurs in shallow waters such as reefs, bays, and inlets with an abundance of marine grass and algae. The green sea turtle is medium in size with adults reaching 4 feet in length and weighing up to 440 pounds. The shell is smooth and light to dark brown with dark mottling. The head is light brown with yellow markings. This species has four pairs of costal scutes and one pair of prefrontal scales on the head (USFWS 2017b). General characteristics of the green sea turtle are provided in **Table 2-15**.

Table 2-15. Green Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 36 inches (91 cm) in length
Identification	Coloration is variable. The heart-shaped carapace is smooth and light to dark brown with dark mottling. The head is small and there is one pair of prefrontal scales between the eyes.
Nesting	Nesting occurs from June to September with clutch sizes ranging from 75 eggs to upwards of 200 eggs per nest. The green sea turtle nests at night an average of 3.3 times per season.

Source: USFWS 2015e



Green Sea Turtle (*Chelonia mydas*)

Source: Wikipedia Commons 2017b

Hawksbill Sea Turtle

The hawksbill sea turtle (*Eretmochelys imbricata*) is a federally and state endangered species potentially occurring at JEB Little Creek (VDGIF 2017). According to the 2016 Sea Turtle Lighting Survey the hawksbill sea turtle is extremely rare in Virginia waters, where there have been only four reports of this species. Three were strandings in the Chesapeake Bay and one was reported along the coast north of the Chesapeake Bay (Department of the Navy 2016b). The two most recent strandings were in 2004 (VAQF 2014). One stranding was documented at JEB Little Creek (NAVFAC MIDLANT 2016). However, the hawksbill sea turtle is unlikely to occur on the Installation.

The hawksbill sea turtle commonly feeds on sponges in coral reefs. The hawksbill is small to medium in size with adults reaching three feet in length and weighing up to 300 pounds. The shell is oval and elongated with overlapping scutes on the carapace. The head is small with a hawk-like beak with four flippers and two claws. This species is the only sea turtle with four pairs of costal scutes on the carapace and two pairs of prefrontal scales on the head (USFWS 2015e). General characteristics of the hawksbill sea turtle are provided in **Table 2-16**.

Table 2-16. Hawksbill Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 27.5 inches (70 cm) in length
Identification	Coloration is brown with splashes of yellow, orange or reddish-brown on the upper portion of the shell or carapace. The carapace is round with five to six costal scutes. The head is triangular and relatively large, with two pairs of prefrontal scales.
Nesting	Nesting occurs between April and November with clutch sizes ranging from 140 eggs to upwards of 200 eggs per nest. The hawksbill nests at night an average of 4.5 times per season.

Source: USFWS 2015f

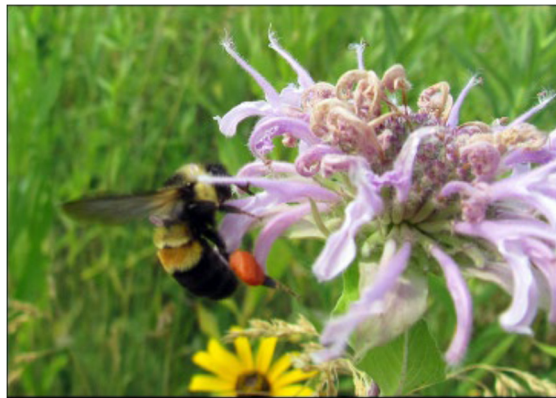


Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Source: Wikipedia Commons 2017c

2.11.7 Rusty-patched Bumble Bee

The rusty-patched bumble bee (*Bombus affinis*) has been listed as endangered by USFWS due to widespread habitat degradation from intensive farming, global climate change, disease, and pesticide use, but the species is not listed by the State of Virginia (VDGIF 2017). This species lives in colonies with one queen and several workers. The rusty-patched bumble bee can be easily identified by its all-black head, but the workers and males can be distinguished by a rusty reddish patch located in the middle of their back on the second abdominal segment. The historical habitat of the rusty-patched bumble bee was within the grasslands and tallgrass prairies of the Upper Midwest and Northeast. Due to habitat degradation, many nesting sites are in abandoned rodent cavities or aboveground clumps of grass and overwintering sites. This species is active from April through September (USFWS 2017c, USFWS 2017d). The rusty-patched bumble bee's current range does not include JEB Little Creek (USFWS 2017d). There have been no reports of the rusty-patched bumble bee being present on the Installation.



Rusty-Patched Bumble Bee (*Bombus affinis*)

Source: USFWS 2017d

Photo courtesy of Christy Stewart

2.11.8 Yellow-banded Bumble Bee

The yellow-banded bumble bee (*Bombus terricola*) is listed as a species of concern that is currently under review for listing by the USFWS. This species was historically known to occur in Virginia, including much of the northwestern portion of the state, extending southward into the Appalachians. This species is also historically known to exist in the upper Midwest to the Rocky Mountains, a large portion of southeastern Canada and extending to the northwest into British Columbia. The yellow-banded bumble bee is an important pollinator having the most common threat from disease, habitat loss, and pesticide use (USFWS 2016a). JEB Little Creek is in the current range for the yellow-banded bumble bee; however, there are no records of the yellow-banded bumble bee on the Installation (USFWS 2017e).



Yellow-banded Bumble Bee

Source: USFWS 2016a

Photo Courtesy of Sandy Gillian

2.12 Conservation Sites and Dune Protection Areas

Dune Protection Area

The JEB Little Creek DPA encompasses 17 ac (7 ha) of primary dune and 21 ac (8 ha) of secondary dune and dune field, which includes 91 percent of all shoreline at the Installation (Department of the Navy 2012a). The majority of the dunes at JEB Little Creek are intact with vegetated primary and secondary dunes exhibiting consistent slope and segment breaks created by vehicular or pedestrian access routes through the dunes. Dune enhancement and restoration efforts have included application of sand fencing, utilization of recycled Christmas trees to build dunes, and planting native dune grasses.

This page intentionally left blank.

3.0 PROGRAM COMPONENTS – JOINT EXPEDITIONARY BASE LITTLE CREEK

3.1 Ecosystem Management

This INRMP follows the direction set forth in the memorandum issued by the Deputy Under Secretary of Defense for Environmental Security (08 August 1994) regarding Implementation of Ecosystem Management in the DoD. The memorandum states that ecosystem management will become the basis for future management of DoD lands and waters. The publication *Conserving Biodiversity on Military Lands* (Benton et al. 2008) provides guidance for including conservation and ecosystem management within Installation natural resources programs. In this context, ecosystem management will include the following criteria:

- **Ecological Approach:** There will be a shift from individual species management to the management of ecosystems.
- **Partnerships:** Ecosystems cross political boundaries, making the need for cooperation, coordination, and partnerships essential for managing ecosystems.
- **Participation:** Public needs and desires will be emphasized in management decisions.
- **Information:** The best available scientific information will be used to select technologies to be used in managing natural resources.
- **Adaptive Management:** Adaptive management techniques will be incrementally applied as they are identified.

The DoD's overall goal regarding ecosystem management is to preserve, improve, and enhance ecosystem integrity. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies and communities. The specific principles and guidelines that DoD has identified to achieve this goal are as follows:

- Maintain and improve the sustainability and native biodiversity of ecosystems.
- Administer with consideration of ecological units and time frames.
- Support sustainable human activities.
- Develop a vision of ecosystem health.
- Develop priorities and reconcile conflicts.
- Develop coordinated approaches to work toward ecosystem health.
- Rely on the best science and data available.
- Use benchmarks to monitor and evaluate outcomes.
- Use adaptive management.
- Implement through installation plans and programs.

Ecosystem management recognizes that humans are ecosystem components and that sustainable human activity does not mutually exclude the preservation and enhancement of ecological

integrity. Therefore, it is ecosystem management that provides JEB Little Creek the means to protect biodiversity and provide high-quality military readiness.

3.2 Land Management

Overall real estate responsibility lies with the PWD. The JEBCFS Environmental Division provides support in ensuring compliance with environmental laws and regulations as well as natural resources conservation. The land management program supports the military mission, protects environmental quality, and supports range sustainability. Management concerns include erosion and sediment control, stormwater management, nonpoint-source pollution, wetlands, coastal zone protection, ERP support, shoreline management, and grounds and landscape management. Compliance with applicable laws and regulations of the VMRC, USACE, VDEQ, and Virginia Division of Soil and Water Conservation is a key component of the land management program. Other initiatives include reviewing preconstruction plans for proposed projects, conducting periodic site inspections for erosion and sedimentation control needs, participating in the NEPA review process, participating in the Chesapeake Bay Agreement programs, and using native plant species for landscaping. State and federal regulations pertinent to the land management program are briefly discussed in the following subsections. A list of native plants for the Coastal Plain region of Virginia is included in **Appendix I**.

3.2.1 Erosion and Sediment Control

With the exception of the beaches and dunes areas, erosion and sedimentation are not major water quality issues at JEB Little Creek due to the flat topography and high permeability of the soils. Activities that remove vegetation and disturb soil can greatly increase the risk of erosion and sedimentation, and require implementation of protective measures. Site-specific Stormwater Pollution Prevention Plans (SWP3s) that address runoff control during and after construction activities must be prepared for all construction projects. As with SWP3s for industrial discharges, SWP3s for construction sites must be updated as necessary to remain consistent with any changes needed to protect surface water resources. Sediment basins are a structural control requirement for sites disturbing 3 ac (1.2 ha) or more. On sites disturbing less than 3 ac (1.2 ha), sediment basins are encouraged, but other control methods may be employed.

Additional erosion and sedimentation control requirements are provided by the Virginia Erosion and Sediment Control Law (Code of Virginia §62.1-44.15:51). This law generally requires an Erosion and Sedimentation Control Plan for any land-disturbing activity equal to or exceeding 10,000 square feet (ft²) (929 square meters [m²]) in area; however, because JEB Little Creek is located within the Chesapeake Bay Preservation Area, an Erosion and Sedimentation Control Plan must be developed for disturbed areas greater than 2,500 ft² (232 m²). Land-disturbing activities include, but are not limited to, clearing, grading, excavating, transporting, and filling of land. Regulated land-disturbing activities must comply with minimum standards outlined in the Virginia Erosion and Sediment Control Handbook (VDCR 1992).

3.2.2 Stormwater Quality

Stormwater management is an important part of point source pollution control. The stormwater drainage system at JEB Little Creek collects runoff from impermeable surfaces throughout developed areas, which can inadvertently facilitate the transport of industrial pollutants into the Chesapeake Bay. The SWP3 prepared for JEB Little Creek identifies and maps potential pollutant sources that may contribute to the contamination of stormwater discharges from permitted outfall

drainage areas (AH Environmental Consultants 2009). Potential sources of pollutants include outdoor industrial activities and processing areas; material storage and handling areas; areas where hazardous material/hazardous waste or petroleum, oil, and lubricant products are stored; construction and demolition sites; and land areas where chemicals are applied. The plan also describes stormwater management standards and controls, and best management practices (BMPs) used at JEB Little Creek to maintain and protect water quality. The SWP3 was developed as a requirement of the Virginia Pollutant Discharge Elimination System (VPDES) and several other state and federal water pollution control regulations. The VDEQ requires JEB Little Creek to amend the SWP3 whenever there is a change in design, construction, operation, or maintenance that has a significant effect on the potential for the discharge of pollutants to the waters of the state. JEB Little Creek currently has 23 permitted stormwater outfalls that ultimately discharge into Little Creek Harbor. All but nine of the outfalls are located within the Industrial Management Unit. Nonpoint source pollution is monitored at all JEB Little Creek outfalls under the conditions set forth in the VPDES permit issued for the Installation (AH Environmental Consultants 2009).

The dune assessment conducted in 2012 identified a large concrete stormwater outflow pipe that had collapsed in the northwestern portion of JEB Little Creek. Water transported through the pipe emptied prematurely into the dune, causing erosion of the dune and adjacent sections of the beach. The pipe was repaired following the 2012 study, and the dune and beach was restored. **Section 3.7.1** contains additional management information for the DPA.

3.2.3 Coastal Zone Protection

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

Enforceable policies of Virginia's Coastal Zone Management Program include, but are not limited to, the following:

- *Tidal and Nontidal Wetlands Management.* This program preserves tidal wetlands, prevents their despoliation, and accommodates economic development in a manner consistent with wetlands preservation. The Virginia Water Protection Permit Program administered by the VDEQ includes protection of wetlands, both tidal and nontidal. This program is authorized by Code of Virginia §62.1-44.15.20 and the Water Quality Certification requirements of Section 401 of the CWA of 1972. The tidal wetlands program is administered by the VMRC (Code of Virginia §28.2-1300 through §28.2-1320).
- *Fisheries Management.* The program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by the VMRC (Code of Virginia §28.2-200 through §28.2-713) and the VDGIF (Code of Virginia §29.1-100 through §29.1-570). The State Tributyltin Regulatory Program is part

of the Fisheries Management Program. The General Assembly amended the Virginia Pesticide Use and Application Act as it related to the possession, sale, or use of marine antifoulant paints containing Tributyltin, as the use of Tributyltin in boat paint constitutes a serious threat to important marine animal species. The Tributyltin program monitors boating activities and boat painting activities to ensure compliance with Tributyltin regulations promulgated pursuant to the amendment. The VMRC, VDGIF, and Virginia Department of Agriculture and Consumer Services share enforcement responsibilities (Code of Virginia §3.1-249.59 through 3.1-249.62).

- *Subaqueous Lands Management.* This program establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the VDEQ, Water Division. The program is administered by the VMRC (Code of Virginia §28.2-1200 through §28.2-1213).
- *Dunes Management.* Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes. This program is administered by the VMRC (Code of Virginia §28.2-1400 through §28.2-1420).
- *Point Source Pollution Control.* The point source program is administered by the VDEQ State Water Control Board (Code of Virginia §62.1-44.15) and the State Air Pollution Control Board (Code of Virginia §10-1.1300). The Point Source Pollution Control Program regulates discharges into state waters through VPDES and Virginia Pollution Abatement Permits, and through implementation of the National Pollutant Discharge Elimination System permit program established pursuant to Section 402 of the CWA.
- *Nonpoint Source Pollution Control.* Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by VDCR (Code of Virginia §10.1-560 et. seq.), which regulates activities in the Chesapeake Bay Resource Management Areas and Resource Protection Areas within 84 of Virginia's coastal zone localities.
- *Shoreline Sanitation.* The Virginia Department of Health regulates the installation of septic tanks, sets standards concerning soil types suitable for septic tanks, and specifies minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program includes shellfish harvest closures due to bacterial contamination, and is administered by the Department of Health through Code of Virginia §32.1-164 through §32.1-165.
- *Coastal Lands Management.* VDCR, Division of Chesapeake Bay Local Assistance regulates activities in Chesapeake Bay Resource Management Areas and Resource Protection Areas within 84 localities in the state's coastal zone through a state-local cooperative program established pursuant to the Chesapeake Bay Preservation Act (Code of Virginia §10.1-2100 through §10.1-2114) and Chesapeake Bay Preservation Area

Designation and Management Regulations (9 Virginia Administrative Code [VAC] 10-20-10 et seq.).

- *Point Source Air Pollution Control.* The VDEQ implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board (Code of Virginia §10–1.1300).

Management of coastal zone resources at JEB Little Creek includes management of the nearshore environment, including Little Creek Harbor, and the beaches and dunes areas located at the Installation. Implementation of shoreline stabilization projects is under the purview of the JEB Little Creek PWD, aside from specific measures that are conducted annually to reduce beach erosion.

The 2010 DoD Quadrennial Defense Review requires DoD to conduct climate impact assessments at its permanent installations. Awareness of the climate change impacts to the coastal zone environment is crucial for natural resources management at JEB Little Creek. The DoD and SERDP are currently conducting vulnerability and impact assessments, which will result in the development of adaptation strategies for affected installations.

3.2.4 Wetlands and Water Quality Protection

Due to their importance to the health of the ecosystem and the human environment, a large number of federal, state, and local laws regulate land uses and actions that have the potential to impact wetlands and water quality. EO 12088, *Federal Compliance with Pollution Control Standards*, EO 11990, *Protection of Wetlands*, and the CWA require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In accordance with these requirements, JEB Little Creek must obtain all appropriate federal, state, interstate, and local certifications and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, and stormwater management programs for any action that may impact water quality. USACE permits are required under Section 10 of the Rivers and Harbors Act of 1899 prior to commencing any work or building any structures in a navigable water of the U.S.

Under Section 404 of the CWA, discharge of dredged and fill material into waters of the U.S., including wetlands, is prohibited unless a permit is issued by the USACE, Norfolk District. State and local agencies may also have jurisdiction regarding impacts to wetlands. Such agencies include VMRC, VDEQ, Virginia Beach Wetland Board, and VIMS. Military construction, training, and other activities that could affect wetlands may require permits from these agencies. Permits are requested by submitting a Joint Permit Application (initiated by the proponent) through the Environmental Division to the VMRC. This application process will result in either an Individual or Nationwide/Regional permit issued by the USACE, and separate permits by the state and local agencies as appropriate or denial of the permit(s). If permits are issued that encompass loss of wetlands, the Installation works toward the goal of “no net loss” of wetlands. These may require creation of in-kind wetlands at other locations, including through offsite mitigation banking. Such projects that will or could impact wetlands require an environmental impact assessment in accordance with NEPA.

NWPs may be used to streamline the permitting process for activities that would have minimal adverse effects on aquatic environments. Activities such as the maintenance of existing structures,

residential construction, reshaping existing drainage ditches, and construction of recreational facilities that do not substantially alter the existing landscape are permitted under NWPs. The maximum acreage limits for most NWPs is 0.5 ac (0.2 ha), with notification to the USACE District Engineer required for activities that result in the loss of greater than 0.1 ac (less than 0.1 ha) of waters of the U.S. (82 FR 1860-2008). If project impacts are expected to exceed these criteria or certain other criteria, an Individual permit must be sought.

Military construction and other projects with the potential to disturb wetlands are reviewed individually with regard to wetland impacts, and individual permits are sought as needed. Although permits may be obtained that allow for the filling of wetlands, in accordance with EO 11990, *Protection of Wetlands*, federal agencies may do so only after finding no practicable alternative. Navy policy is to avoid adverse impacts to existing aquatic resources, and offset adverse impacts that are unavoidable. Additionally, the Navy will strive to achieve a goal of no net loss of values and functions of existing wetlands.

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

- Filling or dumping
- Permanent flooding or impounding
- New activities that cause significant alteration or degradation of existing wetland acreages or functions

Information on individual and state permit requirements and application procedures (including joint permit application) is available on the VDEQ website:

<http://www.deq.state.va.us/Programs/Water/WetlandsStreams/PermitsFeesRegulations.aspx>.

3.2.5 Floodplain Protection

The USACE also regulates discharges of dredged or fill materials within 100-year floodplains. Few NWPs are available for this purpose and almost all of these require notification of the USACE District Engineer. Floodplains receive additional protection through EO 11988, *Floodplain Management*, which instructs federal agencies to reduce the risk of flood loss by avoiding building in floodplains, and to restore and preserve the natural and beneficial values served by floodplains. However, a large portion of JEB Little Creek is located within the 100-year floodplain or 500-year floodplain (**Figure 2-6**) associated with the Chesapeake Bay, Little Creek Harbor and base lakes, ponds and channels. Training exercises require use of the landscape features within this floodplain; some impact to this area may be unavoidable. Appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken in floodplains.

3.2.6 Watershed Protection

JEB Little Creek is located within the Chesapeake Bay watershed, which is recognized as one of the most important and productive estuarine ecosystems in the world and is protected by federal, state, and local regulations. The Chesapeake Bay watershed is home to more than 3,600 species and over 15 million people all competing for resources and space within this region covering

64,000 square miles (mi²) (165,759 square kilometers [km²]). The Chesapeake Watershed Cooperative Ecosystem Studies Unit, which includes university/research institutions and federal agency partners such as the DoD, promotes stewardship and integrated ecosystem management of natural and cultural resources within the Chesapeake Bay watershed through collaborative research, technical assistance, and education.

The Navy is a signatory to a number of Chesapeake Bay agreements, including the 1994 *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*, the 1998 *Federal Agencies' Chesapeake Ecosystem Unified Plan*, the *Chesapeake 2000 Renewed Bay Agreement*, and EO 13508, *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* (2009). These agreements identify goals and commitments aimed at the preservation and restoration of the Chesapeake Bay. Major goals of the Chesapeake Bay agreements include reducing nutrients and toxins, protecting stream corridors, enhancing and protecting wetlands, protecting priority watersheds, identifying and controlling invasive species on priority sites, and expanding conservation landscaping on federal facilities. Major initiatives undertaken at JEB Little Creek that directly support these goals and help fulfill Navy commitments to the Chesapeake Bay Agreements include establishment of riparian forest buffers and planting submerged aquatic vegetation (SAV).

Navy management actions implemented at JEB Little Creek that directly support the goals of the Chesapeake Bay agreements include:

- Restoring and protecting water quality and wetlands
- Establishing riparian forest buffers
- Planting SAV
- Implementing dune restoration and shoreline stabilization measures
- Promoting education and outreach
- Establishing an oyster reef

Since the adoption of the CBP's Riparian Forest Buffer Initiative, JEB Little Creek has planted or enhanced over 2,050 linear feet at three sites (**Figure 3-1**) identified in a Chesapeake Bay riparian forest buffer site assessment (Department of the Navy 2000b). Treatments at these sites included planting native tree and shrub species and posting "No Mowing" signs 25–50 feet (7.6–15 m) inland from the shore along protected areas. Efforts to increase SAV at the Installation included the planting of 2,000 shoots of eelgrass within a 215-ft² (20-m²) area. The project was a joint effort of JEB Little Creek, the Alliance for the Chesapeake Bay, the National Aquarium in Baltimore, and the Chesapeake Youth Conservation Corps and was considered a success (Alliance for the Chesapeake Bay 2004).

3.3 Oil and Hazardous Substances

3.3.1 Oil and Hazardous Substance Spill Prevention and Protection

Due to the location of various facilities within the boundaries of JEB Little Creek and the amount of oil stored within these facilities, the threat of oil and hazardous substance (OHS) spills presents an important environmental concern. If a spill were to occur, JEB Little Creek's location adjacent to the Chesapeake Bay and other environmentally sensitive areas could lead to significant injury to fish, wildlife, and sensitive areas, and contaminate groundwater supplies for the Installation and adjacent communities.

Information on the storage and handling of OHS is detailed in the Installation Spill Prevention, Control, and Countermeasures Plan (SPCCP) and Oil Discharge Contingency Plan (ODCP) (Department of the Navy 2000c). The SPCCP was prepared in accordance with the provisions of 40 CFR Part 112 and OPNAVINST 5090.1D and provides information for preventing discharges of oil from onshore facilities into navigable waters of the U.S. or adjoining shorelines, and procedures to ensure early detection and quick response in the event of an oil discharge. An ODCP is required for all installations that have total aboveground oil storage or handling capacity greater than 25,000 gallons (94,635 liters). JEB Little Creek's ODCP was prepared in accordance with Commonwealth of Virginia Oil Discharge Contingency Plan Requirements (9 VAC 25-91-170) and OPNAVINST 5090.1D. ODCP goals include measures for ensuring proper and timely response to threats of an oil discharge, and containment, cleanup, and mitigation of oil spills. The SPCCP and ODCP contain a vast array of information including facility information, information regarding environmentally sensitive areas, spill notification and response procedures, assessments of worst-case discharge, and post-discharge review procedures.

To help identify and prioritize protection of natural resources in the event of an oil spill, the NOAA Office of Response and Restoration has developed an Environmental Sensitivity Index (ESI) that identifies sensitive coastal areas (NOAA 2003). Natural resources identified on ESI maps include shoreline types, shellfish beds, common local shellfish, finfish, nesting areas for various types of birds, bird species, and known locations of threatened and endangered species. A number of socioeconomic features that would require protective measures are also displayed on the ESI maps. Protection methods such as proposed boom placement locations, skimmer locations, and staging areas are also mapped. ESI map numbers 73, 74, and 75 display the shorelines and features of JEB Little Creek and adjacent areas. ESI maps are currently available from NOAA Office of Response and Restoration at the following website: <http://response.restoration.noaa.gov/esi>.

Waters at and adjacent to JEB Little Creek could be affected by an OHS spill. Spills released directly into an adjacent waterway have the potential to spread due to natural tidal actions. Areas potentially at risk due to tidal action following an OHS spill are:

- Little Creek Harbor and associated environs including Little Creek Cove, Desert Cove, Northwest Branch, and Little Creek Channel
- Bays, including Lynnhaven Bay, Willoughby Bay, Back Bay, and Linkhorn Bay and their estuaries
- Coastal waters, including the southern shore of the Chesapeake Bay and waters of the Atlantic Ocean stretching south to mid-Virginia Beach.

In situations where the release is not directly into an adjacent waterway (i.e., a ground spill), the areas listed above are still potentially at risk due to the presence of storm sewer outfalls and drainage ditches. The south shore of the Chesapeake Bay and Little Creek Harbor (including all associated environs) directly receives drainage discharge from JEB Little Creek.

In the event of an OHS spill at JEB Little Creek, environmentally sensitive resources in the region (**Figure 3-2**) that are given protection priority because of their intrinsic value include the following:

- Groundwater used for public and private wells
- Marshes, swamps, and other wetlands



Legend
— Installation Boundary
■ Riparian Forest Buffer Site



0 1,500 3,000
Feet

0 0.3 0.6
Miles

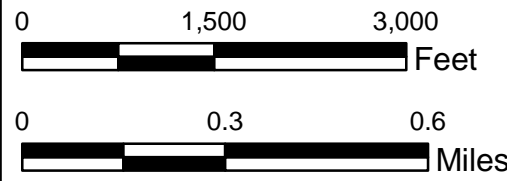
Source: ESRI, World Imagery; Navy 2016

Figure 3-1.
Riparian Forest Buffers of
JEB Little Creek

This page intentionally left blank.



Environmental Restoration Program Sites
Installation Restoration Program Site
Solid Waste Management Unit
Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 3-2.
Regional Environmentally Sensitive
Resources

This page intentionally left blank.

- Streams and rivers commonly used for recreational fishing; blue crab habitat; waterfowl wintering areas; rare, threatened, or endangered species habitats
- Wildlife refuges and sanctuaries
- Special interest areas designated by the State of Virginia
- Parks and other recreational areas, and residential neighborhoods

Of the shoreline types located at and adjacent to the Installation, the sandy beaches along the rivers and bays are least sensitive to oil spills. This is because of their characteristic semi-permeable substrate, low potential for oil penetration and burial, and low densities of fauna living within the substrate. The hard substrate associated with fine sand beaches increases the ease of cleanup by allowing easy access by vehicular and foot traffic. Freshwater and intertidal marsh habitats are the most sensitive to oil because of their high biological value and use by a wide range of species, the potential for long-term impacts, and the cleanup difficulty resulting from limited access. Booming plans for oil spills in the Facility Response Plan provide protection for sensitive resources.

3.3.2 Oil and Hazardous Substance Spill Response

The Prevention, Reporting, Response, and Cleanup of Oil and Hazardous Substance Spills for Hampton Roads Installations Plan establishes effective prevention, reporting, response, and clean-up procedures for OHS spills at or from installations and annexes under the purview of CNRMA and located in the Hampton Roads Area (Department of the Navy 2004). The plan outlines Navy environmental policy and reporting procedures in the event of a discharge and describes proper procedures for spill prevention for both ashore and afloat activities. The plan also defines legal authority of civil officials to direct and control responses to OHS emergencies. It is Navy policy that all OHS discharges of any quantity are reported, including spills to pavement, and airborne discharges released below 6,000 feet (1,829 m).

In the event of an OHS spill, JEB Little Creek has access to both Navy watercraft and contractor spill response personnel and equipment for handling oil spills. The NAVFAC MIDLANT Environmental Servicer Oil Recovery Team, located at Naval Station Norfolk, maintains a full-time oil spill response staff and equipment capable of containing and cleaning up an oil spill. In the event of a large oil spill, the PWD can call upon other local Navy facilities or a commercial contractor. Industrial Marine Services, located in Norfolk, serves as the primary OHS spill contractor, and has the ability to provide additional personnel and equipment to help contain and clean up OHS spills.

3.4 Urban Forestry Management

Most of the forest resources at JEB Little Creek are in the south and southeastern portions of the Installation in relatively small, isolated patches that are surrounded by development. Although the forest resources are not managed for timber production, they do provide a number of social, environmental, and economic benefits. Social benefits include improving the quality of life for Installation personnel and their dependents through recreational activity. Several of the forested parks, picnic areas, and other recreational areas are heavily utilized and recognized as valuable assets by the Navy community.

The urban forests also provide economic benefits because of the ameliorating effects they have on the environment. Trees and shrubs that are located around urban areas reduce energy consumption by shading buildings, providing windbreaks, and cooling the air through transpiration. Other

benefits provided by urban forests include water conservation and water quality improvement by reducing flow velocities and capturing and storing excess runoff as well as carbon sequestration value. In addition, urban forests provide habitat that attracts wildlife to the urban environment providing benefits to these species as well as recreational benefits to Installation personnel and their families (e.g., bird watching). Navy policies on urban forests, as stated in NAVFAC P-73, Real Estate Operations and Natural Resources Management Procedural Manual, Volume II (Department of the Navy 1987) and NAVFAC P-904, Planting Design (Department of the Army and the Navy 1976) require consideration of both forest and landscape trees in all planning decisions. *COMNAVREGMIDLANT Tree Preservation and Replacement* is used for the management and mitigation of trees at JEBLCFS.

3.4.1 Beneficial Landscaping

The 1994 Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837) provides the primary guidance on landscaping requirements on federal properties. EO 13148, *Greening the Government through Leadership in Environmental Management*, requires federal agencies to incorporate beneficial landscaping into landscaping programs, policies, and practices. The term beneficial landscaping describes practices that integrate native vegetation and wildlife habitat into the landscape and minimize the adverse effects that landscaping has on the natural environment. Specific directives of the memorandum are that, to the extent practicable, federal landscaping projects should:

- Use regionally native plants, including plants that will attract pollinators
- Use construction practices that minimize adverse effects on the natural habitat
- Reduce fertilizer and pesticide use
- Use water-efficient practices
- Create outdoor demonstrations to promote awareness of the environmental and economic benefits of beneficial landscaping

The basis for this guidance is to ensure that plants suited for local site conditions are selected, and the introduction or use of potentially invasive species is avoided. Using native plants ensures compliance with EO 13751, *Safeguarding the Nation from the Impacts of Invasive Species*. Furthermore, a plant properly selected for site conditions will require less intensive management, potentially reducing pesticide, fertilizer, and water usage. Other factors to consider when selecting plant material include rooting space, space for crown development, soil properties, tolerance for urban conditions, drip line, soil compaction, aesthetics, availability, quality, and expected maintenance. For more information about tree care, visit the International Society of Arboriculture website (<http://www.isa-arbor.com>).

The preferential use of regionally native plant species over nonnative species is particularly important as they are generally better suited for local site conditions and reduce the need for intensive maintenance and use of fertilizers and pesticides. Native plant species are better sources of food and cover for native wildlife. The overuse of nonnative species, such as Bradford pear (*Pyrus calleryana*) and crape myrtle (*Lagerstroemia indica*), is not consistent with beneficial landscaping practices and should be avoided. These species offer few environmental benefits and, in the long run, increase maintenance costs because of pruning and care requirements. A list of native landscaping species suitable for the Coastal Plain region of Virginia is in **Appendix I**.

3.4.2 Landscape Design and Installation

General design, security issues, and standards are considered in the development of landscapes on JEB Little Creek. Landscape improvements and modifications are designed to coordinate with the existing landscape patterns for consistency and unity. Providing for passive and active surveillance of perimeter and landscape areas is a primary consideration in plant selection and layout. Landscapes are installed to include opportunities for low impact development. These management strategies incorporate landscape design practices to reduce the volume of stormwater runoff and decentralize flows. Landscape design and installation are conducted in accordance with the American National Standards Institute (ANSI) for Nursery Stock (ANSI Z60.1) and Tree Care Operations (ANSI Z133.1).

3.4.3 Inventory and Maintenance

Inventory and maintenance activities are conducted to determine program requirements and to minimize landscape maintenance whenever possible. General observations on species diversity (number of species present), regeneration (relative presence of young trees), age distribution (regeneration, immature, mature), and tree condition (excellent, good, fair, poor, dead, and hazard) are recorded during landscape inventories.

Newly planted areas must have a watering and maintenance plan in place before installation of the new landscape. Landscaping contracts/work performed by contractors should include a maintenance plan as part of the contract cost. Failure to include a maintenance plan usually leads to death of the landscape vegetation. This is wasteful and, in some instances, requires the given area to be landscaped again. Drip irrigation should be included for all areas to be landscaped to cut labor cost, conserve water, and ensure survival of plantings. Additionally, the JEBLCFS Environmental Division is the sole approval authority for landscape designs, ensuring that only drought-tolerant plants are used; no monoculture sites are created as these would increase the risk of disease; and only native plants be used (**Appendix G**). Guidance for proper selection of landscaping and trees, including spacing from streets, buildings, and walkways, is maintained in the 2013 Installation Appearance Plan for JEBLCFS.

Management of hazard trees is included in urban forestry. Hazard trees and limbs are those trees/limbs deemed by the Environmental Division to pose a risk to human safety or property. The Environmental Division uses criteria to determine the degree of risk and assigns this to given hazard trees as a means of prioritizing removal (or pruning). Removal of hazard trees by contractors with certified arborists on staff is preferred, but can be costly. Funding for hazard tree removal is requested as part of the Annual Work Plan operated by PWD.

More information on native plants for conservation, restoration, and landscaping is available from the VDCR-DNH at http://www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

3.5 Wildlife and Marine Resources Management

An important function of the natural resources management program is to maintain and enhance habitats that support wildlife species, including mammals, birds, herpetofauna, fish, and invertebrates. The basic objectives of fish and wildlife management at JEB Little Creek are to:

- Conserve and promote conservation of game and nongame fish and wildlife and their habitats.
- Balance wildlife population levels with habitat carrying capacity.
- Provide recreational opportunities for Installation personnel, their dependents, retired military, and community members, as permitted by mission and safety constraints.

Due to the high level of development at JEB Little Creek and in the region, conservation and enhancement of remaining natural habitats is important to protecting Installation wildlife resources. Conservation efforts focus on maintaining a diversity of forested habitats that provide year-round food and cover (such as coniferous stands) as well as seasonal food and cover (such as deciduous stands) for wildlife. Providing supplemental habitat in urban areas is another management action that enhances wildlife habitat at JEB Little Creek. Providing nest boxes is particularly effective in improving habitat for the Installation's avian community.

3.5.1 Wildlife

Wildlife management on JEB Little Creek is focused on providing habitat for nongame wildlife primarily within an urban environment. An important function of the natural resources program is to maintain populations and enhance habitats to support native fish and wildlife species. Restoration of sites within the dune protection areas of the Installation benefits wildlife through enhanced biodiversity and protects the infrastructure of the Installation.

Maintenance of the remaining natural areas provides unique habitats for multiple species to exist on the Installation. Enhancing the quality of natural areas can be achieved by providing edge habitat to improve biodiversity. Dead and dying trees (called snags) and live trees with natural cavities provide important habitat for many wildlife species. Snags and cavity trees provide foraging, nesting, roosting, and perching sites. The abundance of woodpeckers, raptors, passerines, small mammals, and bats in an area is often directly related to the availability of snags and tree cavities. All snags on JEB Little Creek, consistent with personnel safety, forest health, and the protection of facilities, will be retained for wildlife value.

Nuisance Wildlife

The DoD's Armed Forces Pest Management Board defines nuisance wildlife as wildlife that, because of their feeding or nesting habits, interferes with the military mission or well-being of domestic animals, other wildlife, or humans (Armed Forces Pest Management Board 2012). The Armed Forces Pest Management Technical Board Information Memorandum Number 37 assigns responsibility for human health and safety to the Commander, JEBLCFS. An Integrated Pest Management Plan (IPMP) for JEBLCFS was recently completed in 2016 (NAVFAC 2016). Authority and responsibility for nuisance wildlife resides with the NRM who will coordinate with the regional Game Warden, as necessary.

Wildlife damage issues are best resolved by applying an integrated approach (application of multiple methods) for effective resolution to human-wildlife conflicts. The JEBLCFS Environmental Division should be contacted for technical assistance. JEBLCFS Environmental Division normally utilizes internal resources to resolve human-wildlife conflicts, or may initiate an interagency agreement with USDA WS. Large trapping efforts for feral cats (*Felis catus*) are handled by the NAVFAC MIDLANT Environmental Services Pest Controller, which applies follow-up maintenance trapping if needed.

The Installation NRM or appointed delegate is responsible for maintaining any permits necessary for controlling species protected by federal or state law. For management of state wildlife species, 4 VAC 15-30-50 (Possession, Transportation, and Release of Wildlife by Authorized Persons) the VDGIF Administrative Code defines authority of wildlife management duties to natural resources staff in performance of official duties.

The VDGIF defines nuisance wildlife species in 4 VAC 15-20-160, and includes several wildlife species that could occur at JEB Little Creek, including coyotes (*Canis latrans*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English (house) sparrow (*Passer domesticus*), and pigeons. Capture and relocation of mammalian wildlife species is prohibited by Code of Virginia §23.1-521. Authority of local animal shelters to “receive, temporarily confine, and humanely euthanize wildlife” is defined in 4 VAC 15-30-50.

The NRM and all other personnel involved in lethal control activities must be properly trained and certified for all weapons employed in accordance with applicable regulations. It should be noted that the use of pesticides (poisoned baits) to control vertebrate pests, other than mice and rats, is strictly prohibited.

Pursuant to 4 VAC 15-30-50 the following mammal and bird species are designated as nuisance species: house mouse, Norway rat, black rat (*Rattus rattus*), coyote, feral hog (*Sus scrofa*), nutria, woodchuck, European starling, house sparrow, and rock dove (*Columba livia*). Other nonnative species as defined in the Migratory Bird Treaty Reform Act of 2004 and regulated under 50 CFR 10.13 also are included as nuisance species.

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

<https://law.lis.virginia.gov/admincode/title4/agency15/chapter30/section50/>

4 VAC 15-30-50 permits department employees while in the “performance of their official duties” to capture, temporarily hold or possess, transport, release, and when necessary humanely euthanize wildlife, given the action is done in accordance with board policy. Recognizing the threat to native wildlife, an aggressive feral cat trapping, as well as an education and surveillance program, was established on base. Over the past two years, over 80 cats were trapped by NAVFAC MIDLANT Environmental Services: Pest Control Shop and taken to local animal shelters. This program will stay in place for the foreseeable future to ensure eradication is maintained.

Bird nesting in buildings and concentrations of resident Canada geese (*Branta canadensis*) can damage property at JEB Little Creek. Most bird species, to include birds’ nests and their eggs, are protected under the MBTA. Therefore, coordination and possible permitting through the USFWS and VDGIF is required if control is applied to manage migratory birds. JEBLCFS Environmental Division should be consulted prior to controlling any bird or nest on the Installation to ensure compliance with all applicable MBTA regulations.

Resident Canada geese are a nuisance wildlife species at JEB Little Creek. High fecundity, low mortality, and desirable habitat have concentrated geese populations on the Installation. Goose graze on short grasses such as those found in parks, lawns, or golf courses and prefer feeding sites

with open vistas and access to lakes and marshes. Large numbers of birds raise the potential for epizootic waterfowl diseases, pose a sanitation problem, and damage valuable turf. Additionally, this species poses a bird-aircraft strike hazard for the helipad used for routine landings and training located at LZ Green training area located off Gator Boulevard (**Figure 2-2**), and also potentially contribute to local bird-aircraft strike hazard issues at neighboring Norfolk International Airport.

An integrated approach is generally required to achieve optimal control of nuisance goose populations, including erecting barriers, hazing, and habitat alteration. Specific tactics that may be used at JEB Little Creek for goose management include increasing vegetation height around lakes and ponds, hazing, and oiling or addling eggs. Pursuant to the MBTA, a federal depredation permit is required to trap or kill Canada geese. A federal depredation permit is not required to harass Canada geese. The Installation NRM or the appointed delegate maintains the required permits.

Since 2015, JEB Little Creek has maintained an inter-agency services agreement with USDA WS to perform resident Canada goose management on the installation. Resident Canada goose management will continue as needed at JEB Little Creek.

The USDA Animal and Plant Health Inspection Service website provides additional guidance on wildlife damage assessment, including management of nuisance wildlife:
http://www.aphis.usda.gov/wildlife_damage/index.shtml

Feeding (intentional and accidental) further encourages Canada geese and other waterfowl to remain in areas frequented by people. To abate this problem, the Installation has posted and maintains a number of signs around Lake Bradford and Chubb Lake near housing and park areas to discourage the feeding of waterfowl. These signs serve to educate residents and employees on the ecology and habits of waterfowl and the importance of not feeding Canada geese.

3.5.2 Migratory Birds

The MBTA is the primary legislation in the U.S. established to conserve migratory birds. It implements the commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. The species of birds protected by the MBTA appears in Title 50, Section 10.13, of the Code of Federal Regulations. On 02 December 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense.

Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include the following:

- Routine operation of installation operating support functions, such as administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; MWR activities; shops; and mess halls

- Operation of industrial activities
- Construction or demolition of facilities used for the purpose described in the above two bullets

The authorization of take incidental to military readiness activities was published in the Federal Register on 28 February 2007 (50 CFR Part 21.15). The regulation provides that the Armed Forces must confer and cooperate with the USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of a military readiness activity if it determines that such activity may have a significant adverse effect on a population of a migratory bird species.

The requirement to confer with the USFWS is triggered by a determination that the military readiness activity in question will have a significant adverse effect on a population of migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. Assessment of impacts should take into account yearly variations and migratory movements of the affected species.

Non-military readiness activities that are likely to have a measurable negative effect on migratory bird populations is addressed separately in a Memorandum of Understanding (MOU) with USFWS developed in accordance with EO 13186, signed 10 January 2001, *Responsibilities of Federal Agencies to Protect Migratory Birds*. The MOU between the DoD and the USFWS was signed on 21 July 2006 and defines each party's requirements to help promote the conservation of migratory bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations, where practicable (**Appendix J**). DoD responsibilities include, but are not limited to, the following criteria:

- Obtaining permits for import and export, banding, scientific collection, taxidermy, special purposes, falconry, raptor propagation, and depredation activities
- Encouraging incorporation of comprehensive migratory bird management objectives in the planning of DoD planning documents
- Incorporating conservation measures addressed in regional or state bird conservation plans in the INRMP development process
- Inventory and monitor bird populations on DoD lands to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts
- Avoiding or minimizing impacts on migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds, where practicable
- Minimizing vegetation removal and manipulation during the breeding season, where practicable
- Developing, striving to implement, and periodically evaluating conservation measures for management actions to avoid or minimize incidental take of migratory birds, and if necessary, conferring with the USFWS on revisions to these conservation measures, where practicable

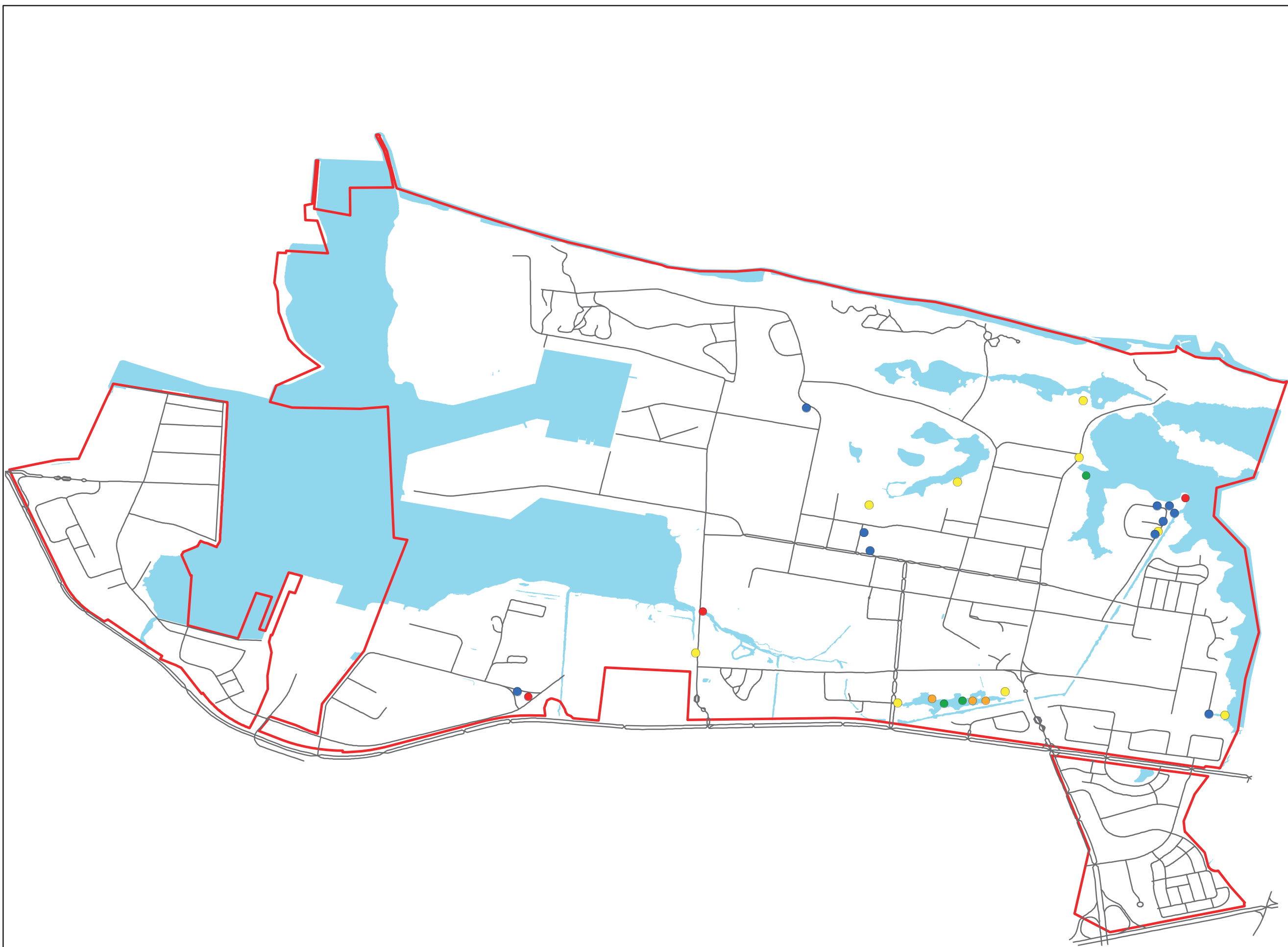
During annual INRMP reviews, the Navy must report any migratory bird conservation measures that have been implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds. Migratory bird management at JEB Little Creek includes provision of migratory bird data in support of programs including the USFWS's North American Waterfowl Management Plan, USFWS's Neotropical Migratory Bird Conservation, and Watchable Wildlife (DoD Partners in Flight n.d.) and various habitat enhancement projects.

Coordinated Bird Monitoring Plan

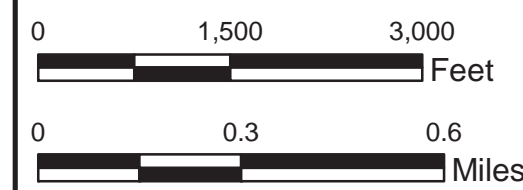
In 2008, the DoD approved the Coordinated Bird Monitoring Plan. The objective of the plan, jointly designed by the DoD and USGS biologists and managers, is to provide a comprehensive approach for helping the DoD fulfill its responsibilities under regulations that pertain to migratory birds. The plan outlines procedures for ensuring that bird monitoring and assessments address important issues for the DoD; follow accepted procedures for design, data collection, and analysis; and that the data are preserved in long-term archives. A Coordinated Bird Monitoring Database has been established by the USGS, which DoD installations may use for long-term storage of their bird monitoring data. This will assist in the identification of species of concern on installations and the implementation of appropriate management strategies (DoD 2012b). Bird surveys are performed, as needed, to establish year-round data on a range of bird species that use the Installation. JEB Little Creek conducts ongoing monitoring for bird abundance and diversity of species through annual Christmas bird counts and other field surveys. Christmas bird counts are coordinated and performed by local Audubon Society volunteers.

Nest Box Program

Artificial nest boxes are useful for enhancing habitat conditions for a number of bird and wildlife species in areas where there are few natural cavity trees or where competition from aggressive nonnative species such as house sparrows and European starlings is high. Placement of structures that benefit insectivorous birds in urban and housing areas also provides a benefit to people as these birds consume thousands of insects a day and provide enjoyment for human observers. Eastern bluebirds (*Sialis sialis*), tree swallows (*Tachycineta bicolor*), purple martins (*Progne subis*), owls, wood ducks (*Aix sponsa*), mice, squirrels, and bats are species that commonly utilize artificial structures. JEB Little Creek currently maintains nesting platforms for ospreys, and nest boxes for bluebirds, mallards (*Anas platyrhynchos*), and wood ducks. **Figure 3-3** shows a map of the 2009 nest box and platform locations. An evaluation of the conditions of nest boxes on the Installation and replacement of boxes that are no longer functional is planned at the time of this INRMP revision.



- Legend**
- Bird Boxes/Call Sites**
- Bluebird
 - Mallard
 - Wood Duck
 - Osprey
 - Frog and Toad Call
 - Installation Boundary
 - Road Streets
 - Water Bodies



Source: ESRI, World Imagery; Navy 2016

Figure 3-3.
Nest Box and Frog/Toad Survey
Locations of JEB Little Creek

This page intentionally left blank.

Hantavirus Pulmonary Syndrome Warning

Those who monitor bluebird boxes and other nest boxes occasionally find that mice have taken up residence in a box. It is well established that certain species of wild mice such as the white-footed mouse, the deer mouse (*Peromyscus maniculatus*), the cotton rat (*Sigmodon hispidus*), and the rice rat (*Oryzomys palustris*) are reservoirs of the dangerous Hantavirus. Humans can contract the virus through inhalation of mouse saliva or excreta aerosols or dust containing mouse excreta. The virus can also be directly introduced through broken skin, eyes, by ingestion of contaminated food or water, or via a mouse bite. This virus has one of the highest fatality rates among this group of viruses, with a case fatality rate approaching 50 percent (Centers for Disease Control and Prevention 2011). Though the risk of infection is small, proper precautions should be followed to prevent infection when cleaning out mouse-contaminated areas. Some precautions include:

- Wearing a good quality dust mask
- Wearing good quality disposable latex gloves
- Wetting down the mouse nest and contaminated bluebird box with a 5 percent bleach solution or other household disinfectant to deactivate the virus and prevent dust from becoming airborne

For the most up-to-date and comprehensive information on the Hantavirus threat, visit the Centers for Disease Control website at: <http://www.cdc.gov/hantavirus>

Osprey Management

Prior to the ban of dichlorodiphenyltrichloroethane (DDT) in the 1970s, osprey populations declined severely throughout the United States. In recent years, however, osprey populations have rebounded and are now common in the Tidewater region. At JEB Little Creek, ospreys nest on a variety of structures including constructed nesting platforms, light poles, and channel markers. The Installation participates in an osprey-monitoring program and has constructed a number of nesting platforms to provide suitable nest structures. Because of potential fire and electrocution, nesting platforms or light poles retrofitted with a raised platform are preferable to ospreys nesting on unmodified light poles or utility poles. Three nesting platforms were erected in 1993 near active nests on baseball field lights to provide alternative nest locations, and three more platforms were installed in 1995.

Osprey nesting season begins in April and continues until nestlings are fledged in July or August. Historical osprey nesting data collected at JEB Little Creek indicate osprey are likely to continue to utilize these structures. Additional measures that would reduce the risks of fire and electrocution include retrofitting the occupied light poles with constructed platforms or baskets and constructing platforms at a height greater than the existing nests and fitting utility poles with raptor electrocution guards. Osprey nesting was observed at four locations on the Installation during 2017.

As with all migratory birds, ospreys are protected by the MBTA; no operations or maintenance may be performed on a structure if a nest is occupied, and no nest may be removed or damaged, except as permitted by USFWS and VDGIF. The 4 VAC 15-30-10 provides general protection for all native birds and their nests, eggs, and young, with the exception of species subject to legal harvest. Although osprey may be considered a nuisance species as defined by Code of Virginia

§29.1-511, §29.1-100 specifically excludes state and federally protected species (VDGIF 2010). The NRM monitors nest activity and will inform public works personnel of nesting status if maintenance is required on any of the light poles or platforms that are occupied, or if consultation with USFWS and VDGIF is required for such activity.

Osprey nests should be relocated or removed as follows:

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

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

Anyone seeking to have an active nest relocated or removed should contact the NRM who will coordinate with the VDGIF, USFWS, or USDA WS. To comply with federal law, Virginia law, and VDGIF regulations, active nest relocation or removal may only be undertaken by an individual authorized by USFWS for the nest removal.

*Individuals interested in applying for a USFWS permit to
remove or relocate an active nest may do so at:*

<http://www.fws.gov/migratorybirds/mbpermits/ApplicationForms.html>

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

Eastern Bluebirds. The eastern bluebird is another species that has suffered population declines throughout its range because of pesticide use. Other threats to bluebird populations include habitat loss and the introduction of two invasive, nonnative species: the house sparrow and European starling. However, in areas where nesting boxes have been put up in suitable habitat, bluebird populations are increasing (North American Bluebird Society 2012). Ideal habitat consists of an open area for foraging, such as mowed lawn, that is fringed by shrubs and hardwood trees. Erecting nest boxes in such areas reduces competition from house sparrows, tree swallows, and other small cavity nesters that also utilize this habitat type. The Installation currently has 12 bluebird boxes located throughout the administrative and housing areas. The NRM monitors nest utilization and fledgling success throughout the nesting season.

Ducks. Wood ducks and mallards are the area’s only breeding duck species known to use artificial nest structures; American black ducks (*Anas rubripes*) have not been observed using these structures in the area. Wood ducks primarily nest in tree cavities in wooded swamps and marshes at the edges of ponds. Because suitable habitat is fairly limited at JEB Little Creek, supplemental wood duck boxes benefit recruitment of nesting pairs and nesting success. The Installation currently has three wood duck boxes mounted on poles in the large freshwater wetland near the Heros Circle Nature Trail. Lakes 3 and 4 at the golf course represent other potential sites for wood duck boxes to be installed.

Mallards are a very common duck that, in contrast to wood ducks, inhabit a variety of habitats. Mallards are generally ground nesters, but will use artificial nesting baskets, tunnels, or floating platforms. Mounting the structure a few feet above water is a technique that provides protection from predators. The Installation currently has three mallard duck boxes: two located in the large freshwater wetland near the Heros Circle Nature Trail, and one located near the shore of Lake Bradford.

The American black duck is another species that may potentially use artificial nest baskets, but they have not been observed using the structures in the area. These ducks breed in freshwater and brackish wetlands with abundant emergent vegetation. The nest is placed in a concealed location, usually on or near the ground but occasionally several feet off the ground. Placing nesting baskets or floating platforms in the saltwater marsh near the wildlife viewing platform on the Heros Circle Nature Trail may benefit this species. The Installation currently has not placed any nest boxes targeting American black duck; however, this species will likely utilize the nest boxes that target use by wood ducks or mallards.

3.5.3 Marine Resources Protection

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

In accordance with the MMPA, and NAVFAC’s Interim Environmental Policy No. 10-001, “Marine Mammal Protection Act Compliance for In-Water Construction” (February 2011), the Installation should evaluate any action that produces sound in water where marine mammals are present to determine if a “take” authorization is required in the form of an Incidental Harassment Authorization or a Letter of Authorization from NMFS’s Office of Protected Resources. Accordingly, all training and other Installation activities that have the potential to impact marine resources are coordinated and permitted through the appropriate federal and state agencies.

Operations personnel are responsible for preparing NEPA documentation and obtaining permits for training activities, whereas environmental personnel are responsible for preparing NEPA documentation and facilitating and coordinating the receipt of required permits for Installation-related natural resources activities.

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

Marine Animal Stranding Protocol

Stranded sea turtles and/or marine mammals may be encountered at JEB Little Creek. If discovered, the following procedures are followed for required and consistent reporting:

- If a marine mammal (dolphin, porpoise, whale, seal, or manatee) or sea turtle is discovered on JEB, immediately contact the Command Duty Officer (CDO):
 - Working hours: (757) 462-7385/86 (Quarterdeck)
 - After hours: (757) 438-3930 (CDO)
- And then the JEBLCFS Environmental Division:
 - (757) 462-5351 or (757) 636-4313
 - (757) 462-5350
- CDO will immediately secure the area (if animal is dead, secure above high tide line) and contact:
 - a) Virginia Aquarium Stranding Response Team:
 - (757) 385-7576 (Alive animals) or (757) 385-7575 (Dead animals)
 - b) Regional Stranding Coordinator (Hotline: 1-866-755-6622 or 978-282-8478)
- Be prepared to supply location, species, condition of the animal (dead or alive) and contact number of person who will be near a phone. If dead, please secure the animal above high tide line.
- CDO will notify CNO N45 Washington, D.C. (per OPNAVINST 3100.6J) via a Navy Blue in OPREP-3 Reporting System **ONLY** when:
 - A manatee or whale impact occurs

- **MULTIPLE** marine mammals (such as dolphins, porpoises, or seals) are impacted
- Notification by Navy Blue is **NOT** required for injured or dead turtles since these species are not marine mammals.
- Monitor the animal from a safe distance. Remain a minimum of 100 yards (274 m) from the stranded animal. Crowding the animal is unsafe for the observer as well as the animal. Do not touch the animal, alive or dead, as wild animals can carry many diseases, parasites, and bacteria, some of which can be transmitted to humans. Do not attempt to push the animal back into the water and if it goes back into the water on its own, do not attempt to follow after or swim with it.
- Carefully observe the animal. Observe the position of the alive or dead animal and monitor its breathing, if alive. Wait for responders from Virginia Aquarium Stranding Response Team to arrive and direct them to the animal. Relay all observations to the responders so that they can provide the best possible care for the stranded mammal or sea turtle.

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

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

To report a stranded marine animal to the Virginia Aquarium's Stranding Response Team, call (757) 385-7575 (dead animals) or (757) 385-7576 (alive animals). These lines are open 24 hours a day. More information is available on the Virginia Aquarium website: <https://www.virginiaaquarium.com/consERVE/report-a-stranding>

A sea turtle lighting survey was completed at JEBLCFS in 2015 and included night surveys to inventory all light sources visible from the shore. The report included recommendations for eliminating unnecessary lights, minimizing lighting from outdoor and indoor sources, using alternative long-wavelength light sources, using light screens, altering light angle, and enhancing dune profiles. Recommendations were provided and included in the INRMP project implementation schedule (**Appendix A**).

3.5.4 Fisheries Management

Lake Bradford and Chubb Lake, the two largest lakes at JEB Little Creek, support relatively good freshwater fisheries. Cooperative efforts with VDGIF and/or USFWS to manage the fisheries have been ongoing since 1977. In the late 1970s, tiger muskellunge (*Esox lucius* x *Esox masquinongy*), a cross between muskellunge and northern pike, were stocked in Lake Bradford and Chubb Lake.

In 1995 walleye (*Sander vitreus*) were stocked in Lake Bradford. The USFWS, Office of Fishery Assistance has also conducted fisheries surveys every four years at one or both of the lakes since 1977. These surveys are important for detecting changes in the fish community and population structure and determining management actions. In recent years, fisheries surveys (Swihart and Galvez 1996 and Galvez and Swihart 2000) have shown Lake Bradford to possess excellent fish community structure, with largemouth bass dominating the top predator level. Water quality conditions are favorable for growth and reproduction of the fish species present. Fish surveys conducted in 2000 identified 14 fish species, with largemouth bass, bluegill, white perch, pumpkinseed sunfish, and yellow perch representing the most abundant sport fishes. No tiger muskellunge were collected in the 2000 survey but stocked walleye were sampled. Gizzard shad, common carp, bowfin, and American eel were the only nongame fish observed in the survey.

The most recent fisheries survey of Lake Bradford occurred in 2013 by the VDGIF, and involved electrofishing to sample and survey the fish population and richness of the lake (VDGIF 2013a). Many of the species previously detected in past efforts were sampled in 2013. However, the health of the fishery was described as “forage heavy,” indicating a high number of prey species and few predators. The age class of bass sampled involved few juvenile fish, which are target prey of the multiple sunfish species sampled. Nutrient loading was suspected to contribute to the high abundance of gizzard shad in the lake because the species forages on phytoplankton and zooplankton. Multiple recommendations were made to enhance the fish population at Lake Bradford, including modification of creel and size limits to be more consistent with state regulations, and allowing the take of panfish.

3.5.5 Oyster Reef

In the spring of 2010 several small oyster reefs were installed along the north shore of ERP Site #7 in Little Creek Cove. Clean shell material was placed to provide habitat for eastern oyster (*Crassostrea virginica*), crabs (infraorder Brachyura), and other aquatic organisms. A total volume of 4,093 bushels of oyster shell were used to create the reef habitat. Dr. Jim Wesson, a representative of VMRC, visited the created reef habitat in 2012 and made an assessment that the created oyster bed was responding well. Additional monitoring is planned to determine if the oysters become subject to diseases that typically affect oyster restoration projects, such as MSX and dermo. In 2017, a project was developed to enhance deficiencies in the existing oyster reef by incorporating recycled blocks between shell reefs. Execution of this project is planned for late 2017 or early 2018.

3.6 Rare, Threatened, and Endangered Species Management

3.6.1 Federal and State Regulations

ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for listed species. The ESA requires that every federal agency ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of federally designated critical habitat. The ESA also requires federal agencies to consult with the USFWS or the NMFS, as appropriate, on any action that is likely to jeopardize the continued existence of species proposed for federal listing under the ESA, or result in the destruction or adverse modification of habitat that supports federally listed species.

Federal candidate species for listing, or species listed under state ESAs, are not protected under the federal ESA. Because federal candidate species for listing may be listed in the future, installations are required to avoid taking actions that result in the need to list these species, and are encouraged to participate in conservation agreements with the USFWS. At a minimum, installations are required to document the distribution of federal candidate species listing on the installation and monitor their status. Installations are encouraged to cooperate with state authorities in efforts to conserve state-listed species.

*The Virginia Fish and Wildlife Information Service online database is available at:
<http://vafwis.org/fwis>.*

Rare plants and animals in Virginia have been designated as such by the VDCR-DNH based on the number of individuals of a particular species that are estimated to occur within the state. Although the state rarity ranking itself does not mandate protection, JEB Little Creek and the Navy view management of rare species and species of special concern as a matter of good stewardship. The VDGIF has regulatory and enforcement jurisdiction over all species listed under the state ESA, excluding listed insects. In addition, VDGIF manages an online database, the Virginia Fish and Wildlife Information Service, that contains current and comprehensive information on all of Virginia's wildlife resources. The VDCR-DNH recommends coordination with the Virginia Fish and Wildlife Information Service staff during initial project review to identify potential adverse impacts to critical wildlife resources.

3.6.2 Rare, Threatened, and Endangered Species

Rare, threatened, and endangered species that have been observed at JEB Little Creek are identified in **Table 2-6**. Observations of rare, threatened, and endangered species should be reported to the Installation NRM, and the observer should gather as much information as possible. Species observed should not be approached, as it is a violation of the ESA to harass or otherwise disturb a listed species. If possible, without approaching the protected species, observers should record location information (with global positioning system [GPS] data if possible), time, photographs, weather conditions, and behavior information. Provide this information immediately to the JEBLCFS Environmental Division NRM at (757) 462-5351.

The VDCR-DNH is responsible for maintaining the rare plant inventory, database maintenance, and protection and management of Virginia's natural heritage resources. These resources include habitats of rare, threatened, or endangered plant and animal species; state significant communities; and other natural features. Because federal and state lists of threatened and endangered species change over time, careful tracking and periodic field surveys are needed to confirm the occurrence of rare species on the Installation. The VDCR-DNH tracks the current status of natural heritage resources in a database that is available on its website.

Although several plant species that are considered very rare or rare in Virginia are known to occur at JEB Little Creek (**Table 2-6**), no federally listed plant species have been documented on the Installation. Loggerhead, green, and Kemp's ridley sea turtles have been occasionally observed in the beach habitats of JEB Little Creek. These occurrences are rare and there are no recordings of nests or false crawls; therefore, utilization of the Installation for nesting is unlikely (VAQF 2014; NAVFAC MIDLANT 2013). Three federally listed birds (piping plover, roseate tern, and rufa red

knot, and one bat (Northern long-eared bat) have the potential to occur on JEB Little Creek. The federally protected bald eagle and the federally endangered Atlantic sturgeon are also known to occur near JEB Little Creek.

Protective measures for piping plover, roseate tern, and rufa red knot that can be implemented in the event any of these species are identified as nesting at JEB Little Creek include:

- Avoiding human activities within fenced or posted wildlife protection areas
- Restricting approaching or lingering near piping plovers, roseate tern, and rufa red knot or their nests if detected
- Requiring all dogs be kept on a leash and keeping cats indoors
- Requiring beachgoers to dispose of all trash and food scraps in appropriate receptacles, as trash/food scraps left on the beach can attract predators which may prey upon eggs or chicks
- Controlling predators, including but not limited to gulls, mink (*Mustela vison*), and raccoons
- Managing native vegetation and controlling exotic vegetation
- Establishing and maintaining an emergency response plan for oil and chemical spills

Piping Plover

The piping plover is a threatened species, both federally and within Virginia, and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. Essential habitat for piping plover includes beaches near dunes and elevated areas, particularly barrier islands. Major threats to the Atlantic Coast piping plover population include human disturbance (especially during nesting) and mammalian predators such as red foxes, raccoons, and feral cats. Piping plover habitat is continually being degraded throughout most of its range from dune stabilization and residential development. Critical conservation strategies for protection of this species include management and protection of barrier islands, which in addition to providing essential habitat, reduce the potential for mammalian predation. SWAP recommendations for protection of piping plover include performing annual population surveys and conducting research on habitat use, population dynamics, and impacts from avian predation and disturbances in their wintering grounds (VDGIF 2005).

Although piping plovers have not been observed at JEB Little Creek, several management measures are in place for protection of this species because of the presence of suitable nesting habitat (see additional details on this species in **Section 2.11.1**). Observations of piping plovers should be reported to the NRM, and the observer should gather as much information as possible. Birds observed should not be approached, as it is a violation of the ESA to harass or otherwise disturb a listed species. As described in **Table 2-7**, a piping plover may appear to be injured, but could in fact be engaged in protective behavior of a nearby nest or fledgling.

Roseate Tern

Roseate tern is a federally listed species, with the northeastern U.S. population listed as endangered and the remaining population listed as threatened. The federally endangered northeastern U.S. population has the potential to occur at JEB Little Creek. However, a roseate tern survey was completed in 2014 at JEB Little Creek and no roseate terns were observed. Roseate tern is a

medium-sized bird that nests on small barrier islands and spends most of its life offshore and along the Atlantic coast. The species migrates in late August to early September to the waters off Trinidad and northern South America. Roseate tern populations declined greatly due to hunting in the late 19th century. Populations remain in the low range of 2,500–3,300. Primary threats to roseate tern include habitat disruption and development along sensitive barrier island habitat the species relies on for nesting (USFWS 2011b).

Rufa Red Knot

Rufa red knot is a federally listed species, a state imperiled (S2) species, and is ranked as a Tier IV Species of Greatest Conservation Concern in the Virginia SWAP. Essential habitat for red knots includes muddy or sandy coastal environments with large areas of intertidal sediments, specifically the mouths of bays and estuaries, unimproved tidal inlets, and tidal flats. The primary threat to the red knot population is the reduced availability of horseshoe crab eggs due to the elevated harvest of adult crabs for bait in the fishing industry. Horseshoe crab eggs along the mid-Atlantic Coast provide essential nutrition to migrating red knots (USFWS 2007 and 50 FR 73706-73748).

Rufa red knot habitat is continually being degraded throughout most of its range from dune disturbance and residential development. Critical conservation strategies for protection of this species include beach closures to prevent disturbance, exclosures to reduce competition from gulls, and efforts to conserve horseshoe crabs (USFWS 2007).

Although red knots have not been observed at JEB Little Creek, several management measures are in place for protection of this species, due to the presence of suitable foraging and resting habitat (see additional details on this species in **Section 2.11.3**). Observations of red knots should be reported to the NRM, and the observer should gather as much information as possible, but should not approach the bird. It is a federal violation to harass or otherwise disturb a listed species, or any migratory bird. The observer should make note of location (using GPS data, if possible) and time of the encounter, photograph, and notate the conditions and the bird's behavior. This information should be forwarded immediately to the JEBCFS Environmental Division NRM at (757) 462-5351.

Bald Eagle

The bald eagle was removed from the Virginia ESA in 2013 (VDGIF 2013b); however, this species is provided protection under the Bald and Golden Eagle Protection Act (BGEPA) and MBTA which prohibit take of the species without a permit. Bald eagles have been observed at JEB Little Creek though no known nesting sites have been documented. Based on results of consultation with the USFWS on the 2010 INRMP, the USFWS requested that if future nesting of bald eagles is documented at the Installation, that these be identified in updates to the INRMP, and that the Installation consider how Installation activities would negatively impact nesting sites, as required by the BGEPA.

Kemp's Ridley Turtle

The Kemp's ridley is a federally endangered species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. The Kemp's ridley utilizes the Chesapeake Bay area as a seasonal foraging ground (NAVFAC MIDLANT 2016). A nest has not been reported on the Installation, but two nests have been found in Virginia – one in June 2012 at NASO-DNA and one in July 2014 on False Cape State Park (NAVFAC MIDLANT 2016). Nesting occurs from April to July. The primary nesting habitat is off the Tamaulipas and Veracruz coasts of Mexico. On

average, females nest 2.5 times in one season. Outside of the nesting season the typical habitat is from the Gulf of Mexico to as far north as Nova Scotia and Newfoundland. The Kemp's ridley is the most endangered of the sea turtles, primarily due to human activities and disturbances, including incidental capture from commercial fishing (USFWS 2015b).

Loggerhead Turtle

The Loggerhead is a federally threatened species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. The Chesapeake Bay is considered one of the most important development habitats for juvenile loggerhead sea turtles (NAVFAC MIDLANT 2016). Nesting primarily occurs along open beaches or along narrow bays. Nesting season occurs from April through September with the highest reproduction during June and July. Loggerheads have the ability to nest up to seven times during one nesting season. The loggerhead sea turtle primarily occurs in the Atlantic, Pacific and Indian Oceans in the temperate and tropical region. Essential habitat includes inshore areas such as bays, lagoons, salt marshes, creeks, ship channels and the mouth of large rivers as well as areas hundreds of miles out to sea. Major threats to loggerheads include the degradation or loss of nesting habitat from coastal development and beach armoring, as well as the incidental take of turtles for longline fishing vessels (USFWS 2015c).

Leatherback Sea Turtle

The leatherback sea turtle is listed as an endangered species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. Data dating back to 1991 indicate that the leatherback sea turtle is known to strand in Virginia (NAVFAC MIDLANT 2016). Critical habitat for this species is in the U.S. Virgin Islands, California, and the Oregon/Washington area but no critical habitat has been designated on JEB Little Creek. The leatherback sea turtle is known worldwide to occur in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The species prefers nesting on beaches with proximity to deep water and rough seas. U.S. nesting occurs from March to July on average of 5 to 7 times within a nesting season. Nesting occurs along the Atlantic coast of Florida, Sandy Point in the U.S. Virgin Islands, Puerto Rico's islands of Culebra and Vieques, and the Fajardo and Manuabo areas on the main island of Puerto Rico. Factors contributing to this status include incidental takes in commercial fisheries, coastal development resulting in the loss and degradation of habitat, beachfront lighting, nest predation, degradation of foraging habitat, watercraft strikes and marine pollution and debris (USFWS 2015d).

Green Sea Turtle

The green sea turtle is listed as a threatened species near the Installation, but the breeding colony populations in Florida and off the Pacific coast of Mexico are listed as endangered (USFWS 2015f). This species is also ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. In 2005 one nest was found in southeastern Virginia at Sandbridge Beach and relocated to Back Bay National Wildlife Refuge (BBNWR) (NAVFAC MIDLANT 2016). A false crawl was identified at NASO DNA and a nest was identified at False Cape State Park in the summer of 2017 (Bassi 2017). Nesting season within the U.S. is primarily between June and September, occurring nocturnally at two-, three-, or four-year intervals. The primary habitat outside of the migration season is in shallow waters within reefs, bays and inlets. This species is also known to occur in lagoons that have an abundance of marine grass and algae. The critical habitat for this species is in the Caribbean Sea and no designated critical habitat occurs on JEB Little Creek. During nesting season, this species prefers open beaches with a sloping platform and minimal disturbance. The

largest threats to the green sea turtle are the commercial harvest of eggs and meat along with a disease called fibropapillomatosis that causes tumors on the skin and internal organs and results in mortality. Other factors resulting in mortality of this species include degradation or loss of nesting habitat from coastal development and beach armoring, beachfront lighting, degradation of foraging habitat, watercraft strikes, and incidental takes from commercial fishing and channel dredging (USFWS 2017b).

Atlantic Sturgeon

The Atlantic sturgeon is anadromous, meaning it spawns in freshwater but adults spend most of their time in marine and estuarine waters. Males migrate into freshwater one month before females, in March and April. Females lay between one million and 2.5 million eggs in flowing water up to 60 feet deep (USFWS 2017a). Hatchlings remain in their freshwater nursery habitats for approximately one year. As juveniles age, their range extends farther downriver. The age at which juveniles transition to coastal wandering habitat varies (NAVFAC 2014). Once the fish transitions, it will remain a coastal migrant using various coastal estuaries and rivers seasonally until maturity, which is reached between ages 11 and 18. The Atlantic sturgeon has been harvested for centuries, primarily for their eggs which are prepared as caviar. In 1998, the Atlantic Marine Fisheries Commission prohibited Atlantic sturgeon fishing along the Atlantic coast for four decades in an effort to recover the species populations. The Chesapeake Bay DPS was listed as endangered in 77 Federal Register No. 24; Monday; February 6, 2012; pp 5880-5912; Effective date April 6, 2012. Critical habitat was designated in 82 Federal Register No. 158; Thursday August 17, 2017; pp 39160-39274; Effective date September 18, 2017 (USFWS 2017b). No Atlantic sturgeon critical habitat is designated on or near JEB Little Creek.

Northern Long-eared Bat

The northern long-eared bat was listed as federally threatened in April 2015. This medium-sized bat occupies several types of habitats. The preferred winter habitat is in mines and caves used as hibernacula (USFWS 2015a). This species favors small cavities or crevices in live and dead trees, and is adaptable in selecting roosts. It is rarely known to occur in barns and sheds (USFWS 2015a).

Reproduction begins in late summer or early fall through a process called delayed fertilization. During the hibernation period, the females store sperm until spring. After they emerge from hibernation the females ovulate and the stored sperm fertilizes the eggs. The females will roost in small colonies where they will birth one pup (USFWS 2015a).

A severe threat to the northern long-eared bat is the presence of the white-nose syndrome. Actions have been taken to help reduce the transmission of this fungus in caves and closed mines. However, caves and closed mines do not occur at JEB Little Creek.

Climate change impact on ecosystems and species

Projected climate change impacts to natural resources, as described in **Section 2.5.1**, could result in significant impacts to threatened and endangered species and their habitats. The effects of climate change on wildlife are highly variable, including geographic range shifts, changes in relative species abundance, phenology, and other ecological aspects of their biotic communities. There is already evidence of disruptions in community dynamics, such as predator-prey and plant-insect interactions, alterations in biogeochemical cycles, and increased disease, pest, and nonnative species invasions. The rapid pace of recent environmental change has increased the threat of extinction, as species are not able to adapt to changing environments quickly enough. Specific

climate change stressors that can impact threatened and endangered species include increases in sea level; increases in surface and ocean temperatures; increases in carbon dioxide concentrations; changes in precipitation; increases in diseases, pests, and nonnative species; and increases in the frequency and severity of storm events (Society for Ecological Restoration International 2009).

3.7 Invasive Species and Pest Management

The primary objective of invasive species and pest management at JEB Little Creek is to uphold the military mission by protecting infrastructure, real property, and ensuring human safety for all personnel on the Installation. Invasive species threaten the integrity of natural resources on the Installation which compromises the mission.

Pest management is performed by the NAVFAC MIDLANT regional Environmental Services Shop pest controller in accordance with the 2016 JEBCFS IPMP (NAVFAC 2016). The IPMP addresses the relationship of pest management activities to other natural resources management activities at JEB Little Creek. The IPMP should be referenced for detailed information on aspects of pest control operations or pest problems at JEB Little Creek. The relevant pest management policy regulations are provided in DoDI 4150.7, Pest Management Program. Pest management is integrated with many other natural resources management issues covered in this INRMP, especially wildlife management, to ensure compliance and success of recommended actions.

In accordance with the Navy's Pest Management Programs (OPNAVINST 6250.4C) the 2016 JEBCFS IPMP employs Integrated Pest Management (IPM) principles to avoid and minimize use of pesticides. The objective of IPM is to use ecologically, economically, and socially sound strategies to keep pests at tolerable levels. In IPM the full range of pest control options (cultural, mechanical, biological, and chemical) may be employed after careful consideration of the pest's biology, the damage or infestation thresholds that require action, and the impacts each control alternative will have on the environment. A variety of biological, cultural, and mechanical pest management strategies used in IPM are included in the following discussions of the major types of pest issues occurring at JEB Little Creek.

The Armed Forces Pest Management Board has useful information about DoD pest management policy and issues on their website: <http://www.afpmb.org/>

3.7.1 Invasive Plants and Wildlife

Many nonnative species of plants used in agriculture or erosion control (as ornamentals or accidentally introduced) have become problematic weed species. These nonnative species are considered one of the leading threats to natural ecosystems and biodiversity. Several statutes and EOs, including the Chesapeake Bay Preservation Act, EO 11987 *Exotic Organisms* and EO 13751 *Safeguarding the Nation from Invasive Species* address the control of invasive, nonnative species on federal facilities. EO 11987 specifically restricts the introduction of harmful exotic species onto native ecosystems, whereas EO 13751 requires federal facilities, to the extent practicable and permitted by law, to:

- Prevent the introduction of invasive species
- Detect and control such species

- Accurately monitor invasive species populations
- Provide for restoration of native species and habitats that have been invaded
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control
- Promote public education on invasive species

EO 13148, *Greening the Government through Leadership in Environmental Management*, also requires federal agencies to incorporate the principles and practices of beneficial landscaping as specified in the Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837) (see **Section 3.4.1**).

Invasive Plants

A number of nonnative and invasive plant species have been identified and mapped at JEB Little Creek (**Figure 3-4**). Of these, the primary invasive species of concern is common reed. This aggressive grass species occupies approximately 25 ac (10 ha) of saltmarsh and freshwater marsh at JEB Little Creek where land and hydrological regimes have been disturbed. A combination of a fall aerial application of a glyphosate herbicide followed by controlled burning or mowing has been implemented since 2002 as needed. Aerial spray applications for control of common reed on 25 ac (10 ha) at JEB Little Creek were conducted in 2011; these areas are identified on **Figure 3-4**. Monitoring is conducted annually to determine when additional treatments are needed to control common reed on the Installation.

Other invasive species that are problematic at JEB Little Creek are largely landscape ornamentals that have become established and have the potential to overrun native ecosystems. Included are autumn olive (*Elaeagnus* spp.), common periwinkle (*Vinca minor*), multiflora rose, Japanese honeysuckle, nandina (*Nandina* spp.), Chinese wisteria (*Wisteria sinensis*), Japanese stiltgrass (*Microstegium vimineum*), privet, and English ivy. Priorities for controlling these species are based on ecological significance, the severity of infestation, and the likelihood of successful control with available resources. Invasive species control in the mature hardwood forests around the Heros Circle Nature Trail is a priority, as it is one of the least disturbed natural habitats on the Installation.

One invasive, nonnative species, Japanese sedge was observed in the dune grassland community during the 1999 and 2012 ecological assessments of the beaches and dunes areas (Department of the Navy 2012a). Japanese sedge was introduced to Virginia in the 1930s for erosion control, but it is now considered to be less effective than native species in dune stabilization and is listed as an invasive alien in Virginia (VDCR-DNH n.d.).

In addition to the Japanese sedge identified in the dune habitat, the invasive and nonnative tree of heaven (*Ailanthus altissima*) and Japanese honeysuckle also were observed during the 2012 ecological assessment of the dunes areas at JEB Little Creek. Nonnative and weedy plant species including South American genotype cleavers (*Galium aparine*) and Uruguayan pampas grass (*Cortaderia selloana*) were also identified. It is recommended that populations of the invasive, nonnative, and weedy species observed in the dune habitats be removed, and impacted areas of the dunes be restored using clean, coarse-grained material from terrestrial sources. Planting exposed dunes with native species will stabilize the steep slopes and protect remaining sections of the dune. A list of regional native landscaping species is included in **Appendix I**. After the completion of a comprehensive flora survey including the identification of invasive species populations, an

invasive species management plan will be developed to assist in protection and improvement of the natural resource conditions across the Installation.

VDCR published an Invasive Plant Species of Virginia guide to inform land managers of potential risks associated with certain plant species known to exhibit invasive behavior that pose a threat to Virginia's forests, marshes, wetlands and waterways. The list of invasive plant species is available at <http://www.dcr.virginia.gov/natural-heritage/invspdflist>.

Invasive Wildlife

The red-eared slider and softshelled turtles (*Apalone* spp.) are considered invasive/nonnative vertebrate species that may occur in the wetland or lake habitats of JEB Little Creek. The red-eared slider is native to the Midwestern United States extending from West Virginia, south to the Rio Grande River in Mexico, west to eastern New Mexico, and north to Indiana (Somma et al. 2012). It is considered highly adaptable, and was likely introduced to nonnative areas through pet releases and escapes. The red-eared slider overwinters by hibernating and competes with native turtle species for food and basking sites. They may also be able to hybridize with native turtle species, such as the yellow-bellied slider, which results in disruption of genetic integrity of the native species. Softshelled turtles also compete with native species, and are known to occur in Lake Whitehurst and waters downstream that flow onto the Installation (Ewing 2010).

Nutria are an invasive mammal species native to South America. Nutria are prolific, year-round breeders with no natural predators in coastal Virginia. Nutria populations in Virginia have negatively impacted economic and ecological resources of the state, which prompted a multi-year, interagency project to identify effective solutions for eradicating nutria (USFWS 2012d and USFWS 2016b). Nutria frequent habitat utilized by other native Virginia aquatic mammals, including muskrats, otters, and beaver, and have been documented in areas around JEB Little Creek. Environmental staff and the regional Game Warden routinely visit natural sites on base to observe flora and fauna conditions. While nutria have been sited at other installations in the area over the last eight years, no nutria have been reported at JEBLCFS. Patrols of the base will continue quarterly for nutria. Contact with the Virginia Tech Conservation Management Institute has been made to gather information on control methods and reporting of nutria locations. The NRM will conduct inspections of favorable habitat on the installation. The regional Game Warden will conduct control operations if nutria are encountered.

3.7.2 Pest Management

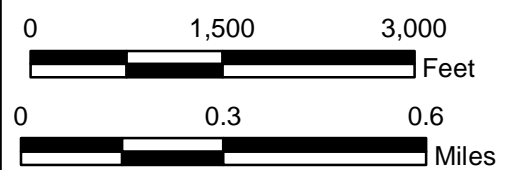
Pest management at JEB Little Creek includes the control and management of feral domestic animals, rodents in buildings, and nonnative birds not regulated by MBTA (such as the European starling and rock pigeons). NAVFAC MIDLANT Environmental Services: Pest Control Shop personnel provide pest management services at JEB Little Creek.

3.7.3 Feral Domestic Animals

Abandoned domestic cats and dogs can become serious pests on military installations. Feral pets such as domestic cats may carry diseases such as rabies, distemper, and feline leukemia, as well as transport biting arthropods that transmit other zoonotic diseases that can pose serious health threats to humans and family pets. Feral pets are a health and safety risk for Installation personnel and threaten wildlife populations, especially migratory birds. Feral cats are an ongoing management issue at JEB Little Creek.



- Invasive and Non-Native Plant Species**
- Japanese honeysuckle
 - Japanese sand sedge
 - ▲ Tree of heaven
 - Common reed
 - Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 3-4
 Invasive and Nonnative Plant
 Locations of JEB Little Creek

This page intentionally left blank.

The CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property identifies the Navy policy on feral pets (**Appendix K**). In accordance with this policy, the Installation must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations. At JEB Little Creek, captured feral pets are taken to the local animal control facility.

JEB Little Creek also controls feral cat populations by encouraging responsible pet ownership and limiting access to food and shelter. Vaccination, registration, and tags are required for every pet on the Installation. The feeding of strays is prohibited and all dumpsters must be secured. The NRM provides pet and wildlife information to Installation personnel through the Public Affairs Officer.

3.7.4 Invasive Control Methods

General control methods that are used to combat invasive plant species infestations include mechanical methods such as cutting, mowing, and burning and chemical applications of herbicides. Herbicide applications are most effective with species that have a larger percentage of foliage in comparison to stems and roots, such as grasses and non-woody vines. For woody species, a combination of practices that includes cutting the larger woody materials and treating resprouting vegetation with a foliar application of herbicides is frequently recommended. To ensure proper identification of species and use of appropriate control methods, natural resources personnel should periodically attend invasive species control workshops and training.

Herbicides may only be applied by licensed DoD employees or contractors in a manner consistent with all label instructions. The 2016 JEBLCFS IPMP gives further guidance on herbicide application, storage, and protective measures. All herbicides used must be approved by the regional entomologists and must be on the authorized user list in accordance with the 2016 JEBLCFS IPMP (NAVFAC 2016). In addition, all outdoor pesticide use that is conducted in remote areas must be coordinated with the NRM to ensure wildlife, plants, or their habitats are not affected.

The most effective treatments for removal of red-eared slider and softshell turtles include hunting, trapping, and destroying eggs. A permit to capture and euthanize these species is required by Virginia law. If euthanizing is determined to be necessary for control of these species at JEB Little Creek, coordination with a VDGIF herpetologist is recommended. J.D. Kleopfer is the current VDGIF Herpetologist, and can be reached for consultation at (804) 829-6703.

A list of Virginia's invasive species, methods of control and fact sheets are available on the VDCR-DNH website: http://www.dcr.virginia.gov/natural_heritage/invspinfo.shtml

Multiple control methods exist for managing nutria. Management is typically achieved through shooting or trapping. If nutria control is necessary (particularly trapping), coordination with the VDGIF will ensure that methods are being applied consistent with Virginia laws and regulations. Some exclusion methods may also be appropriate to deter nutria from smaller-scale bodies of water. Relocation of live nutria is not authorized.

3.7.5 Zika Virus

In accordance with [OPNAVINST 6250.4C](#) (paragraph 4c), the Installation's Naval Branch Health Clinic, Preventive Medicine Department (PMD) is responsible for conducting inspections and surveys aboard installations to determine the species, source, location, and density of medically important arthropods and provide the results to the public works and facilities departments for use in planning pest control operations. Moreover, per OPNAVINST 6250.4C, paragraph 4-c, the Navy Bureau of Medicine and Surgery entomologists, based at the Navy Entomology Center of Excellence and the Navy Environmental and Preventive Medicine Units, is responsible for guidance relating to disease vectors and medical pests.

In July 2016 JEBLCFS organized surveillance efforts to detect mosquito carriers of the Zika virus (*Aedes aegypti* and *Aedes albopictus*). *Aedes* mosquitoes feed during the day and breed in any container of water. Based on surveillance procedures, the NAVFAC MIDLANT Environmental Services Pest Control organized efforts to monitor for the detection of *Aedes* and apply ultra-low volume treatments during early dawn and evening hours to target Zika-carrying mosquitoes. JEBLCFS PMD initiated an outreach initiative to educate residents of base housing and Installation personnel to reduce the amount of standing water used by mosquitoes to lay larvae.

3.8 Habitat Conservation and Restoration

Because large portions of JEB Little Creek are developed and the Installation is located in a densely developed area, conservation and restoration of the remaining natural habitats are high priorities of the natural resources management program. Habitat conservation and restoration are particularly important in areas with significant natural communities; rare, threatened, or endangered species; or exceptional biodiversity. JEB Little Creek has several designated special interest areas that help protect such resources. These include the DPA, the Scout Island Special Interest Area, and the Heros Circle Nature Trail. Protection and restoration of the Chesapeake Bay shoreline is another important conservation priority for the Installation. **Figure 3-5** shows the conservation areas and other special interest areas at JEB Little Creek. Additionally, habitat and conservation efforts at JEB Little Creek should account for projected impacts from climate change, as described in **Section 2.5.1**, which could result in altered habitat, especially along the coast.

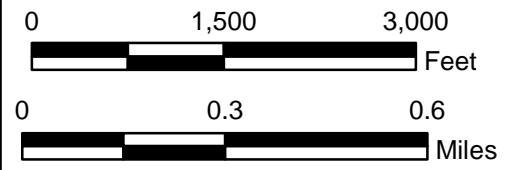
3.8.1 Dune Protection Area

The Beaches and Dunes Management Unit contains several significant natural communities, a state-rare species, and the primary dune system. Primary dune systems are protected under the Coastal Primary Sand Dune Protection Act in Virginia, which is an enforceable policy under the Virginia Coastal Zone Management Program. The primary and secondary dunes at JEB Little Creek are particularly important because they provide protection from storm surges to portions of the Installation and its infrastructure immediately behind the dunes. The dune system and its habitats, however, are extremely sensitive to natural disturbances such as storms and wave action, and human disturbances such as vehicular traffic and excessive foot traffic.

The overall goal of restoration activities within the DPA is to create more extensive and stabilized dunes. This can only be accomplished by minimizing the number of beach access roads and routes, and restoring or rebuilding the primary and secondary dunes.



- Installation Boundary
- Special Interest Areas**
- Shoreline Protection and Restoration Area
- Hero's Circle Nature Trail
- Documented Osprey Nesting Point
- Dune Protection Areas**
- Primary Dune
- Secondary Dune
- Secondary Dune Field



Source: ESRI, World Imagery; Navy 2016

Figure 3-5.
Special Interest Areas and Dune Protection Areas of JEB Little Creek

This page intentionally left blank.

Site-specific dune restoration and protection recommendations for nine existing and potential restoration projects are provided in the 2012 Dune Assessment (Department of the Navy 2012a). These include replacement and extension of fencing to allow for restoration of dunes that are eroded east of the existing sand fence located on the northern perimeter of the Installation.

Other recommendations include closing off certain sections of the DPA located on the northern shore of the Installation to minimize impacts to the dune and allow restoration efforts to progress. The use of heavy machinery may be necessary to fully restore the dunes due to heavy traffic. The report recommends relocating training activities that involve excavation or any other type of major ground disturbance to the back dunes (e.g., landward of the primary and secondary dunes) to the furthest extent possible. A collapsed section of pipe within the dune habitat in the northwest section of the Installation was replaced and repaired as recommended in the report to ensure stormwater discharges beyond the primary dune (see **Section 3.2.2**). Additional projects that would indirectly benefit the dunes are included in **Section 3.2.2** and **Section 3.11.1**.



Dune Restoration Project

Source: L. Eiser

The 2012 dune assessment also describes general restoration techniques, such as invasive species management and dune restoration and protection through signage, sand trapping, dune reconstruction, and native species planting (Department of the Navy 2012a). The assessment also includes the following six universal recommendations that should be applied Installation-wide, as needed and without impacting military readiness activities:

1. Conduct comprehensive threatened, endangered, and species of concern vegetative surveys that include, at minimum, four survey efforts extended throughout the growing season to capture the ideal survey window for various groups of plants.
2. Develop an Invasive Species Management Program for JEBLCFS that includes a comprehensive survey that identifies all invasive species sites within the DPAs.
3. To ensure the continued persistence of all native herpetofauna species, the NRM must work to maintain a healthy dune ecosystem and maritime forest, control introduced predators (e.g., domestic free-ranging and feral cats), remove sources of garbage and food for subsidized predators (e.g., raccoons and skunks), and limit pedestrian and motorized traffic.
4. Conduct additional mammal surveys to gain a better understanding of the population densities and ranges of the southern short-tailed shrew (and other possible shrews) within the JEB Little Creek DPA. Due to the low efficacy of Sherman and Fitch live traps at capturing shrews, a combination of drift fence and pitfall traps should be used. Surveys should focus on maritime grassland communities; however, additional vegetative communities should also be targeted for other shrew species.
5. Conduct additional mammal surveys to gain a better understanding of the population densities and ranges of the eastern harvest mouse (*Reithrodontomys humilus*) within the

JEB Little Creek DPA. Perform transect and grid surveys in areas of potentially productive habitat (i.e., maritime grassland communities).

6. Identify and maintain a few critical beach access routes. Close and post exclusion signs at all potential entry points to those access routes that are determined to be unnecessary. Erect rope fencing with wooden stakes to keep people out of prohibited areas. Install sand fencing to rebuild the primary dune and supplement these efforts by planting native dune species. Place educational signage in areas where access was previously sought and is being closed. Intact, continuous sections of dunes between a few selected access routes have been created and are continuously evaluated to ensure the protection of dunes and fulfillment of mission and training needs (Department of the Navy 2012a).

Additional annual efforts to reduce erosion and stabilize dunes in the beaches and dunes areas include the placement of sand fencing and discarded Christmas trees around the bases of existing dunes. These articles act to entrap windblown sand causing it to accumulate and add to the dune's diameter. Clean Christmas trees (no tinsel or ornaments) are collected from military and civilians who have access to the Installation and Christmas tree lots and brought to JEB Little Creek annually. Base commands assist the Installation NRM, who coordinates the sand fencing and Christmas tree placement program. Future efforts will focus on additional road closures. Annual maintenance and monitoring of these efforts are important to the success of establishing vegetation, stabilizing the dunes, and reducing sand migration in the dunes.

3.8.2 Scout Island Special Interest Area

Scout Island was designated as a special interest area by the VDCR-DNH for the protection of several natural heritage elements. The island supports two significant natural communities and a state-rare plant species. An area of maritime evergreen forest, a large interdune pond, and one of the most northern populations of the state-rare Spanish moss occur on Scout Island. Access to the island is via a footpath that crosses a narrow causeway, which limits use of the island and conserves its natural resources. Boy Scout camping was previously allowed on the island, but it has been discontinued in recent years. If camping is reinstated, overuse should be avoided and cutting of vegetation prohibited.

3.8.3 Heros Circle Nature Trail

The Heros Circle Nature Trail is a diverse natural area that provides recreational, physical fitness, and environmental education opportunities for Installation personnel and their dependents. The Heros Circle Nature Trail includes a 0.8-mi (1.3-km) jogging and nature trail with interpretive signs. The trail passes through the largest stand of mature mixed hardwoods, and loops around an extensive freshwater marsh system. Continued conservation and maintenance of this area is important to the quality of life as well as maintaining the Installation's natural diversity and wildlife habitat. Problems with rutting of roads and invasion of several nonnative species are the primary management issues in this area. Gates have been installed at the trail entrances off Amphibious Drive to prevent vehicular traffic from access to this area, and to reduce misuse and dumping within the wooded areas along the trail. As of 2016, several of the trail structures, signs, trail markers, and other features showed signs of wear. In 2017, the trail was renamed and a revitalization project was initiated to improve trail conditions, update interpretive signs, and improve other features for recreational use.

3.8.4 Shoreline Protection and Restoration

Protection and restoration of the Chesapeake Bay shoreline is an ongoing natural resources issue at JEB Little Creek. Protecting the shoreline is critical to the maintenance of the sand dune communities and beach training areas and for providing recreational opportunities for Navy personnel and their families. A 1997 shoreline management plan developed by the VIMS (Hardaway et al. 1997) and updated in 2003 (VIMS 2003 and Hardaway et al. 2005) assessed the rates and patterns of beach change along the shoreline. These plans state that the shoreline at JEB Little Creek generally has been retreating since at least 1852. Past and ongoing actions that have influenced shoreline morphology include the creation and maintenance of Little Creek Channel, maintenance dredging of Lynnhaven Inlet, periodic beach nourishment on various subreaches of the bay, and the installation of groins and breakwaters on the JEB Little Creek shoreline. Recommendations from this plan resulted in the construction of a headland breakwater system and two revetments at the Officer's Beach.

The 2003 update to the shoreline management plan was developed to determine if additional management strategies should be implemented. The report reassessed shoreline morphology and indicated that the shoreline subreach just west of the Officer's Beach has continued to erode at a rate of about 10 feet (3.0 m) per year, from the existing revetment westward toward Enlisted Beach. Continued erosion along this reach was predicted to proceed into the beach, dune, woodlands, and maritime forest systems behind the beach area. To help address this issue, installation of an additional breakwater (i.e., Structure #11) was completed in March 2011 to reduce the extreme length of the embayment and create two shorter bays along the same reach (**Figure 3-6**). Installation of an additional structure (i.e., Structure #10) is also proposed to further reduce erosion along the reach east of the Enlisted Beach. As recommended by the updates to the JEB Little Creek Shoreline Stabilization Plan in 2003 and 2005 American beach grass was planted on the dunes by the outdoor firing range in 2008 (VIMS 2003 and Hardaway et al. 2005).

Full implementation of the JEB Little Creek Shoreline Stabilization Plan will create a series of headlands and pocket beaches along much of the JEB Little Creek coast. The beaches and dunes areas between the Officers' and Enlisted beaches would be reformed into curvilinear embayments. These stabilization measures could result in significant impacts to the vegetative communities; however, it is expected that over time the displaced dune and woodland features would migrate toward the area of the embayments. **Figure 3-6** illustrates the existing structures and locations of additional structures proposed in the updated shoreline management plans. Annual activities that are conducted to stabilize the dune line are described in **Section 3.7.1**. Appropriate NEPA documentation has been prepared, and the required wetlands permits will be obtained prior to constructing the proposed shoreline stabilization structures identified in **Figure 3-6**. Implementation of shoreline stabilization projects is under the purview of the JEBLCFS Environmental Division/Natural Resources Program, aside from specific measures that are conducted annually to reduce beach erosion.

3.9 Outdoor Recreation and Environmental Awareness

JEB Little Creek largely consists of developed land; however, the Installation does offer a number of outdoor recreation opportunities for active and retired military personnel, civilian employees, and their dependents. The objectives of outdoor recreation and environmental awareness management at JEB Little Creek are to:

- Provide for outdoor recreation opportunities to the maximum extent possible within the constraints of the military mission and capability of the natural resources with the goal of improving the quality of life for Installation personnel, their dependents, and the military community
- Foster understanding and awareness of the environment through educational conservation programs

3.9.1 Outdoor Recreation

Outdoor recreation opportunities at the Installation include fishing, picnicking, bird watching, boating, hiking, camping, swimming, and golfing. Most of these activities are concentrated within designated recreational activities areas, and are administered by the MWR Department at JEB Little Creek. Coordination and cooperation between MWR and natural resources staff is necessary for the protection and management of natural resources on MWR-administered facilities. Natural resources personnel cooperate with MWR staff on issues such as the prevention of nonpoint source pollution, nuisance wildlife control, tree maintenance and other aspects of urban forest management. Outdoor recreation activities that are dependent on the natural resources present at the Installation include fishing and wildlife observation.

Off-road vehicles are prohibited from recreational use on JEB Little Creek because they have the potential to damage natural resources and training areas; however, designated off-road vehicles are used for military purposes, land management activities, and law enforcement.

Fishing

Saltwater and freshwater fishing are popular recreational activities along the shore and freshwater lakes at JEB Little Creek. Fishing from the quay walls, piers, bridges, or Navy vessels is permitted only in certain areas. Saltwater shore fishing is allowed from the shores of the recreational Enlisted “E” beach, the sea wall adjacent to Pier 8, and from Pier 9. Year-round freshwater fishing is permitted at Lake Bradford, Chubb Lake, and Varian Lake. An appropriate Installation fishing permit is required for freshwater fishing, and can be purchased at MWR. This permit is not required for saltwater fishing. State freshwater and saltwater licenses are also required for all fishing activities but are not available for purchase through the Installation. Fishing on JEB Little Creek is currently regulated by Commander, JEBCFS and the JEBCFS Fishing Instruction INST 11015.1D, dated 17 February 2017.

Hunting

Hunting and trapping at JEB Little Creek is prohibited because of the small size of the Installation, proximity to residential/urban areas, inadequate populations of target game animals, and the sensitive habitats at the Installation. However, hunting opportunities are available at other Hampton Roads Naval facilities. Hunting seasons in these areas correspond to state hunting seasons, and a valid state hunting license and an Installation permit are required.



Legend
— Installation Boundary
— Existing Breakwaters



0 1,500 3,000
Feet

0 0.3 0.6
Miles

Source: ESRI, World Imagery; Navy 2016

Figure 3-6.
Existing Shoreline Management
Structures of JEB Little Creek

This page intentionally left blank.

Wildlife Observation

A Watchable Wildlife Area platform and two interpretive signs are located along the trail and boardwalk of the trail that overlooks the saltmarsh of the environmental restoration site/wetland area. The platform provides bird and wildlife watching opportunities for residents and Installation personnel. To enhance user knowledge and appreciation of the area, the interpretive signs provide information on typical saltmarsh vegetation, the variety of wading birds that utilize the saltmarsh habitat, and the importance of the remaining tidal creeks in the region. A boardwalk and observation deck associated with the trail offer joggers and recreationists the opportunity to observe plants and wildlife typical of a freshwater marsh. Several duck boxes installed as part of the natural resources nest box program (see **Section 3.5.3** and **Section 4.2.4**) are located in the marsh within viewing distance of the observation deck. The use of these nest boxes by wood ducks and other types of wildlife offer ample opportunities for wildlife viewing in this area of the Installation.

3.9.2 Environmental Awareness

Environmental education and outreach efforts at JEB Little Creek are coordinated by the NRM, and include annual events such as Arbor Day, Earth Day, and Clean the Bay Day, which are important activities for promoting environmental awareness at JEB Little Creek. Through such activities, Installation residents and volunteers have the opportunity to learn about environmental stewardship as well as contribute to the protection and enhancement of local ecosystems.

JEB Little Creek residents and volunteers are also encouraged to participate in habitat conservation efforts in the beaches and dunes area. Dune stabilization efforts that rely on the participation of volunteers include collecting and installing discarded Christmas trees and planting native beach grasses on sections of the training beaches for dune stabilization. The need to plant native beach grasses is evaluated annually and can be implemented as needed using volunteers. If needed, these plantings can be incorporated into National Public Lands Day events. In 2016, the JEBLCFS Environmental Program was selected for an annual National Public Lands Day: DoD Legacy Award to plant 15,900 American beachgrass sprigs for dune stabilization at Little Creek and Fort Story. The project involved more than 41 civilian and military volunteers from multiple commands and departments at JEB Little Creek-Fort Story.

If protected species such as piping plover or red knot are identified as occurring on the Installation, the NRM will evaluate the need for development of educational outreach materials such as informational handouts. These materials can be distributed to visitors and those living and working on the Installation to increase awareness about threatened and endangered species that occur on JEB Little Creek.

Environmental awareness and education also must extend to planners and project managers throughout NAVFAC MIDLANT installations. Developing instructional materials to inform planners, project managers, and others of natural resources issues that need to be considered when developing project and construction plans would benefit the environment by ensuring that environmental concerns are addressed early in the planning stage and would benefit planners by ensuring compliance with environmental legislation and avoiding possible litigation.

3.10 Community Awareness

Conservation education is the primary tool used to promote community awareness. At JEB Little Creek, this is accomplished through various media, community lectures, classroom activities, and

special events. The Environmental Division and other Installation staff participate in the following initiatives and events for community awareness:

- *The Flagship*, the official newspaper of the Navy Mid-Atlantic Fleet, is the most accessible and efficient method of conveying environmental awareness on the Installation. Natural resources activities on JEB Little Creek, such as Clean the Bay Day and Christmas tree recycling, are published in this newspaper.
- The Environmental Division conducts talks and presentations by request to community groups.
- The Environmental Division conducts an annual Arbor Day tree planting at the Child Development Center as an outreach event. The event includes a Virginia Division of Forestry (VDOF) staff member who discusses the importance of trees, and helps JEB Little Creek maintain Tree City USA status, which is achieved by meeting the four standards of: maintaining a tree board or department, having a community tree ordinance, spending at least \$2 per capita on urban forestry and celebrating Arbor Day.
- In 2016, educational outreach signs were installed at multiple locations at JEB Little Creek, including Enlisted Beach and Seal Park. Informative signs include the topics of riparian buffer zone, dune protection, and Chesapeake Bay marine life.

3.11 Cultural Resources Protection

The regulations and procedures in 36 CFR Part 800, which implements Section 106 and Section 110 of the National Historic Preservation Act (NHPA), require federal agencies to consider the effects of their undertakings on properties listed in, or eligible for inclusion in, the National Register of Historic Places (NRHP). Under Section 110 of the NHPA, federal agencies are required to identify all cultural resources within their landholdings that are eligible for inclusion in the NRHP. Section 106 requires federal agencies to account for the effects of their actions on historic properties and allow the National Advisory Council on Historic Preservation and State Historic Preservation Officer (SHPO) to comment on proposed actions.

Although no structures at JEB Little Creek are eligible for inclusion on the NRHP and a preliminary archeological study revealed no archeological resources of concern occur on the Installation (Department of the Navy 1999), it is possible that unknown archeological resources may be uncovered during ground-disturbing activities.

3.12 Conservation Law Enforcement

The Sikes Act requires that natural resources law enforcement be provided on military lands (Benton et al. 2008). The DoD developed a law enforcement policy in DoDI 4715.03, which mandates that all DoD components must coordinate with the appropriate agencies to support conservation law enforcement and enforce federal and state laws and regulations that pertain to the management and use of the natural resources under their jurisdiction; however, comprehensive DoD conservation law enforcement policy is lacking and each branch of the military has historically addressed the subject individually on an installation-by-installation basis. This has included a variety of conservation law enforcement options including employment of civilian game wardens, military police, or combinations of civilian game wardens and military police. The DoD does not have a standard for conservation law enforcement training, firearms, or civilian job descriptions. Although the USMC has developed a standard conservation law enforcement policy,

and the Department of the Air Force is making strides to develop a similar program, a standard DoD policy on natural resources law enforcement has yet to be developed. A local Navy Game Warden is stationed at NAS Oceana, and has jurisdictional authority at all Hampton Roads Naval facilities.

Law enforcement at JEBCFS is provided by the JEB Security Precinct (CNIC n.d.). If any stranding of marine wildlife is discovered by security personnel along the coastline of JEB Little Creek, the stranding should be reported to the CDO immediately, who will follow the stranding protocol outlined in **Section 3.5.2** of this INRMP.

All Installation fishing permitting, regulations, and creel limits are subject to enforcement by the local game warden. No persons are authorized to kill, collect, or capture any wildlife species on JEB Little Creek. Effective enforcement of laws and regulations applicable to natural resources enhances the overall natural resources program, protects natural and cultural resources, and provides public safety by enforcing off-limit areas and protecting against criminal destruction of natural resources (i.e., trespassing and poaching).

This page intentionally left blank.

4.0 NATURAL RESOURCES MANAGEMENT UNITS – JOINT EXPEDITIONARY BASE LITTLE CREEK

For natural resources management purposes, land and water resources at JEB Little Creek may be divided into three management areas based on ecological and land use considerations. These are the Urban Areas Management Unit, the Natural Areas Management Unit, and the Beaches and Dunes Management Unit (**Table 4-1** and **Figure 4-1**). Although the beaches and dunes area is a natural area, it has unique management considerations that separate it from other natural areas at JEB Little Creek, and it is treated as a separate management unit. The Mid-Atlantic Regional Shore Infrastructure Plan (RSIP) (Department of the Navy 2002) describes zoning classifications in the shoreland zone based on the services provided in an area, without regard for ecological considerations and natural resources management. The RSIP classifications are described for the Natural Areas Management Unit and Beaches and Dunes Management Unit in this INRMP (see **Section 4.2** and **Section 4.3**).

Table 4-1. JEB Little Creek Natural Resources Management Units.

Natural Resources Management Unit	Acres
Urban Areas	1,845
Natural Areas	345
Beaches and Dunes	190
Total	2,380

The management procedures and actions described for each unit will help JEB Little Creek meet its management goals and objectives, maintain regulatory compliance, and ensure an ecosystem approach to natural resources management is implemented. Although management issues may be common to the different management units, practical management solutions and actions are tailored to meet the specific constraints of each unit.

4.1 Urban Areas Management Unit

The Urban Areas Management Unit includes most of the developed and landscaped portions of JEB Little Creek. It encompasses approximately 1,845 ac (747 ha) and includes the operational, administrative, personnel and mission support, and housing activities areas. The unit primarily consists of a developed urban environment and mowed lawn, and includes several wooded patches that lie in and around the housing and recreational areas. The largest forested patches include a 14-ac (6-ha) stand at the playground and picnic area in the central portion of the Installation, a 10-ac (4-ha) pine stand on the peninsula between Desert and Little Creek coves, and about 38 ac (15 ha) of small forest patches scattered throughout the unit. Because of the artificial shoreline around the Little Creek Harbor and the harbor’s industrial nature, the entire harbor is included in this unit.

In recent years JEB Little Creek has undergone rapid development and expansion of its infrastructure and facilities. This development has increased pressure on the remaining natural areas and other natural resources on the Installation.

Many of the natural resources management issues in the Urban Areas Management Unit are related to increased urbanization and development. Relevant management issues for this unit include:

- Coastal Zone Protection
- Wetlands and Water Quality Protection
- OHS
- Urban Forestry
- Fish and Wildlife Management
- Habitat Conservation and Restoration
- Outdoor Recreation and Environmental Awareness
- Invasive Species and Pest Management
- Cultural Resources Protection

4.1.1 Coastal Zone Protection

Through the CZMA, Congress established national policy to preserve, protect, develop, restore, or enhance resources in the coastal zone. Section 307 of the CZMA requires that each federal agency activity within or outside the coastal zone that affects any land or water use, or natural resource of the coastal zone be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of approved state management programs. Federal lands, which are “lands the use of which is by law subject solely to the discretion of the Federal Government, its officers, or agents,” are statutorily excluded from the State’s “coastal uses or resources.” If, however, the proposed federal activity affects coastal uses or resources beyond the boundaries of the federal property (i.e., has spillover effects), the CZMA Section 307 federal consistency requirement applies.

The Virginia Coastal Zone Management Program was established in 1986 pursuant to the Coastal Zone Management Act (CZMA) to protect and manage Virginia’s coastal zone and the resources that lie within. VDEQ is the lead agency for coastal management and is responsible for enforcing the state’s federally approved coastal management plan.

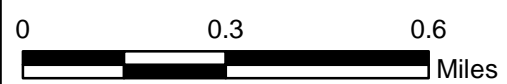
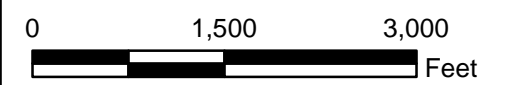
The City of Virginia Beach is in Virginia’s coastal management area. Although JEB Little Creek is statutorily excluded from Virginia’s coastal management area, the NRM must review proposed actions, including development projects, at JEB Little Creek to determine if the action is reasonably likely to affect a land use, water use, or natural resource of Virginia’s coastal zone. The NRM must support the preparation of a Coastal Consistency Determination (CCD) to submit to VDEQ to ensure consistency with the Virginia Coastal Zone Management Program when determined necessary.

4.1.2 Wetland and Water Quality Protection

Wetlands and water quality protection are important issues in the Urban Areas Management Unit because of the high level of development and potential impacts to water resources from new construction and nonpoint source stormwater runoff from developed areas. As with coastal zone management, the NRM must review all the plans for all projects and actions with the potential to impact Installation wetlands. The NRM will assist the proponent of an action in applying for and



Natural Resources Management Units
■ Beaches and Dunes Management Unit
■ Natural Areas Management Unit
■ Urban Areas Management Unit
— Installation Boundary



Source: ESRI, World Imagery; Navy 2016

Figure 4-1.
Natural Resources Management Units
of JEB Little Creek

This page intentionally left blank.

obtaining all required federal and state wetlands protection permits. A detailed Installation-wide wetlands jurisdiction determination was completed in 2015 to identify types, sizes, and locations of wetlands for proper management and protection of resources.

The City of Virginia Beach’s Chesapeake Bay Preservation Area Ordinance (CBPAO) is intended to help address the nonpoint source pollution problem by encouraging the redesign of development projects to eliminate or reduce nonessential nonpoint source runoff (City of Virginia Beach 2012b). The CBPAO also requires development and redevelopment projects in the Chesapeake Bay watershed to implement BMPs to reduce the detrimental effects of nonpoint source pollution. This ordinance affects all property in the City of Virginia Beach that discharge waters within the Chesapeake Bay watershed, including JEB Little Creek. The CBPAO strives to improve water quality by protecting environmentally sensitive areas such as buffers adjacent to waterways, tidal shores, wetlands, and highly erodible soils.

Efforts to protect wetlands and water quality through the establishment and maintenance of riparian buffer zones in this management unit will continue. The NRM will continue to monitor and maintain the designated “No Mowing” areas at riparian buffer sites.

4.1.3 Oil and Hazardous Substance

The greatest risk of OHS spills at JEB Little Creek is within the Little Creek Harbor area of the Urban Areas Management Unit. Sensitive areas and other significant natural resources identified in this INRMP should be included in updates to the Installation SPCCP and ODCP so they may be given a high priority for protection in the event of an oil spill. The NRM will provide maps and other information pertaining to sensitive natural resources as requested.

4.1.4 Urban Forestry

Several small patches of urban forest and landscaping trees are included in this management unit. A large number of these trees show symptoms of stress or physical damage from poor maintenance practices or harsh environmental conditions. The NRM will participate in the identification and marking of damaged or hazard trees for removal. This will also involve periodic monitoring of small planted trees and shrubs annually to identify major health problems; and trim or prune only when required to address health problems. The NRM will also review all plans and actions where tree removal is proposed and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites to ensure compliance with the regional tree preservation and replacement policy. Proponents of projects or activities that may affect existing trees must consult with the NRM to identify all trees in the affected area and to develop a site-specific tree preservation plan for the project in accordance with the Navy’s regional tree preservation and replacement policy. All trees designated in the plan to be preserved have to be identified on all applicable project drawings and marked in the field. Additionally, the NRM will continue to promote the use of beneficial landscaping practices and the importance of using native plant species that will attract pollinators.

Development and implementation of an urban forest management plan that includes an assessment of tree conditions and that provides guidance for care and maintenance of trees is recommended. The availability of this plan would assist land managers in prioritizing and budgeting tree care work efforts in the short- and long-term.

4.1.5 Fish and Wildlife Management

Administration and implementation of the Installation nest box program are the primary wildlife management concerns in the Urban Areas Management Unit. All of the Installation's bluebird boxes are located in this unit. The NRM will conduct annual inspections and maintenance of these structures during the fall and monitor nesting activity throughout the nesting season. Light poles that support osprey nests will be evaluated to determine if they should be retrofitted with nesting platforms, in coordination with USFWS and VDGIF, to reduce the risk of fire and electrocution. Additional nesting platforms that are higher than the existing light poles may also be erected in an attempt to attract ospreys to more suitable sites. Fitting utility poles that are likely to be utilized by osprey with raptor electrocution guards throughout the developed area is another protection measure that will be considered. The NRM will coordinate with the USFWS and VDGIF prior to attempting to move existing nests, and ensure that nest removal, or replacement of nesting platforms are consistent with the guidelines established in VDGIF's guidelines for removal or relocation of osprey nests (VDGIF 2010).

Figure 3-3 provides an easily reproducible map to assist with nest box location and for recording observations. Any additional nest boxes or platforms that are installed or moved will be located with a GPS, entered into the GIS database, and added as a new entry on the data sheet.

The MSFCMA establishes policies for the sustainable management of fishery resources and the protection of essential fish habitat (EFH). The MSFCMA is the primary law governing marine fisheries management in waters of the U.S. The MSFCMA requires that the NMFS, the regional fishery management councils, and the Secretary of Commerce describe and identify EFH for important marine and anadromous fish species under Federal Fishery Management Plans. EFH includes all types of aquatic habitat, including wetlands, coral reefs, seagrasses, and rivers where fish spawn, breed, feed, or grow to maturity, and extends from offshore habitats to inland areas, where the saltwater influence subsides. The MSFCMA requires that any federal activity that may have an impact on EFH be coordinated with NMFS, and that if such activities would adversely affect any EFH identified under the MSFCMA, the Secretary of Commerce shall recommend measures that can be taken to conserve the EFH in question.

4.1.6 Nuisance Wildlife

Feral pets and miscellaneous nuisance wildlife, such as opossums, raccoons, and Canada geese, are the major pest management issues in the Urban Areas Management Unit. The Installation attempts to control feral cat populations through approved sanitation measures, and requires outdoor bulk trash containers to be emptied once per week in the winter and twice per week in the summer. Public education, Installation newsletters, and public service announcements are used to inform housing residents and personnel about spaying and neutering pets and not feeding feral animals. Although these measures reduce their occurrence, nuisance wildlife and feral pets are still pest management issues that need to be dealt with on an occasional basis. The NRM will assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas and will coordinate with the regional Game Warden, as necessary. Feral cats and dogs will be taken to local animal shelters.

Large populations of Canada geese, which occasionally pose a problem at the Eagle Haven Golf Course, also pose a potential birdstrike hazard for helicopters using the LZ Green helipad. Habitat modifications that deter geese, such as increasing vegetation height around ponds, would be coordinated with the golf course superintendent. Golf course managers are required to report

observed increases in the population in an effort to track nest locations. Any measures used to control nuisance populations of feral pets or Canada geese at JEB Little Creek will be conducted in accordance with federal regulation and Virginia law.

Requests for services involving animals, such as sea turtles, marine mammals, game animals, and migratory birds or raptors, not under the purview of the NAVFAC MIDLANT Environmental Services: Pest Control Shop will be directed to contact the installation NRM.

4.1.7 Outdoor Recreation and Environmental Awareness

Some freshwater fishing may occur at Varian Lake, though fish surveys have not been conducted on these lakes and it is unknown if viable fish populations are supported. Intensive fisheries management on these lakes is a low natural resources priority and will not be pursued.

Environmental awareness is an important issue in this management unit, and often information on Christmas tree collection, special community events, pet neutering, fishing schedules, protection measures for federally threatened and endangered species that may occur on the Installation, and other natural resources topics must be communicated to Installation personnel and residents. Including notices in regional natural resources newsletters, the Installation newspaper, and Installation website can be effective methods of communication. Natural resources personnel will post notices in appropriate media outlets as needed to provide environmental information to Installation personnel and residents.

4.1.8 Habitat Conservation and Restoration

Habitat conservation in the Urban Areas Management Unit would best be accomplished by limiting development to previously disturbed sites and avoiding the remaining patches of forests, wetlands, and wetland buffers. As part of the NEPA process, all Installation planning will be coordinated with the NRM and other regional environmental group personnel. This will help ensure that conservation issues associated with the project site are identified and considered early in the planning process. In addition, Installation planners should consult with the NRM personnel to identify and prioritize potential development sites on the Installation. Development of a planning-level GIS layer indicating potential sites would benefit the planning process.

Further habitat restoration will be accomplished by implementing SAV enhancements in Little Creek Harbor. Future projects will include mapping and monitoring known SAV beds and establishing additional beds on suitable sites in the harbor and along the Chesapeake Bay shoreline of the Installation.

4.1.9 Invasive Species and Pest Management

Pest management is conducted to provide maximum pest control at the Installation while minimizing the use of pesticides. IPM, which stresses the use of a variety of control methods to reduce dependence on pesticides, is a key factor in pest management on JEB Little Creek. The objectives of IPM are to use mechanical and physical control (physical removal and exclusion of pests), cultural control (altering specific environmental features to make an area less suitable for or attractive to pests), and biological control (use of natural predators to control a pest) methods before using chemical controls (use of pesticides). Reduced use of pesticides has positive environmental and human health benefits; however, judicious use of pesticides is sometimes necessary to avoid detrimental effects on landscape plants.

Pest management activities at JEB Little Creek include weed control; mosquito control; tick control in training, recreational, and family housing areas; nuisance animal control; forest and landscape pest control; and invasive species control. JEB Little Creek will implement the following recommendations for pest management:

- Implement pest control operations in accordance with the IPMP (regional pest controller).
- Monitor the condition of invasive species at JEB Little Creek (including nonnative migratory birds). Implement the Invasive Species Management Plan for JEB Little Creek.
- Conduct an invasive fauna species survey to collect baseline information on the invasive and nuisance wildlife located at the Installation.
- Remove feral cats and dogs (regional pest controller) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.

4.1.10 Cultural Resources Protection

To avoid unauthorized or accidental disturbance, the Cultural Resources Manager (CRM) and SHPO should be consulted during the planning process regarding any activity that has the potential to impact cultural resources at JEB Little Creek. The NRM will help facilitate cultural resources assessments when necessary.

4.1.11 Summary of Urban Areas Management Unit Actions

A proposed project that is reasonably likely to affect a coastal use or resource of Virginia’s coastal zone may require the submittal of a CCD to VDEQ. In accordance with the CZMA, the NRM must review proposed actions in this unit to: (1) determine if the action is reasonably likely to affect a land use, water use, or natural resource of Virginia’s coastal zone, and (2) assist with the preparation of a CCD for submittal to VDEQ if determined to be necessary.

- Review plans and proposed actions to ensure consistency with the Virginia Coastal Zone Management Program and to help obtain a CCD as required by the CZMA.
- Review plans for projects and actions that have the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.
- Implement BMPs on all construction projects to reduce detrimental effects of nonpoint source pollution.
- Monitor and maintain the designated “No Mowing” areas at riparian buffer sites.
- Continue to participate in Chesapeake Bay Agreements to improve water quality within the Chesapeake Bay watershed.
- As part of the NEPA process, review all Installation development plans and actions to ensure conservation issues are identified and considered early in the planning process.
- Provide maps and other information pertaining to sensitive natural resources that are required for oil spill response planning as requested.

- Develop a scope of work and seek funding for development of an Installation urban forest management plan.
- Participate in the identification and marking of damaged or hazard trees for removal.
- Review all development plans and actions where tree removal is proposed and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.
- Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators.
- Periodically monitor small trees and shrubs to identify major health problems, and trim or prune only when required to address health problems.
- Any additional nest boxes or platforms that are installed or moved will be located with a GPS, entered into the GIS database, and added as a new entry on the data sheet.
- Assess potential site locations and install nesting baskets in locations appropriate for mallard or black duck; inspect and repair wood duck boxes, as necessary, and clean and replace old bedding each fall.
- Monitor locations for possible retrofitting of light poles and installing osprey nesting platforms to reduce the risk of fire and electrocution in coordination with USFWS and VDGIF.
- Conduct annual inspections and maintenance of bluebird nest boxes during the fall and monitor nesting activity throughout the nesting season.
- Provide for protection of native wildlife inhabiting dune habitats by controlling introduced predators (e.g., domestic free-ranging and feral cats), and removing sources of garbage and food that may attract native predators (e.g., raccoons and skunks).
- Develop and implement an invasive species management plan based on results of a comprehensive flora survey.
- Implement common reed control and monitor in identified areas.
- Implement recommendations in the Raptor Management Plan.
- Develop and implement an Owl Nesting Program based on recommendations provided in the Raptor Management Plan.
- Post notices in appropriate media outlets (e.g., newsletter, Installation newspaper, website, or public service announcements) as needed to provide outdoor recreation and environmental awareness information to Installation personnel and residents.
- Monitor the health and extent of the existing SAV beds and establish additional beds.
- Assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas and with monitoring nuisance wildlife, including geese, and implement educational measures as necessary.
- Consult with the CRM and SHPO during the planning process for any activity that has the potential to impact cultural resources.

- Coordinate with USFWS, Office of Fishery Assistance, and VDGIF to conduct fish and water quality surveys approximately every four years on Lake Bradford and Chubb Lake.
- Develop a fisheries management plan to improve the health of Lake Bradford and Chubb Lake while enhancing the quality of recreational fishing opportunity
- Provide opportunities for environmental staff to receive training for basic ArcView and product updates, wetlands delineation and CWA regulations, marine mammal stranding, and invasive species control.

4.2 Natural Areas Management Unit

The Natural Areas Management Unit comprises portions of the Installation that are relatively undeveloped and includes several of the recreational areas and parks, and the larger lakes. A variety of forested and wetland communities occur in this management unit. Of the 345 ac (140 ha) in this unit, approximately 185 ac (75 ha) are forested, 25 ac (10 ha) are saltmarsh, 5 ac (2 ha) are freshwater marsh, and 88 ac are open water. A 40-ac (36-ha) capped landfill (ERP Site 7) is also included in the unit. Recreation is the primary land use in this unit. Important natural resources management issues include:

- Coastal Zone Protection
- Wetlands and Water Quality Protection
- Urban Forestry
- Fish and Wildlife Management
- Outdoor Recreation and Environmental Awareness
- Habitat Conservation and Restoration
- Invasive Species and Pest Management
- Cultural Resources

4.2.1 Coastal Zone Protection

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

- The 2012 Dune Assessment (Department of the Navy 2012a) provides recommendations for shoreline stabilization structures that are necessary to protect the existing shoreline and reduce further erosion of the shoreline. JEB Little Creek PWD is responsible for implementation of the recommended shoreline stabilization structures outlined in the dune assessment document.
- Coastal zone protection at JEB Little Creek includes conservation of natural resources located in the nearshore environment such as SAV and marine fish and mammals (see **Section 4.3.1**).

4.2.2 Wetlands and Water Quality Protection

A large portion of the wetlands on the Installation occur in the Natural Areas Management Unit. Preventing further loss of wetlands through development is the primary focus of wetlands protection in this area. The NRM will review plans for projects that have the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.

Impacts to wetlands may also occur in recreational areas where wetlands are located adjacent to picnic areas or crossed by trails. Proper maintenance of the boardwalk, bridge, and trail that encircle the freshwater wetland in the Heros Circle Nature Trail is particularly important in preventing erosion and damage. The NRM will inspect these areas annually and coordinate with the Seabees and the First Lieutenants Division for needed repairs and maintenance. Another method of protecting wetland resources in this management unit that will be considered is increasing riparian buffer zones and creating “No Mowing” areas where feasible by reducing mowing to the maximum extent possible in areas of heavy utilization along the Lake Bradford shoreline.

4.2.3 Urban Forestry

Maintaining the existing mature hardwood and mixed hardwood/pine forests is the main goal of forest management in the Natural Areas Management Unit. The forested areas in this unit are primarily used for recreation and PT by Installation personnel, their dependents, and visiting units. Providing for the safety of users is therefore an important forest management action for this area. Retaining cavity trees and snags where they will not become a safety hazard is also an important management practice, as it provides wildlife habitat for a range of birds and other wildlife species. The NRM will monitor forest conditions in this area and schedule any required tree maintenance or removal in coordination with grounds maintenance personnel, Seabees, or First Lieutenants Division.

4.2.4 Fish and Wildlife Management

Maintaining the existing forest cover and retaining cavity trees and snags, as described above, are important wildlife management practices in this management unit. Improving the forest’s structural diversity in areas with little or no understory or shrub layer is another management practice that benefits wildlife. In support of this goal, a number of native shrubs and small trees were planted throughout the understory at Seal Park to increase the area’s value to wildlife and improve its visual appeal. Although these plantings require little care and do not require regular pruning, they should be monitored periodically to identify major health problems. Occasional trimming or pruning may be required to remove broken or diseased tissue and promote growth. Encouraging the growth of vegetation by reducing mowing along forest edges, lake shorelines, and, wherever practicable, in park areas, is an additional step that would improve food and cover for wildlife, including pollinators, and to reduce the attractiveness of shore areas to ducks and geese in this management unit.

All of the Installation’s wood duck and mallard boxes are currently located in wetlands in this management unit. The NRM is responsible for inspecting and repairing the wood duck boxes as necessary and cleaning and replacing old bedding prior to 01 March each year.

Three osprey nest platforms are located in this management unit. These platforms and nest boxes will be inspected during the fall and monitored annually during the osprey nesting season by the

NRM. A Raptor Management Plan has been prepared for management of osprey and other raptors that utilize the Installation. This plan also contains recommendations for implementing an Owl Nesting Program.

Wildlife surveys provide valuable information for managing wildlife at the Installation. A frog and toad call survey will be conducted as needed and based on available resources, including three surveys within the year: once in the early spring, once in mid-spring, and once in early summer. The survey route will follow the previously established survey route conducted in 2009 and shown in **Figure 3-3**. A bat box program will be developed for the woodlands associated with the Heros Circle Nature Trail, and other areas as appropriate and as able. Coordinate with USFWS, Office of Fishery Assistance or VDGIF to conduct fish and water quality surveys approximately every four years on Lake Bradford and Chubb Lake. Fisheries surveys will continue to be conducted at four-year intervals, and recommendations to control shad and carp will be implemented if these species reach levels where they start to affect other species. Additional oyster monitoring is planned to determine if the oysters become subject to diseases that typically affect oyster restoration projects, such as MSX and dermo. Surveys of the nearshore environment have been completed, providing the identification of aquatic wildlife; including marine fish and marine mammals and an assessment of their habitats (see **Section 4.3.1**).

4.2.5 Nuisance Wildlife

Large Canada geese populations are a major pest management issue in the Natural Areas Management Unit. The NRM will continue to monitor nuisance geese populations, and implement educational measures such as posting “Do Not Feed the Geese” signs, and sanitary measures such as frequent garbage collection at all recreational areas. Increasing the shrub and herbaceous vegetative component on lake and pond shores would also help reduce the attractiveness of shore areas to ducks and geese as well as increase wetland protection.

4.2.6 Outdoor Recreation and Environmental Awareness

The Heros Circle Nature Trail and watchable wildlife viewing platform are important recreational facilities in the Natural Areas Management Unit that are widely enjoyed by Installation personnel and their families. Periodic maintenance of these facilities will be coordinated and overseen by the NRM. The interpretive signs that are posted along the trail and viewing platforms add to the educational value of the area by providing valuable information on the function of watersheds and area wildlife. The interpretive signs will be cleaned and maintained or replaced as necessary by natural resources personnel.

4.2.7 Habitat Conservation and Restoration

Recent habitat conservation and restoration activities within this management unit are limited to the 2010 installation of oyster reefs in Little Creek Cove. Although no development or other actions are currently planned for the Natural Areas Management Unit, the RSIP proposed zoning map includes two large tracts of forest in the administration land use zone. Expanding development into areas that are currently undeveloped is not consistent with the Navy’s policy on minimizing land use footprints or ecosystem management. All future development at JEB Little Creek should be focused on redevelopment of previously disturbed sites. In accordance with 32 CFR Part 190, request for development and training activity sites must be submitted to appropriate natural resources personnel to ensure conservation issues are considered. The NRM will help ensure

suitable sites with fewer environmental restrictions are considered during the NEPA process for development projects.

The Scout Island Special Interest Area and the Heros Circle Nature Trail are two areas with high conservation priority that occur in this management unit. Because access to Scout Island is limited and the Installation no longer hosts scout camping, significant resources on the island, including the state-rare Spanish moss, are considered well protected. In contrast, the mature hardwood forest and other natural resources in the Heros Circle Nature Trail are somewhat at risk from intensive use and pressure from potential development. Inspections will still be required on a periodic basis.

4.2.8 Invasive Species Pest Management

Chinese wisteria, autumn olive, Japanese stiltgrass, English ivy, common periwinkle, Japanese honeysuckle, and privet are the primary invasive plant species that are impacting the mature hardwood forest and other areas around the Heros Circle Nature Trail in this management unit. These species primarily occur along the trails, roads, and forest edges where they are readily accessible and their removal will cause little disturbance to the natural ecosystem. Trained natural resources personnel will identify and mark target species in the field to be treated, and trained, certified pesticide applicators will conduct the treatments. Treated areas will be monitored and re-treated as necessary to control invasive species.

Common reed is the major invasive species that affects the saltmarsh and tidal creeks in the area. This area was subject to an aerial herbicide application in 2011 (**Figure 3-6**); however, additional focused treatments using a backpack sprayer are still needed to control the common reed. Smaller infestations with high visibility that need immediate treatment and inaccessible areas that cannot be treated under the regional program will be considered for hand-spraying by natural resources personnel. The watchable wildlife viewing platform is one priority area for immediate treatment.

4.2.9 Cultural Resources Protection

It is not expected that any significant cultural resources are located in this management unit.

4.2.10 Summary of the Natural Areas Management Unit Actions

- Review plans and proposed actions to ensure consistency with the Virginia Coastal Zone Management Program and help obtain a consistency determination.
- Review plans for projects and actions with the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.
- Continue to participate in Chesapeake Bay Agreements to improve water quality within the Chesapeake Bay watershed.
- Inspect the Heros Circle Nature Trail and picnic area and other park areas annually and coordinate with the Seabees and the First Lieutenants Division for needed repairs and maintenance to prevent erosion. Maintain and clean signs, or replace as needed.
- Conduct a comprehensive flora survey to include identification of invasive species populations; and rare, threatened, and endangered species.
- Monitor and maintain the designated “No Mowing” areas at riparian buffer sites.

- Monitor forest conditions in the Natural Areas Management Unit and coordinate any required tree maintenance or removal with the First Lieutenants Division or Seabees.
- Periodically monitor the planted small trees and shrubs at Seal Park to identify major health problems, and trim or prune only when required for health problems.
- Encourage the growth of vegetation by reducing mowing along forest edges, lake shorelines, and other locations to improve food and cover for wildlife, and to reduce the attractiveness of shore areas to ducks and geese.
- Assess potential site locations and install nesting baskets in locations appropriate for mallard or black duck; inspect and repair wood duck boxes, as necessary, and clean and replace old bedding each fall.
- Inspect osprey nest platforms during the fall and monitor them annually during nesting season.
- Implement recommendations in the Raptor Management Plan.
- Develop and implement an Owl Nesting Program based on recommendations provided in the Raptor Management Plan.
- Develop a bat box program for the woodlands associated with the Heros Circle Nature Trail, and other areas as appropriate and as able.
- Conduct frog and toad call survey as needed and based on available resources with three surveys conducted within the survey year: once in the early spring, once in mid-spring, and once in early summer following the route shown in **Figure 3-3**.
- Coordinate with the USFWS, Office of Fishery Assistance to conduct fish and water quality surveys approximately every four years on Lake Bradford.
- Coordinate and oversee the repair or replacement of boardwalks, viewing platforms, and interpretive signs associated with the recreational facilities in this management unit.
- Monitor oyster recruitment annually in Little Creek Cove oyster reef.
- As part of the NEPA process and in accordance with 32 CFR Part 190, review all Installation development plans and actions to ensure conservation issues are identified and considered early in the planning process.
- Develop and implement an invasive species management plan based on results of a comprehensive flora survey.
- Implement common reed control and monitor in identified areas.
- Develop and implement an invasive species management plan
- Identify and mark targeted invasive species in the Heros Circle Nature Trail and wildlife viewing platform to be treated, and coordinate with trained, certified pesticide applicators to conduct the treatments.
- Monitor treated areas and re-treat as necessary to control the invasive species.

- Coordinate with USFWS, Office of Fishery Assistance to conduct fish and water quality surveys approximately every four years on Lake Bradford and Chubb Lake.
- Provide opportunities for environmental staff to receive training for basic ArcView and product updates, wetlands delineation and CWA regulations, marine mammal stranding, and invasive species control.
- Remove feral cats and dogs (regional pest controller) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.
- Assist action proponents in applying for, reviewing, and obtaining required federal and state wetlands protection permits.

4.3 Beaches and Dunes Management Unit

The Beaches and Dunes Management Unit encompasses approximately 190 ac (77 ha) along the Chesapeake Bay shoreline in the northern portion of the Installation. Two small arms firing ranges, two recreational beaches, the LCAC facility, and several training areas are located in this management unit. The training areas in this unit are a critical resource for the Atlantic fleet's amphibious and land-based military exercises. The coastal setting, general topography, and vegetative cover are important features of the training environment. This unit contains the DPA, which includes an expanse of undeveloped primary and secondary dunes that are an important component of regional biodiversity. The unit also includes several significant natural communities and several occurrences of state-rare species, and contains habitat that could support several federally protected species. The dune system is also vital for the protection of the facilities located inland from the shore from blowing sand and storm surges.

The RSIP classifies most of this unit as mission support; however, environmental consideration must be made when planning training activities in the Beaches and Dunes Management Unit. Soil disturbances and root damage to the vegetation pose serious threats to this sensitive environment. Relevant natural resources management issues in this unit are:

- Marine Resources Protection
- Coastal Zone Protection
- Wetlands and Water Quality Protection
- Fish and Wildlife Management
- Rare, Threatened, and Endangered Species Management
- Habitat Conservation and Restoration
- Invasive Species and Pest Management

4.3.1 Marine Resources Protection

Sightings of stranded marine mammals or sea turtles on JEB Little Creek beaches or in the Bay will be reported to the CDO who will report the incident to the Virginia Aquarium's Stranding Response Team. The NRM will act as the liaison between the activity and regulatory agencies in such instances. The NRM will also assist Installation personnel with the identification of marine mammals as needed.

If any planned Installation activities have the potential to impact marine or nearshore resources, natural resources personnel will coordinate with and obtain the required permits from the appropriate federal and state agencies.

A survey completed in 2016 established baseline conditions, including physical habitat and biological assessments, of the Installation's nearshore environment through a variety of assessments and surveys including: marine fish surveys, water quality surveys, benthic surveys, SAV mapping, and a marine mammal survey. The nearshore area of JEB Little Creek is dominated by fine and medium sand. Only soft bottom was observed, with little evidence of other biological organisms. In soft sediment, the infaunal communities were somewhat diverse with somewhat higher densities of organisms (Tetra Tech 2016a). Community parameters such as species richness, diversity, and evenness were similar between seasons. Annelids were dominated in the spring and nematodes dominated in the summer. A total of 31 fish species were collected in JEB Little Creek's nearshore waters. Of the fish collected in this survey near JEB Little Creek, 12 are harvested commercially and five have EFH in the survey area. Groups of bottlenose dolphins were the only marine mammals observed in the study. Water quality indicated that most nutrients are within an expected range. Water temperatures were uniform from the surface to the bottom. Temperature varied greatly between seasons; 24° C in the summer and 1° C in the winter. Dissolved oxygen was typically 80 percent or higher except in the bottom layer during summer when it decreased to 68 percent. Salinity was higher at the bottom compared to the top. Turbidity had an across-season average of 2.5 nephelometric turbidity units (NTUs). Overall pH averaged at 8.19.

Implementation of this project ensured compliance with the requirement for the Installation to collect baseline flora/fauna inventories that are to be included in the INRMP. In addition, the information collected will be used to fill in important informational gaps in understanding the roles of the various species and habitats occurring within the nearshore environments of the Installation. Collected data will benefit EFH and managed fishery species, known and proposed threatened and endangered species (e.g., the Atlantic sturgeon, which is federally and state endangered, and the loggerhead sea turtle which is both federally and state-threatened), various migratory birds, and cetaceans.

4.3.2 Coastal Zone Protection

Along with the wetlands, floodplains, and other coastal zone resources that occur on the inland portions of the Installation, the primary dunes located in this unit are a coastal resource that is regulated by the CZMA. Dune utilization in this unit should be conducted pursuant to the Coastal Primary Sand Dune Protection Act and be consistent with the state's Coastal Zone Management Program.

4.3.3 Wetlands and Water Quality Protection

Wetland communities in the Beaches and Dunes Management Unit include the shoreline and a number of small interdunal wetlands. Protection of this rare habitat type is important to the area's biodiversity and its faunal communities. These ponds serve as the only freshwater sources in the area and support a number of amphibian species. Protection from the major threats to these wetlands, migrating sand dunes and vehicular traffic, will be implemented through habitat conservation and restoration. The NRM will review plans for projects and actions with the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits

4.3.4 Fish and Wildlife Management

Portions of the beaches provide suitable nesting habitat for some shorebirds; however, because of intensive training activity along the beach, the likelihood of shorebird nesting activity is reduced. The NRM will monitor the beach areas during the shorebird nesting season, from the beginning of April through July, for signs of nesting activity. If nesting activity is discovered, measures will be taken to shield the birds from human disturbances to the maximum extent possible. Disturbance of shorebird nests is a federal violation under the MBTA.

Marine fish and mammal surveys discussed in **Section 4.3.1** will benefit fish and wildlife species located in the nearshore environment at JEB Little Creek.

4.3.5 Rare, Threatened, and Endangered Species Management

No federal or state-listed species were identified at JEB Little Creek during the VDCR-DNH survey; however, three plants considered rare in Virginia were identified. Subsequent surveys have identified additional rare plant species at JEB Little Creek, including wild olive, tall yellow-eyed grass, and bluejack oak (Department of the Navy 1997 and Department of the Navy 2000a). Additionally, federally listed sea turtle species, including loggerhead, leatherback, green, and Kemp's ridley sea turtles have occasionally been observed within the beach habitat of JEB Little Creek, but there has been no documentation of these species nesting on the Installation. Additional federally listed species, including piping plover and rufa red knot have the potential to occur. The Atlantic sturgeon is also known to occur year-round around the Installation. In addition to the preservation of beaches and dunes habitats of JEB Little Creek, most of the wetlands and water quality management, general fish and wildlife management, and habitat conservation management recommendations provided in this INRMP should indirectly benefit any rare, threatened, and endangered species that occur at JEB Little Creek. JEB Little Creek will conduct an Installation-wide species survey, including a survey for rare, threatened, and endangered species with the potential to occur, when funding is available.

4.3.6 Habitat Conservation and Restoration

Beaches and Dunes Protection

Ongoing efforts to reduce erosion and stabilize dunes in the beaches and dunes areas, including the DPA, include the placement of sand fencing and discarded Christmas trees around the bases of eroding primary dunes to prevent further loss and help the process of accretion. Clean Christmas trees (no tinsel or ornaments) will continue to be collected at JEB Little Creek annually. Additional fencing and signs will be posted to block excess vehicle access roads that dissect the dunes system and cause additional degradation. Suitable areas for planting beach grasses will also be identified and planted. Annual maintenance and monitoring of these efforts are important to the success of establishing vegetation, stabilizing the dunes, and reducing sand migration in the dunes.

Shoreline Erosion Control

Protection and restoration of the Chesapeake Bay shoreline is an important natural resources issue in this management unit. The 2003 and 2005 updates to the Shoreline Stabilization Plan (VIMS 2003 and Hardaway et al. 2005) recommend the installation of four 200-foot (61-m) headland breakwaters to stabilize the shoreline. Breakwater Structures #4 and #11 were installed in 2010 and installation of additional breakwater structures are not planned at this time. Additional beach fill is also recommended; however, potential environmental impacts and impacts to the training

mission will be analyzed before these actions are taken. Appropriate wetlands permits will be obtained, as necessary, prior to installing any of the proposed shoreline erosion control structures. JEB Little Creek PWD is responsible for implementing shoreline stabilization projects at the Installation.

It is expected that the area landward of the proposed offshore breakwaters will require planting with beach grasses to help with sand stabilization. The planting of native beach grasses is evaluated yearly and implemented as needed using volunteers. If needed, these plantings can be incorporated into annual National Public Lands Day events. To provide better project oversight and ensure project success, the NRM will attend coastal ecology and shoreline protection workshops as needed.

4.3.7 Outdoor Recreation and Environmental Awareness Management

Recreational use of off-road vehicles is prohibited on JEB Little Creek because they have the potential to negatively impact natural resources and damage DPAs and other training areas. However, designated off-road vehicles are used for military purposes, land management activities, and law enforcement. There are no formal outdoor recreation activities permitted within the DPA.

4.3.8 Invasive Species and Pest Management

The NRM coordinates with pest control to manage feral cat populations. Feral cats are the primary pest management issue in this management unit. Captured cats will be turned over to a local animal shelter.

Several invasive, nonnative, and weedy plant species, including Japanese sedge, have been observed in the maritime dune grassland community in this unit. It is recommended that invasive species in this unit, especially those identified in the DPA be removed. Restoration of the areas targeted for invasive species removal and post-construction monitoring for success should also be conducted. It is also recommended the JEB Little Creek develop and implement an invasive species management plan that identifies short- and long-term management measures for control of invasive plant species at the Installation.

4.3.9 Summary of the Beaches and Dunes Management Unit Actions

- Report marine animal strandings to the Virginia Aquarium’s Stranding Response Team.
- Serve as liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.
- Assist Installation personnel with the identification of marine mammals as needed.
- Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities with the potential to impact marine resources.
- Apply data collected during the habitat assessment and species inventory of the nearshore environment.
- Review plans and proposed actions to ensure consistency with the Coastal Primary Sand Dune Protection Act and the Virginia Coastal Zone Management Program and help to obtain a CCD when required.

- Review plans for projects and actions with the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.
- Continue to participate in Chesapeake Bay Agreements to improve water quality within the Chesapeake Bay watershed.
- Monitor the beach area for shorebird nesting activity from April through July, and take action to minimize disturbance to shorebirds.
- Conduct an Installation-wide species survey, including a survey for rare, threatened, and endangered species.
- Conduct focused mammal surveys for southern short-tailed shrew and other shrews, and the eastern harvest mouse within the DPA to identify population densities and ranges for these mammal species as funding permits.
- Conduct a comprehensive flora survey to include identification of invasive species populations; and rare, threatened, and endangered species.
- Coordinate with the local command to install sand fencing and Christmas trees at the base of eroding primary sand dunes.
- Identify additional areas where fencing and signs are needed to block excess vehicle access roads that dissect the dunes system and cause additional degradation and coordinate their installation.
- Implement identified dune stabilization and restoration measures.
- Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of the dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures including identifying and maintaining only a few critical beach access routes, installing rope and sand fencing, posting informational signs, and planting native beach grasses.
- Implement the dune restoration projects identified in the 2012 Dune Ecological Assessment and Restoration Report.
- Develop and implement an invasive species management plan based on results of a comprehensive flora survey.
- Implement common reed control and monitor in identified areas.
- Monitor and control feral cat populations to the extent practicable.
- Monitor the maritime grassland communities for invasive species, including Japanese sedge; remove and restore areas where invasive species are identified, and monitor for success.
- Provide opportunities for environmental staff to receive training for basic ArcView and product updates, wetlands delineation and CWA regulations, marine mammal stranding, and invasive species control.
- Monitor aquatic habitats for presence of invasive nutria.

This page intentionally left blank.

5.0 EXISTING CONDITIONS – JOINT EXPEDITIONARY BASE FORT STORY

JEB Fort Story lies in the Atlantic Coastal Flatwoods section of the Outer Coastal Plain Mixed Forest ecoregion province at the entrance to the Chesapeake Bay (Bailey 1994). The landscape is described as a coastal ecosystem consisting of maritime forest, oceanfront dunes, interior sand dunes and wetlands, and beaches.

5.1 Location and Regional Settings

JEB Fort Story is located at Cape Henry in the City of Virginia Beach, Virginia (**Figure 5-1**). The Installation encompasses approximately 1,457 ac (590 ha) of land. The first land parcel (approximately 350 ac [142 ha]) of what is now JEB Fort Story, was acquired in 1914 as a donation of the General Assembly of Virginia. It is bordered on the northeast by the Atlantic Ocean, on the northwest by the Chesapeake Bay, and on the south by the 2,770-ac (1,121-ha) First Landing State Park (formerly known as Seashore State Park). First Landing State Park's natural area (1,500 ac [607 ha]) was designated as a National Natural Landmark in 1965.

Developed areas of JEB Fort Story are primarily concentrated within the northern half of the Installation (**Figure 5-2**). There are two primary land uses at JEB Fort Story: open operational areas (1,027 ac [416 ha]) and the built-up training areas (430 ac [174 ha]). Most of the area in the open operational area is used for training (**Figure 5-3**). The training area provides facilities for recreation, indoor training, and housing, and all the administrative functions of the Installation. The natural terrain of JEB Fort Story allows for training on beaches, sand, and surf in variable tidal conditions.

The beach training areas are used throughout the year. Beach areas are used for testing equipment and a variety of operations and training activities. Utah Beaches 1 and 2 and Omaha Beach are used for amphibious training, Joint Logistics Over-The-Shore (JLOTS) exercises, and testing of equipment. Inchon Beach is used for training in cargo-handling operations and in the installation of the Tactical Marine Terminal. There are beaches on each end of the Installation that are used for training exercises, with debarking occurring at one end, training occurring in the bay and ocean, and entering occurring at the other end. Inland training areas are used for tactical bivouac training, cargo-handling exercises, deployment training, parachute drop zones, helicopter landing zones, sports and static display areas, and civilian functions and activities (USACE 1996).

Approximately 2.7 ac (1.09 ha) of the Installation is maritime upland forested, consisting of Maritime Live Oak Forest Community Type, and Maritime Loblolly Pine Forest Communities (Department of the Navy 2012b). The last commercial timber harvest occurred in 1954, and there are no plans to conduct commercial harvests in the future. Cape Henry Lighthouse (approximately 2 ac [1 ha]) and Cape Henry Memorial (approximately 1 ac [less than 1 ha]) are the two major tourist attractions that are located on JEB Fort Story.

5.2 Military Mission

5.2.1 Historical Overview and Military Mission

The onset of World War II created the need for extensive military expansion, and 1,087 ac (450 ha) were acquired, tripling the size of Fort Story. The headquarters of the Harbor Defense Command was moved from Fort Monroe to Fort Story. By the end of 1944, Fort Story had increased the heavy artillery for its coast artillery garrison, and the convalescent hospital was enlarged to accommodate more than 13,000 patients. After World War II, Fort Story's mission changed with

the arrival of the 458th Amphibious Truck Company. The natural terrain of sand dunes and beaches, surf, variable tides, and deepwater anchorage offshore make JEB Fort Story the ideal location for amphibious training. Fort Story was subsequently transferred from the Harbor Defense Command to the Transportation Corps in July 1948 as a subpost of the Transportation Training Command, Fort Eustis (Tetra Tech 1999). The last land acquisition made at Fort Story was in 1963 when 12 ac (5 ha) were purchased.

Fort Story was managed by the Army, but was combined with Naval Amphibious Base Little Creek in October 2009 within the reorganization plan by the 2005 Base Realignment and Closure Commission. This reorganization formally combined both installations as JEBLCFS, and transferred ownership of the Installation to the Navy (**Figure 5-1**).

The mission of JEB Fort Story is to provide joint service, logistical training for the Army and Navy and special operations training. JEB Fort Story provides a unique combination of features including dunes, beaches, surf, deepwater ship anchorage, variable tide conditions, natural terrain, and maritime forests. This combination of features allows JEB Fort Story to provide the ideal conditions for conducting amphibious operations and training for JLOTS operations and training of Transportation Corps units of the active and reserve Army forces.

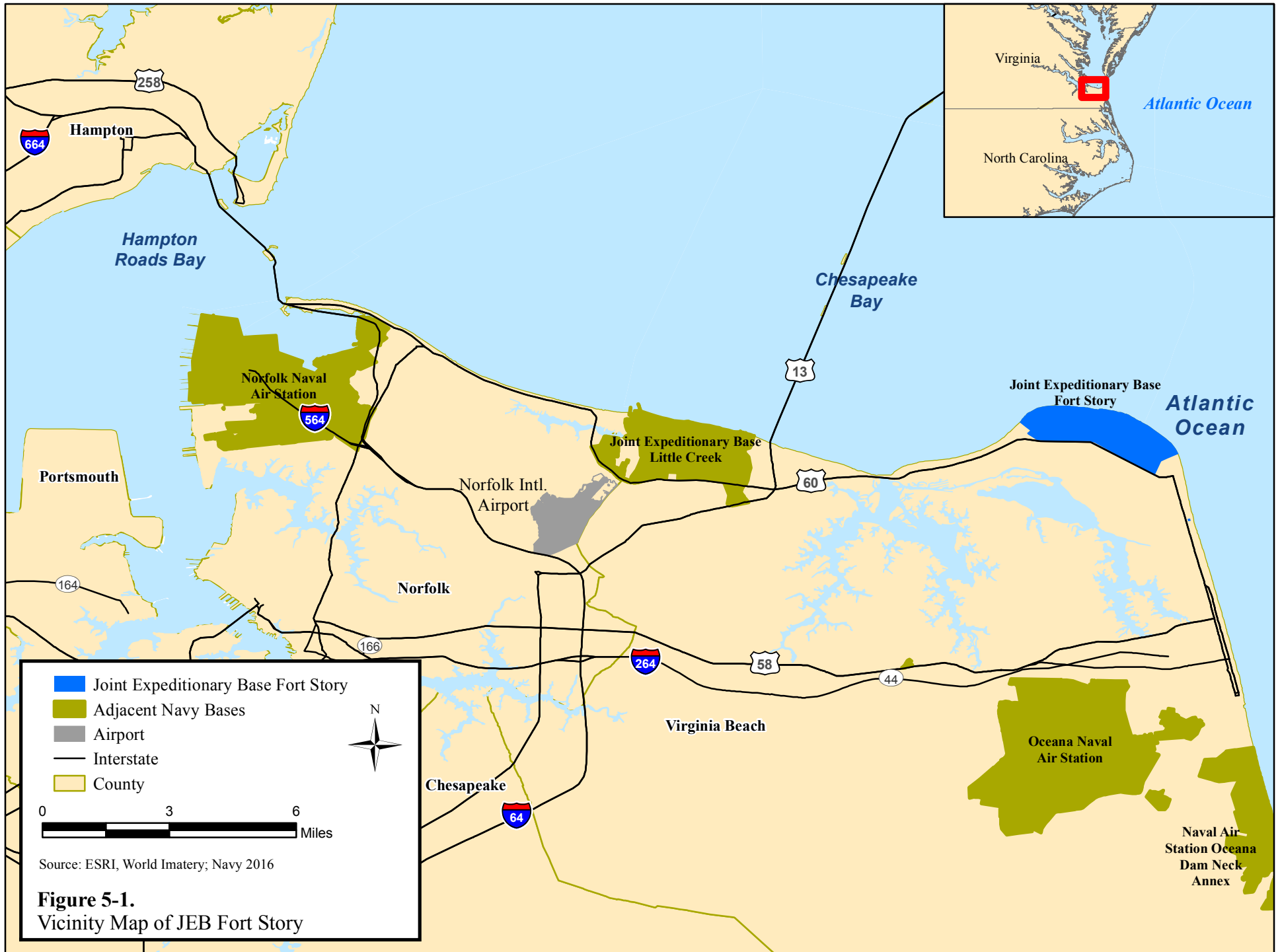
JEB Fort Story is home to the 11th Transportation Battalion of the 7th Sustainment Brigade, which is headquartered at Fort Eustis, Virginia. The 11th Transportation Battalion is capable of deploying worldwide to perform a multitude of operations including multimodal transportation operations to receive, stage, onward move, and sustain forces. U.S. Army Forces Command (FORSCOM) also conducts water purification operations.

JEB Fort Story is used by other military services throughout the year, including the Navy and USMC. Navy Explosive Ordnance Disposal Training and Evaluation Unit Two provides Atlantic Fleet Explosive Ordnance Disposal personnel with advanced and specialized training in the Explosive Ordnance Disposal operational mission areas of diving, demolition, helicopter insertion/extraction, and parachute extraction. The USMC Training and Advisory Group extensively uses the training land, beach, and sea training areas at JEB Fort Story for training students of all military services, including United States Coast Guard and foreign students, for assignment in the reconnaissance military occupational specialty.

5.2.2 Mission Impacts on the Environment

The Navy recognizes that healthy and viable natural resources are required to support the military mission. The JLOTS and amphibious training require an intact shoreline. Training exercises conducted inland require vegetative cover for concealment. Natural resources conditions in the training areas on JEB Fort Story must be maintained to provide realistic landscapes for training.

Military operations at JEB Fort Story have the potential to alter the environmental setting and condition of the natural resources, particularly beach dunes. For example, constructing roads or conducting military operations within dune habitat are likely to result in loss of vegetation and habitat. This in turn leads to erosion of the dunes, decreased protection of inland areas from storms, degraded or lost habitat for sensitive species inhabiting the dunes, costly repairs to fix roads, and an increased risk of flooding. Although short-term changes in the environmental setting might continue to provide for realistic training opportunities, the absence of long-term management measures to conserve and restore natural resources properly might impede JEB Fort Story's ability



This page intentionally left blank.



- Legend**
- Installation Boundary
 - Building
 - Road



0 1,500 3,000
 Feet

0 0.3 0.6
 Miles

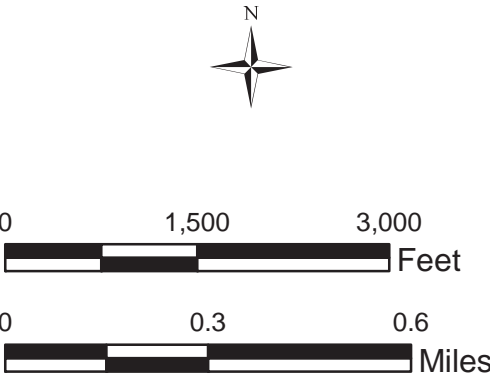
Source: ESRI, World Imagery; Navy 2016; FEMA, DFIRM ID 515531

Figure 5-2.
 Installation Map of JEB Fort Story

This page intentionally left blank.



- Legend**
- Installation Boundary
 - Building
 - Road
 - Deep Zone
 - Training Area



Source: ESRI, World Imagery; Navy 2016; FEMA, DFIRM ID 515531

Figure 5-3.
Training Areas of JEB Fort Story

This page intentionally left blank.

to provide realistic training conditions in the future. In addition, environmental damage can place artificial constraints on training through the loss of training acreage, decreased tactical maneuverability, and increased maintenance costs.

This INRMP will be implemented to facilitate the military mission; however, it is necessary to consider limitations due to the management and protection requirements of natural resources. For example, the presence of wetlands and threatened and endangered species limits or prevents certain military activities because of state and federal laws that protect those sensitive resources. Alternative sites or mitigation measures may be required, but natural resources management is never intended to conflict with the military mission. The NRM is responsible for maintaining a current knowledge of applicable regulations and ensuring Installation compliance. Environmental considerations can affect implementation of the military mission. However, these considerations do not significantly affect JEB Fort Story's ability to effectively conduct its military mission.

5.3 Overview of Natural Resources Management Program

An effective and proactive natural resources management program helps to preserve the integrity and minimize degradation of the natural resources while supporting the military mission and protecting real estate. JEB Fort Story was previously managed by the Command headquarters for the 11th Transportation Battalion based at Fort Eustis.

The NRM is responsible for management of the 1,457 ac (590 ha) of land and natural resources at JEB Fort Story. A primary responsibility of the NRM is to ensure compliance with federal, state, and regional environmental regulations. Also, in accordance with 32 CFR Part 190, DoD Natural Resources Management Program, all current and planned mission activities, such as master planning, construction requests, site approval requests, and training exercise plans, must be effectively coordinated in a timely manner with the NRM.

The natural resources management program is broadly responsible for stewardship of the Installation's natural habitats (wetlands, beaches, and dunes areas), fish and wildlife resources, and for implementation of an outdoor recreation program. Each of these areas of responsibility must be managed to balance potential conflicts between each other, the military mission, and other Installation activities. A brief overview of management concerns and objectives within these program areas is presented below.

5.3.1 Ecosystem Management

Natural resources management at JEB Fort Story is focused on using an ecosystems conservation approach to natural resources management rather than management of individual species or habitats. Partnerships and public involvement are important components of ecosystems management as they address habitat and species management measures that can benefit natural communities and species that extend beyond the boundaries of the Installation. Ecosystem management also utilizes the best available scientific information and techniques, which allows for application of an adaptive management approach.

5.3.2 Marine Resources Protection

Management of marine resources at JEB Fort Story includes protection of marine fauna and habitats. In accordance with the MMPA, and NAVFAC's Interim Environmental Policy No. 10-001 "Marine Mammal Protection Act Compliance for In-Water Construction" (February 2011), the Installation should evaluate any action that produces sound in water where marine mammals

are present to determine if a “take” authorization is required. Authorization can be issued in the form of an Incidental Harassment Authorization or a Letter of Authorization from the NMFS Office of Protected Resources. Accordingly, all training and other Installation activities that have the potential to impact marine resources are coordinated and permitted through the appropriate federal and state agencies. Operations personnel are responsible for preparing NEPA documentation and obtaining permits for training activities, whereas environmental personnel are responsible for preparing NEPA documentation and facilitating and coordinating the receipt of required natural resources permits for Installation-related activities.

The BBNWR will conduct monitoring for nesting sea turtles during a 25 May through 31 August survey period. If a nest is discovered, USFWS will provide adequate protection of the nest. The nest will be left in situ unless Navy operational uses of the beach would result in take of the nest. If a take of the nest will occur, the Navy will coordinate with USFWS and activities will be documented in a MOU (NAVFAC MIDLANT 2016).

Shoreline areas are surveyed for stranded sea turtles or marine mammals during sea turtle monitoring. If a stranded (dead or alive) sea turtle or marine mammal is identified, the surveyors will adhere to the protocol established by the Environmental Division, as outlined in the recommendations provided in **Section 6.5.3**, which apply to any stranded marine mammal that appears to be injured, disoriented, or dead.

5.3.3 Chesapeake Bay Program

All military installations in the Chesapeake Bay watershed, including JEB Fort Story, participate in the CBP. The Environmental and Natural Resources Division, Directorate of PWD represents JEB Fort Story concerning this program. The Navy attempts to demonstrate consistency with relevant pollution reduction goals that are the purpose for the Chesapeake Bay Preservation Act. The Navy is a signatory of the Chesapeake Bay FFA and is committed to supporting the goals and initiatives to restore the Chesapeake Bay ecosystem. The Federal Chesapeake Bay Restoration Act of 2000 (33 USC §1267) provides further protection to the Chesapeake Bay watershed. This act made compliance with various Chesapeake Bay agreements mandatory by the DoD, including the 1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay, the 1998 Federal Agencies’ Chesapeake Ecosystem Unified Plan, and the Chesapeake 2000 Agreement (**Appendix E**). These agreements identify goals and commitments aimed at the preservation and restoration of the Chesapeake Bay. Major goals of the Chesapeake Bay agreements are to reduce nutrient and toxin loads entering the bay, protect stream corridors, enhance and protect wetlands, protect priority watersheds, identify and control invasive species on priority sites, and expand conservation landscaping on federal facilities. **Appendix E** contains the cooperative agreement between DoD and USEPA in regards to the Chesapeake Bay Agreement.

5.3.4 Land Management

Erosion, sedimentation, stormwater management, coastal zone protection, wetlands, and water quality protection are addressed under land management. Shoreline management projects are implemented to monitor shoreline conditions, establish shoreline erosion control, and stabilize dunes at the Installation. Areas that are disturbed, both as a result of human activities or natural causes, will be stabilized and repaired to restore eroded areas to pre-disturbance conditions. Wetland delineations completed in 2005, 2010, and 2015, and confirmed by the USACE, delineate areas of JEB Fort Story that meet the criteria for designation as wetlands. According to the 2016 Preliminary Jurisdictional Wetland Determination, approximately 350 ac (141 ha) have been

designated as wetlands (USACE 2016). All proposed construction and land-disturbing activities that have the potential to impact wetlands must be reviewed on an individual basis. The NRM is responsible for reviewing site plans for any activity with the potential to disturb wetlands. When impacts to wetlands are unavoidable, federal and state laws require wetland mitigation. Efforts to protect wetlands and water quality at JEB Fort Story include water quality monitoring, maintaining 100-foot (30-m) buffers around lakes and wetlands, and managing all mitigation sites and wetlands on the Installation.

5.3.5 Training Area Management

Management of the training area is a fundamental component of natural resources management at the Installation as this area has the highest concentration of land uses, transportation systems, and infrastructure. Management of the training area include grounds maintenance, urban plant management, turf management, and tree and shrub management.

Urban Forestry. Management of the urban forest landscape at JEB Fort Story is focused on landscape design and installation, inventory, and maintenance. Urban forestry at JEB Fort Story includes management of individual trees and forested areas that are located in or near training areas, but does not involve understory vegetation. Management activities on JEB Fort Story are conducted in accordance with the DoD Urban Forestry Manual (DoD 1996) and the COMNAVREG MIDLANT Instruction for Tree Preservation and Replacement. Landscape design and installation utilize native plants, in accordance with the ANSI for Nursery Stock (ANSI Z60.1) and Tree Care Operations (ANSI Z133.1). Inventory and maintenance activities are conducted to determine program requirements, minimize landscape maintenance, and catalog general information of urban forest trees (including species diversity, regeneration, age distribution, and tree condition). The JEBLCFS Environmental Division is the sole approval authority for landscape designs so that only drought-tolerant plants are used, that no monoculture sites are created as these would increase the risk of disease, and that only native plants are used.

5.3.6 Wildlife and Fisheries Management

A variety of wildlife species occur in multiple habitats of JEB Fort Story. Wildlife management goals include maintaining healthy and viable populations through proper ecosystem management and improving habitat in developed areas (such as increasing the use of nesting and roosting boxes). Fishing is permitted at certain JEB Fort Story waterbodies, as authorized by the JEBLCFS Commander, per the JEBLCFS Fishing Instruction 11015.1D (17 February 2017). The objective of fisheries management is to provide recreational fishing opportunities while maintaining the biological integrity and mission capability of the Installation.

5.3.7 Rare, Threatened, and Endangered Species Management

Management of rare, threatened, and endangered flora and fauna include protection and conservation measures for protected species known to occur at the Installation and compliance with state and federal regulations related to protection of special status species. Piping plover, a federally threatened species, is the only avian federally listed species to have been observed on the installation. The federally threatened loggerhead sea turtle is also known to occur on the Installation during nesting season (Department of the Navy 2016b). Protection of federally listed species is mandated by federal law and protection of federal candidate species for listing, state-listed species, and other rare species demonstrates good stewardship on behalf of the Navy. This INRMP provides specific conservation and management techniques for several federally listed

species that occur or have the potential to occur on JEB Fort Story, including: piping plover, rufa red knot, roseate tern, northern long-eared bat, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and green sea turtle (USFWS 2016c).

5.3.8 Habitat Conservation and Restoration

The conservation and restoration of significant natural habitats at JEB Fort Story are a primary focus of the natural resources management program. The objectives of terrestrial habitat management are improving biological diversity for native flora and wildlife at the Installation by manipulating habitats, rehabilitating degraded areas to natural conditions, and increasing habitat diversity. Habitat conservation and restoration at JEB Fort Story includes management and conservation of special and sensitive habitats, including the DPA and Conservation Site Areas, and creation of habitat for pollinators. Efforts to protect and stabilize the beaches and primary dune system have produced visible improvements over the years with evidence of buildup in certain areas. Areas that were severely eroding have begun to revegetate and threatened dunes have begun the process of accretion. However, beach erosion is an issue that requires recurring monitoring and these areas also are subject to damage from storm surges and storms such as hurricanes. The fore dunes are subject to a high level of training activities, and numerous small dune restoration projects, such as installation of sand fencing and recycled Christmas trees, have been implemented to reduce erosion and improve sand accretion.

5.3.9 Outdoor Recreation

The provision of outdoor recreation opportunities on military lands is secondary to the primary mission of the Installation. Outdoor recreation in designated training areas is prohibited during times of actual training use, and access to these areas must be scheduled in advance to avoid interference with the military mission. The outdoor recreation program administered by MWR is designed to provide military, civilian staff, and local residents with ample opportunity to participate in enjoyable, high-quality, outdoor-related activities. In addition, the program must be consistent with the Installation's mission, while maintaining ecosystem integrity and function. Maintaining a quality outdoor recreation program is reliant on the effective and efficient management of natural resources.

The outdoor recreation program at JEB Fort Story includes many activities such as picnicking, camping, fishing, and wildlife watching. Numerous indoor and outdoor recreational facilities are available at JEB Fort Story. These facilities are open to military personnel, their dependents, and authorized guests. The beach houses and year-round campground are the most popular facilities. JEB Fort Story is accessible to the public based on its designation as a Historic District (**Section 6.10** and **Appendix M**) and events/functions held by the First Landing Foundation. The City of Virginia Beach has a renewable lease for use of the beach area located on the eastern end of the Installation. The Cape Henry Lighthouse and the Cape Henry Memorial are both open to the public throughout the year. This 1.20-ac (0.49-ha) area includes a handicapped-accessible ramp that leads to an overlook of the Chesapeake Bay and Atlantic Ocean. The Boy Scouts of America often are granted permission to use certain parts of the Installation for camping and other scouting events.

5.3.10 Community Awareness

Conservation awareness is fundamental in promoting awareness and appreciation for critical natural resources that occur at JEB Fort Story and the projects that are conducted to preserve these

resources. Conservation education is the primary tool used to promote community awareness at JEB Fort Story, which is accomplished through various media, community lectures, classroom activities, and special events. The Environmental Division and other Installation staff participate in initiatives and events for community awareness, including publications of natural resources activities and information in *The Flagship*, the official newspaper of the Navy Mid-Atlantic Fleet, and the JEBCFS Facebook page, such as Clean the Bay Day and Christmas tree recycling events; and hosting talks and presentations by request of community groups. Based on need, the NRM also may prepare and distribute educational outreach materials, such as informational handouts that will increase awareness about rare, threatened, and endangered species that occur, or could occur on JEB Fort Story. Environmental awareness and education also must extend to planners and project managers throughout NAVFAC MIDLANT installations, and include developing instructional materials to inform planners, project managers, and others of natural resources issues that need to be considered when developing project and construction plans would benefit the environment by ensuring that environmental concerns are addressed early in the planning stage and would benefit planners by ensuring compliance with environmental legislation and avoiding possible litigation.

5.3.11 Cultural Resources Protection

Protection of cultural resources is specified in the JEB Fort Story Integrated Cultural Resources Management Plan. JEB Fort Story was designated as the Fort Story Historic District in 2003 and is considered eligible for the NRHP by the DOI (**Appendix M**). All buildings and structures constructed prior to 1974 contribute to the Historic District. Installation personnel will consult and coordinate with the CRM for activities or projects that are planned, which could have the potential to affect historic or cultural resources. The CRM will be contacted for coordination prior to conducting modifications to structures or soil disturbance, and it is the CRM's responsibility to clear such activities through the Virginia SHPO. Buildings 221 and 219 are of particular importance, as these structures currently serve as hibernacula, roosting sites and maternity roosts for Rafinesque's eastern big-eared bat (*Corynorhinus rafinesquii*), a Virginia endangered species. These buildings are also over 50 years old, and may be contributing to the Historic District.

5.3.12 Pest Management

Pest management at JEB Fort Story includes management of nuisance wildlife and invasive plant species. Invasive, nonnative species, feral animals, and insect pests are growing environmental concerns nationwide and are the primary pest problems associated with natural resources management at JEB Fort Story. Control efforts for these pests are ongoing and include IPM practices, which are detailed in the 2016 JEBCFS IPMP, the CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property, and pest management programs (OPNAVINST 6250.4C). The Armed Forces Pest Management Board also provided guidance on management of feral animals in *Integrated Management of Stray Animals on Military Installations* (Technical Guide No. 37 dated 25 May 2012).

EO 13751, *Safeguarding the Nation from Invasive Species*, identifies actions that may affect the status of invasive species. Subject to availability of appropriations and to the extent practicable and permitted by law, each federal agency shall use relevant programs and authorities to prevent invasive species introduction. In areas where invasive species have been introduced, federal agencies shall detect and control, monitor, provide for restoration of native habitats, conduct research, and promote public education relative to invasive species. Primary management

objectives recommended in EO 13751 are to eradicate small infestations and contain expansive infestations. Early eradication of small infestations will save significant time and money and will be more successful than attempts to eradicate larger infestations.

5.4 Constraints and Opportunities

Although a large portion of the Installation is developed, there are opportunities for habitat improvement, wetlands and water quality protection, and urban forest management. Natural resources constraints on training or other mission-related activities at JEB Fort Story include surface waters and wetlands, conservation site areas, and the DPA. Natural resources management issues and requirements pose the following constraints to JEB Fort Story's military mission and to the further development of Installation lands:

- Limitation on new construction in surface waters, wetlands, and floodplains
- Conservation and encouragement of protected flora and fauna species habitat, ecological community groups of the dune ecosystem, conservation site areas, and the DPA and associated restoration sites

The remaining areas of JEB Fort Story represent areas where military operations would not be restricted by mission readiness activities or natural resources management issues. Opportunity areas include existing training areas and developed areas of the Installation, as well as non-specialized habitat areas.

5.5 Climate

An understanding of general climate patterns is important to the planning and success of natural resources management and construction activities. JEB Fort Story is located in an area where temperature extremes are moderated by the Atlantic Ocean. The average yearly temperature is 60 °F (16 °C). January is the coldest month with an average low of 32.5 °F (0.27 °C) and July is the warmest month with an average high of 87.4 °F (30.78 °C). The average growing season (daily minimum temperatures higher than 40 °F for a light frost) lasts approximately 250 days from the middle of March to late November. The average annual precipitation is approximately 45.95 inches (117 cm) and is generally concentrated in the late summer. The prevailing wind is from the southwest in summer and northeast in winter at an average speed of 10 mi (16 km) per hour. During hurricane events that typically occur during June through September, torrential rainfall may accompany winds greater than 75 mi (121 km) per hour. The average relative humidity is 62 percent. The climate summary in **Table 5-1** includes data recorded at the Southeast Regional Climate Center at the Norfolk International Airport from 1946 to 2016.

Table 5-1. Weather Data Recorded at Norfolk International Airport, 1946–2016.

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average Max Temp (°F) ^a	48.9	50.8	58.3	68.2	76.0	83.7	87.4	85.6	80.1	70.4	61.3	52.7	68.6
Average Min Temp (°F) ^b	32.5	33.5	40.1	48.6	57.8	66.4	71.1	70.2	64.9	53.7	43.8	36.0	51.6
Mean Average Temp (°F) ^c	40.7	42.1	49.2	58.4	66.9	75.0	79.3	77.9	72.5	62.1	52.6	44.4	60.1
Average Precipitation (in.) ^d	3.49	3.20	3.62	3.16	3.67	3.93	5.55	5.39	4.60	3.45	3.03	3.19	46.27

Source: NOAA 2016a, NOAA 2016b, NOAA 2016c, and NOAA 2016d

5.5.1 Climate Change

DoDI 4715.03 requires the Navy to consider climate change in the development of INRMPs to help mitigate impacts on military installations. Impacts that must be considered include shifts in species’ ranges and distributions, changes in phenology, rising sea levels, and variations in ecological processes such as drought, fire, and flood (DoD 2011).

In May 2014, the U.S. Global Climate Research Program released its *Third National Climate Assessment*, which was written under the authority of the Federal Advisory Committee Act. The report identified several trends and project impacts related to climate change throughout the U.S. as well as within specific regions of the country. The annual average temperature in the southeastern U.S. has risen 1.5° F (0.8° C) since 1880 (through 2012). Temperature fluctuation is primarily due to the effects of El Niños, La Niñas, and volcanic eruptions. There has been a 27 percent increase of precipitations falling in very heavy rain events from 1958 to 2012 over almost the entire region. Additionally, the power of North Atlantic hurricanes has increased since the early 1980s, associated with an increase in sea surface temperature. Continued warming is projected, with a 3 °F to 5 °F (16 °C to 15 °C) increase in average annual temperatures under lower emission scenarios and a 5 °F to 10 °F (15 °C to 12 °C) increase in temperatures for the higher emissions scenarios. Sea-level rise is also projected to increase, along with threats of coastal flooding, shoreline retreat and higher intensity hurricanes (Melillo et al. 2014).

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

Sea-level rise has the potential to affect existing coastal infrastructure critical to the DoD. DoD facilities located on the coast, such as JEB Fort Story, are expected to experience significant changes to environmental resources and human-made infrastructure. The DoD's SERDP is pursuing a number of areas of investigation to address the information and decision support needs of DoD coastal installations under the threat of climate change. Project RC-1701, *Risk Quantification for Sustaining Coastal Military Installation Assets and Mission Capabilities*, is examining approaches that can quantify potential impacts to critical infrastructure and mission performance in the Hampton Roads area of Virginia. Although the study is specifically focused on nearby Norfolk Naval Station, the assessment framework will help policymakers and NRMs develop strategies that support mission adaptation and long-term sustainability at DoD installations in the region. Project RC-1701 will develop an integrated, multi-criterion, multi-hazard risk assessment framework that will be used to evaluate changes in risks to coastal military installations and mission capabilities in the Hampton Roads region due to global climate change (SERDP 2013). Protection of dunes and wetlands is extremely important to combat sea level rise.

5.6 Physiography and Soils

JEB Fort Story is located in the lowland subprovince of Virginia's Middle Atlantic Coastal Plain. The topography of the Coastal Plain region is a terraced landscape that stair-steps down to the coast and to the major rivers (College of William and Mary, Department of Geology n.d.). Elevation at JEB Fort Story ranges from sea level to about 85 feet (26 m) above mean sea level. The topography arises from a marine terrace of gently undulating to almost level relief (USGS 1986). The primary dunes (located between the waterfront and Atlantic Avenue) and secondary dunes (southwest of Atlantic Avenue) average 25 feet (7.6 m) in height, whereas a third line of dunes (between the first line of secondary dunes and the wetlands) rises to about 85 feet (26 m). The shoreline has experienced sporadic episodes of severe erosion during major storm events. Beyond the beachfront and the sand dunes lie forested wetlands that average 10 feet (3 m) in elevation (USACE 1996).

The geology of JEB Fort Story includes layers of unconsolidated Coastal Plain sediments from the Cretaceous period (66–144 million years ago), Tertiary period (28–66 million years ago), and Quaternary period (1.8 million years ago to present day) overlying a crystalline basement. The Coastal Plain sediments dip toward the Atlantic Ocean. The lower Cretaceous deposits consist of quartzo-feldspathic sands, gravels, silts, and illite/smectite clays. The sediments are largely of fluvial-deltaic origin and form a clastic wedge that thickens northeastward and eastward. Overlying these sediments are the upper Cretaceous deposits, composed of an upper unit that is 90–100 feet (27–30 m) thick and consists of gray and green, clayey and silty, fine to coarse pebbly sand; a middle unit of fine to coarse glauconitic quartz sand up to 60 feet (18 m) thick; and a lower unit, up to 200 feet (61 m) thick, of laminated to thick-bedded, olive-gray silt, clay, and fine sand that is in part glauconitic and shelly. On top of the upper Cretaceous lie the upper Tertiary and Quaternary deposits. This layer includes formations of Miocene, Pliocene, and Pleistocene ages and unnamed Holocene deposits. The thickness of this layer is approximately 900–1,100 feet (274–335 m) (USGS 1989).

Virginia is considered to be relatively active seismically, but the earthquakes are rarely strong. Since records have been kept, no earthquakes have been centered in the JEB Fort Story area. JEB Fort Story is located within Earthquake Hazard Zone 1, which means there is slight probability for damage should an earthquake occur (USGS 1989). The most recent significant earthquake in the

region occurred in 2011, when a magnitude 5.8 earthquake occurred near Mineral, Virginia, creating cracks in the Cape Henry Lighthouse (USGS 2013).

JEB Fort Story is located entirely within the coastal zone of Virginia as established in Virginia's Coastal Resources Management Program. The Installation abuts 19,000 feet (5,791 m) of beach on its northern and eastern boundaries, which are exposed to wind and wave energy. The western reaches of the JEB Fort Story shoreline are bounded by the Chesapeake Bay, and the shoreline east of the Cape Henry apex is bounded by the Atlantic Ocean. The net shoreline transport of sand sediment is from east to west. In recent history, the western reaches have been progradational or stable, and the eastern shoreline has been receding at a relatively constant rate (U.S. Army Waterways Experiment Station 1997). A linear network of geotextile containment tubes serves as a dune core and fortifies 2,000 feet (610 m) of continuous dune line. Nineteen stone breakwaters were constructed offshore to provide protection from beach erosion for 5,500 feet (1,676 m) of shoreline.

There are 12 soil units mapped on JEB Fort Story (**Table 5-2**). These soils are classified as sandy coastal soils, swamp marsh soils, or upland soils (USDA NRCS 2016). Hydric soils occur primarily in the south-central and southeastern portions of the Installation. There is a slight to severe potential for soil erosion for more than half of the Installation. Where proposed activities will directly affect soils or the viability of a proposed activity is dependent on soil conditions, an onsite soil characterization should be conducted to protect soil.

The coastline contains sandy material with a high content of gravel and shells. The coastal dunes and flats contain fine sand that is moderately well to poorly drained. The low flats and shallow depressions between coastal dunes contain fine sand that is poorly drained. The high, wooded coastal dunes contain excessively drained sand and fine sand. The low, wooded dunes and toe slopes contain droughty sand. The grass-and shrub-covered high sand dunes contain excessively drained fine sand on severe slopes. The coastal areas behind the fore dunes contain excessively drained to somewhat poorly drained fine sand and sand. The low, wooded swamps and low dunes have a high seasonal water table and slow surface runoff. The depressions and troughs between wooded coastal dunes are often ponded and contain mucky peat. The disturbed or degraded areas contain droughty, disturbed sandy material.

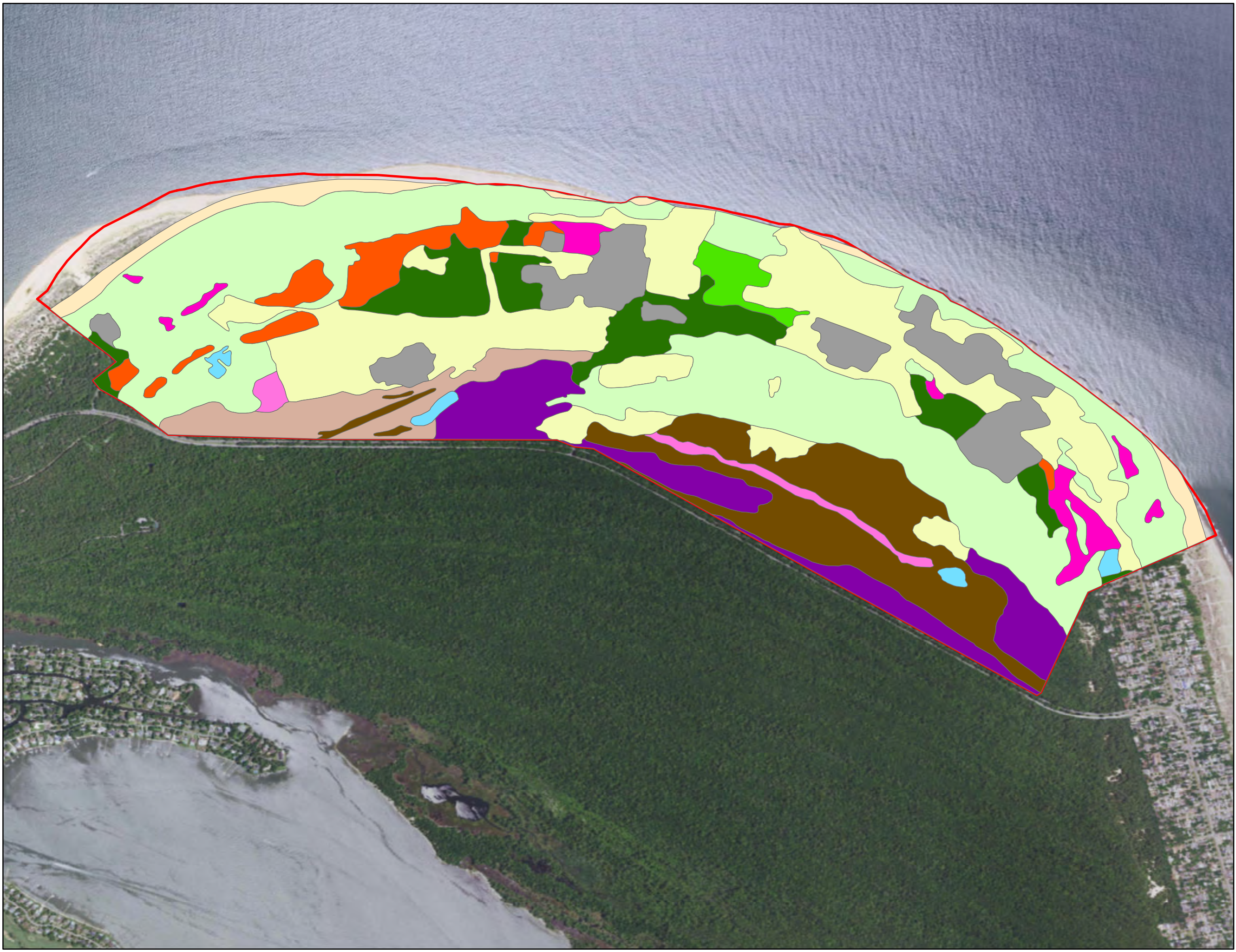
Soils information is available from the USDA NRCS website: <http://soils.usda.gov/>

Table 5-2 provides a brief description of some of the major soil characteristics, and **Figure 5-4** shows their location at JEB Fort Story.

Table 5-2. General Characteristics of JEB Fort Story Soils.

Soil Series	Texture/Parent Material	Drainage Class	Hydric	Limitations	Landscape Position
Beaches (0–10% slopes)	Sandy material; some areas with high content of gravel and shells		Onsite investigation necessary for determination	Severe erosion; onsite investigation needed to determine uses and limitations; no capability class assigned	Coastline
Corolla fine sand	Parent material sandy marine deposits	Moderately well drained	No	Rapid permeability; low natural fertility; slight erosion hazard	Grass- and shrub-covered high sand dunes in coastal areas
Corolla-Duckston fine sands (0–4% slopes)	Surface: fine sand Subsoil: fine sand (upper) fine sand and sand (lower)	Moderately well to poorly drained	Duckston only	Rapid permeability; low natural fertility; slight erosion hazard	Coastal dunes and flats
Duckston fine sand (0–2% slopes)	Surface: fine sand Subsoil: sand	Poorly drained	Yes	Rapid permeability; low natural fertility; slight erosion hazard	Low flats and shallow depressions between coastal dunes
Fripp sand (2–30% slopes)	Surface: sand Subsoil: fine sand	Excessively drained	No	Rapid permeability; severe erosion hazard; low natural fertility	High, wooded coastal dunes
Lakehurst Variant sand (0%–4% slopes)	Surface: sand Subsoil: sand	Moderately well drained	No	Rapid permeability; low natural fertility; droughty; slight erosion hazards	Low, wooded dunes and toe slopes
Newhan fine sand (2–30% slopes)	Surface: fine sand Subsoil: fine sand	Excessively drained	No	Rapid permeability; severe slope; severe erosion hazard; droughty	Grass- and shrub-covered high sand dunes in coastal areas
Newhan-Corolla fine sands (0–15% slopes)	Surface: fine sand Subsoil: fine sand (upper) Fine sand and sand (lower)	Excessively drained to somewhat poorly drained	No	Rapid permeability; low natural fertility; moderate to severe erosion hazard	Coastal areas, mostly behind primary foredune
Pamlico mucky peat, ponded (<1% slope)	Surface: partially decomposed organic material Subsoil: highly decomposed organic material	Very poorly drained	Yes	Very slow surface runoff; rapid permeability	Depressions and troughs between wooded coastal dunes
Pamlico Lakehurst variant complex	Surface: organic material and or sandy eolian deposits over sandy marine deposits	Very poorly drained to moderately well drained	Yes	Very slow surface runoff; rapid permeability	Depressions and troughs between wooded coastal dunes. Low, wooded dunes and toe slopes
Psamments, undulating (0–25% slopes)	Surface and subsoil: disturbed sandy material	Moderately well to well drained	No	Severe erosion; onsite investigation needed to determine uses and limitations; no capability class assigned	Disturbed or dredged coastal areas
Urban land (0%–2% slopes)	Not prime farmland, very low capacity to the most limiting layer to transmit water	Variable	Onsite investigation necessary for determination	Onsite investigation needed to determine uses and limitations; no capability class assigned	Areas where > 80% of the surface is covered by parking lots, buildings, and other structures

Source: USDA NRCS 2016



- Legend**
- Installation Boundary
 - Soil Units**
 - Beaches
 - Corolla fine sand
 - Corolla-Duckston fine sands
 - Duckston fine sand
 - Fripp sand, 2 to 30 percent slopes
 - Lakehurst variant sand
 - Newhan fine sand, 2 to 30 percent slopes
 - Newhan-Corolla fine sands, 0 to 15 percent slopes
 - Pamlico mucky peat, ponded
 - Pamlico-Lakehurst variant complex
 - Psammments
 - Urban land
 - Water



0 1,500 3,000 Feet

0 0.3 0.6 Miles

Source: ESRI, World Imagery; Navy 2016

Figure 5-4.
Soils of JEB Fort Story

This page intentionally left blank.

5.7 Hydrology

5.7.1 Surface Water

Stormwater runoff on the Installation drains into the Atlantic Ocean, the Chesapeake Bay, and wetlands through several stormwater drains and outfalls. Two of these outfalls are permitted under the National Pollutant Discharge Elimination System program. However, there are no streams on the Installation, and much of the stormwater infiltrates into the sandy soil or is lost through evaporation or evapotranspiration (USACE 1996).

JEB Fort Story has four constructed man-made lakes (**Figure 5-5**) that cover approximately 10 ac (4 ha) (USACE 1996). A water quality study of Snake, Hospital Road, and East Entrance lakes was conducted in October 1991 (USFWS 1991). Data were not significant in terms of temperature, pH, and dissolved oxygen readings. Mulehead Lake was not included in this 1991 water quality study. All four lakes should be retested as soon as possible to provide valuable information for water quality management at JEB Fort Story.

5.7.2 Groundwater

The water table throughout JEB Fort Story is generally encountered between 0 and 10 feet (0 and 3 m) using sea level as a reference. Depth of the water table ranges from the surface to 2.5 feet (0.8 m) near the shore to greater than 40 feet (12 m) in high ridge areas. An average depth of 10 feet (3 m) to the water table was encountered from 28 monitoring wells as part of an ERP groundwater study conducted in 1995 (USACE 1996).

Water table contours within the JEB Fort Story area are generally characterized by the presence of a localized groundwater divide, or dome, in the vicinity of the central sand ridge complex. This dome-shaped water table surface is characteristic of barrier islands. The crest of this dome extends from the area of the First Landing State Park Nature Center, along a portion of Shore Drive (U.S. Highway 60, which separates the park from the Installation), and continues into JEB Fort Story to the foot of the large dunes crossed by Coast Artillery Road. Ambient groundwater flows generally from the central sand ridge area northward toward the coastline and southward toward the wooded wetland, with eventual flow through the Lynnhaven Inlet to the Chesapeake Bay. Much of the near-surface groundwater flowing toward the park is lost to the system through evapotranspiration within the swamp areas.

Six aquifer units (**Table 5-3**) separated by intervening semiconfining units make up the hydrogeologic framework of the Coastal Plain sediments in the JEB Fort Story vicinity (USACE 1996). The majority of the water supply for the JEB Fort Story and Virginia Beach areas comes from surface reservoirs; however, the cities of Virginia Beach and Norfolk have deep wells for augmentation of the reservoirs during extreme drought emergencies. Small, private wells are used for domestic supply. The Yorktown-Eastover aquifer is a major source of groundwater. The water quality in the upper portion of this aquifer is generally good; however, the water has high iron content. The lower portion of the aquifer contains brackish water, and extensive pumping could cause the brackish water to intrude, which could contaminate the freshwater layer.

Table 5-3. Aquifers Located in the JEB Fort Story Vicinity.

Aquifer	Description
Columbia aquifer	Water table aquifer, composed of undifferentiated approximately Holocene age sediment, extends approximately 120 feet (37 m) below the surface
Yorktown-Eastover aquifer	Occurs within the Yorktown and Eastover formations of Pliocene and Miocene age, respectively; extends from approximately 160–440 feet (49–134 m) below the surface
Chickahominy-Piney Point aquifer	Occurs within the Chickahominy and Piney Point formations of Eocene age and the Old Church Formation of Oligocene age; where present, extends from 810–950 feet (247–290 m) below surface
Upper, Middle, and Lower Potomac aquifers	Occur within the Potomac Group of Cretaceous age; Upper Potomac aquifer occurs at approximately 1,130–1,350 feet (344–411 m) below the surface; insufficient data available to determine the thicknesses of the Middle and Lower Potomac aquifers

Source: USACE 1996

Well development is discouraged along the shoreline due to the possibility of lateral saltwater intrusion. The Virginia State Water Control Board does not support the use of groundwater as a major source of municipal water supply.

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

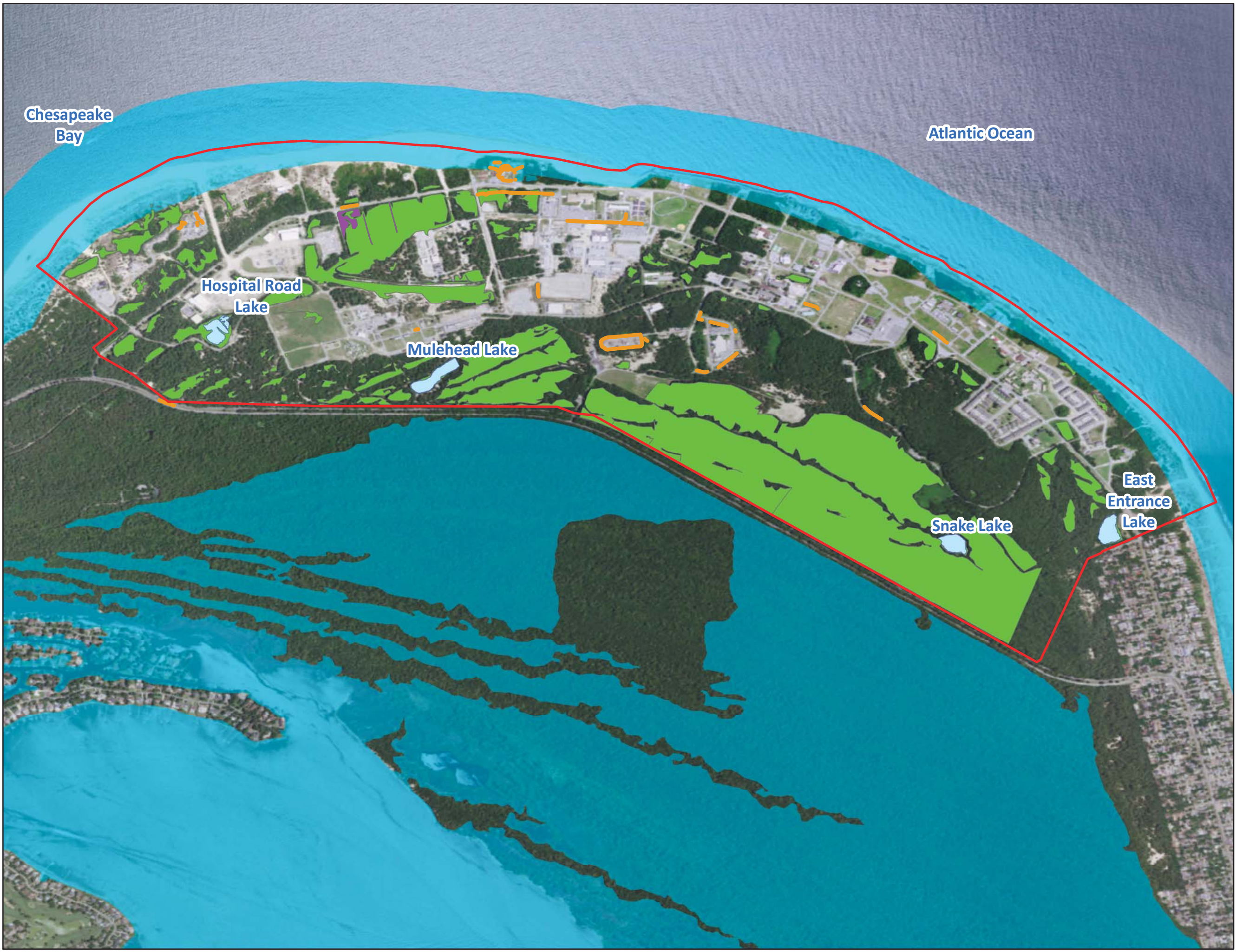
5.7.3 Watersheds

JEB Fort Story lies entirely within the Chesapeake Bay watershed. The Chesapeake Bay receives water from a 64,000-mi² (165,759-km²) drainage basin that includes parts of New York, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, and all of Washington, D.C.

5.7.4 Floodplains

The Federal Emergency Management Agency defines the 100-year floodplain as an area that has a one percent chance of being equaled or exceeded in any given year. The 500-year floodplain is an area that has a 0.2 percent chance of a flood in a year. Both the 100-year and 500-year floodplain are the standard used by federal agencies for floodplain management.

Federal Emergency Management Agency flood insurance rate maps show that a large portion of the Installation lies within the 100-year floodplain. Less than approximately 20 percent of the Installation is covered by the 500-year floodplain associated with the Chesapeake Bay, Atlantic Ocean, and Installation lakes, and ponds (**Figure 5-5**). Because floodplains cover much of the Installation, several buildings, large portions of infrastructure, and developed areas occur within the 100- and 500-year floodplains.



- Legend**
- Installation Boundary
 - Ditch
 - Waterbody
 - Jurisdictional Wetland
 - 100-Year Floodzone
 - Wetland Mitigation Site



0 1,500 3,000
 Feet

0 0.3 0.6
 Miles

Source: ESRI, World Imagery; Navy 2016;
 FEMA, DFIRM ID 515531

Figure 5-5.
 Aquatic Resources of JEB Fort Story

This page intentionally left blank.

5.7.6 Wetlands

The USACE Norfolk District issued a preliminary wetland jurisdictional determination on JEB Fort Story in February 2016. A 2005 survey identified 133 wetland areas but did not distinguish between those wetlands regulated by USACE and isolated waters/wetlands that may not be regulated by other agencies. In addition, the Cowardin Classification (Cowardin et al. 1992) of the wetland area was not assigned. In December 2010, a wetland delineation was conducted according to USACE protocols and included assignments of Cowardin classification. The Installation received the preliminary jurisdictional determination from USACE Norfolk District for this delineation in February 2016 as previously described (**Appendix F**). Total acreage of delineated wetlands for JEB Fort Story is 350 ac (141.645 ha) (USACE 2016) (**Figure 5-5**).

During the 2007 construction of the Navy Small Arms Test and Evaluation Compound (SATEC), permits were obtained from the USACE Norfolk District and VDEQ to fill 0.85 ac (0.34 ha) of forested wetlands. Mitigation requirements comprised construction of in-kind wetlands onsite (1.7 ac [0.7 ha] of mitigated wetlands were constructed) and avoidance of all bluejack oaks (*Quercus incana*) in the area of land disturbance. No alterations can be made to the 1.7 ac wetland mitigation system without coordination and approval from VDEQ. **Appendix F** contains copies of permits, mitigation plan (that requires a 90 percent success rate per acre) and USACE jurisdictional determinations of wetlands at JEB Fort Story.

All construction projects and training events affecting wetlands (to include non-vegetated wetlands that exist between mean high water and mean low water, isolated wetlands and non-isolated adjacent wetlands) require preparation of appropriate NEPA documentation, Federal CCDs, and appropriate permits.

5.7.7 Nearshore Environments

The nearshore environment is generally defined as the area encompassing the transition zone from subtidal marine habitats to the associated upland systems. VIMS defines the nearshore environment in the Chesapeake Bay as the habitats from the marine riparian zone to the shallow subtidal waters, approximately 7 feet (2 m) in depth. Nearshore habitats are vulnerable to impacts from development and climate change. Significant stressors in the Chesapeake Bay include sea level rise, shoreline hardening, land development, and nutrient enhancement (VIMS n.d.).

In April 2016, survey of the nearshore environment was completed at JEB Fort Story to establish baseline data, including physical habitat and biological assessment, and information for the Navy in environmental planning, consultation with agency stakeholders, and development of projects to manage for fish and wildlife resources. The nearshore area of JEB Fort Story consists of medium sand and silt. Only soft bottom was observed, with little evidence of other biological organisms. In soft sediment, the infaunal communities had greater diversity and abundance during the summer. Dominant taxa were similar between spring and summer, both dominated by phylum Nematoda. The second most abundant phylum in spring was mollusk species, while polychaetes dominated in the summer. The survey documented 37 different fish species, and a separate telemetry array study detected Atlantic sturgeon. All of the marine mammals observed at JEB Fort Story were bottlenose dolphins. Water temperatures were uniform from the surface to the bottom. Temperatures varied greatly between seasons, 77 °F (25 °C) in the summer and 33.8 °F (1 °C) in the winter. Dissolved oxygen was typically measured at 95 percent saturation or higher. Salinity was higher at the bottom compared to the top. Turbidity had an across-season average of 5.1 NTUs. Overall pH averaged at 8.21 (Tetra Tech 2016a).

The Chesapeake Bay is one of the most productive estuarine ecosystems in the world. **Section 5.7.3** provides a detailed description of the Chesapeake Bay watershed, and **Section 7.1.1**, **Section 7.2.1**, and **Section 7.3.2** provide information on watershed protection at JEB Fort Story.

5.8 Environmental Cleanup Program

5.8.1 Environmental Restoration Program Sites

An Installation Action Plan was prepared for JEB Fort Story in 2008 to define all ERP requirements and outline a comprehensive approach and associated costs to conduct future investigations and remedial actions at each solid waste management unit at the Installation and other areas of concern (Fort Eustis 2008). The Installation Action Plan is used to coordinate planning information between the ERP manager, Installation, executing and regulatory agencies, and the public. The Installation Action Plan also is used to track requirements, schedules, and tentative budgets for all major Navy ERPs. The 11 ERP sites located on JEB Fort Story are presented on **Figure 5-6**.

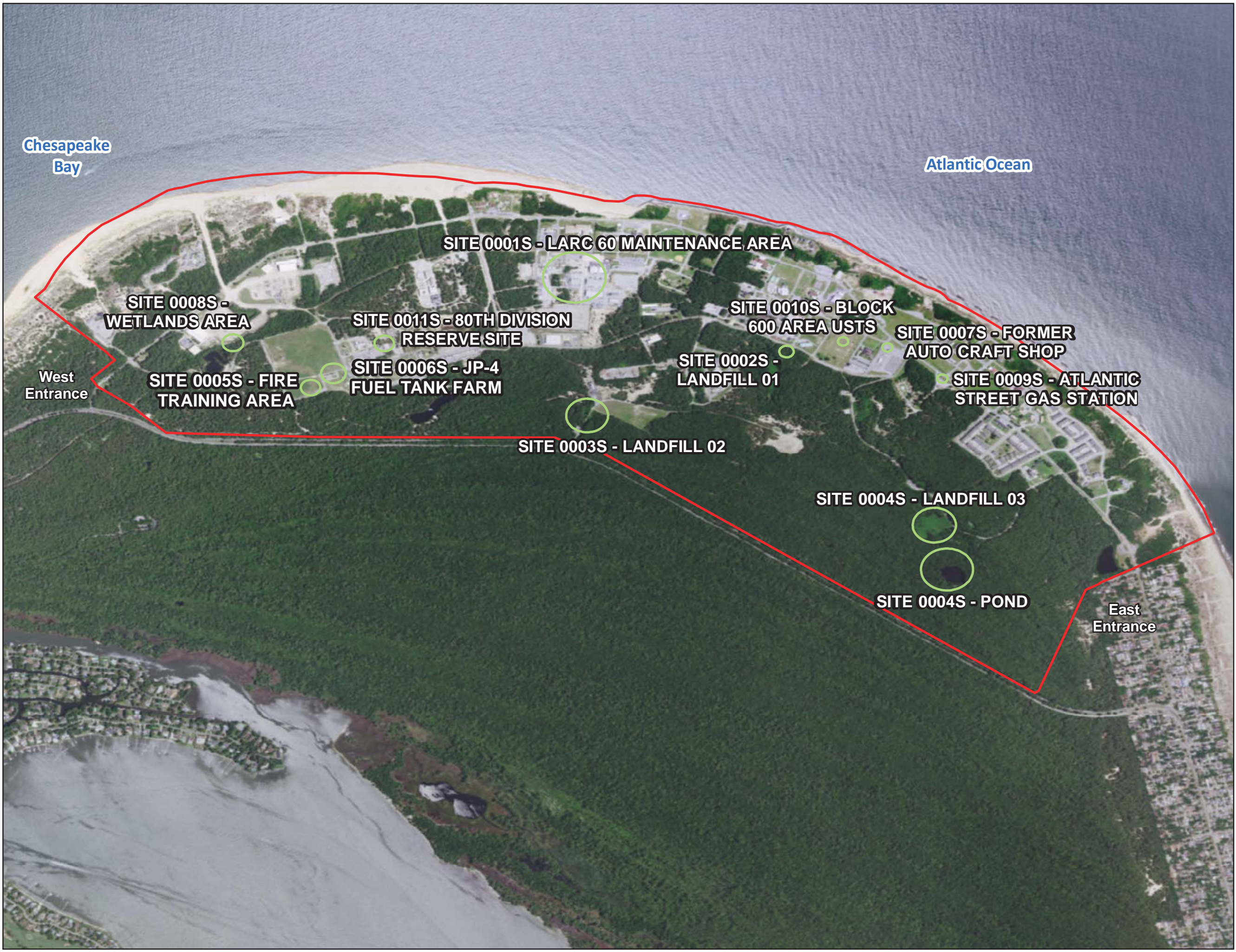
JEB Fort Story is not on the National Priorities List. All restoration activities are coordinated with VDEQ. Restoration activities at JEB Fort Story were addressed during the JEBLC Restoration Advisory Board meetings.

If any natural resources activities occur within or in the vicinity of any of the ERP sites, the NRM will coordinate with the ERP Manager to obtain up-to-date information on these sites and implement any recommendations provided by the ERP Manager as necessary.

5.8.2 Military Munitions Response Program

The MMRP was initiated in 2001 to address environmental health and safety hazards associated with unexploded ordnance and discarded military munitions as a component of the ERP. The initial requirement under MMRP was completion of an inventory of former training ranges and munitions sites eligible for MMRP in 2003. Based on the *CTT Range Inventory Report*, one MMRP site, the Small Arms Range (STORY-01-R-01), which was originally identified at JEB Fort Story, was determined to be ineligible for inclusion in the MMRP because it was in an operational range area.

A review of historical documents obtained during the 2003 Site Investigation identified the presence of several coastal batteries that were not identified in the *CTT Range Inventory Report*. Documentation indicated guns at these batteries were fired, and that several of the batteries fired munitions that may have contained high explosives. Based on these findings, a new Munitions Response Site was defined, the Inner Coastal Defense Range (STORY-002-R-01). This site comprises 258,510 ac (104,615 ha) and is located beyond the Installation boundary within the Atlantic Ocean and the Chesapeake Bay. Munitions constituents (MC) were not considered a concern near the batteries because of coastal erosion, soil removal during construction, and the lack of persistence of MC in soils. During the technical planning meeting held on 18 March 2008, stakeholders agreed that the Inner Coastal Defense Range Munitions Response Site did not require any field investigation as part of the Site Investigation, but would require additional investigation for munitions and explosives of concern during the site investigation. Based on the conceptual site model, MC is not expected to pose a hazard to human health or the environment; therefore, no further action is recommended. However, if during the investigation for munitions and explosions of concern, areas of concern are identified, sampling for MC may be warranted.



- Legend**
- Installation Boundary
 - Environmental Restoration Program Site

Chesapeake Bay

Atlantic Ocean

West Entrance

East Entrance

SITE 0008S - WETLANDS AREA

SITE 0005S - FIRE TRAINING AREA

SITE 0011S - 80TH DIVISION RESERVE SITE

SITE 0006S - JP-4 FUEL TANK FARM

SITE 0001S - LARC 60 MAINTENANCE AREA

SITE 0003S - LANDFILL 02

SITE 0002S - LANDFILL 01

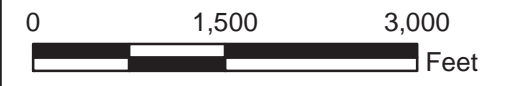
SITE 0010S - BLOCK 600 AREA USTS

SITE 0004S - LANDFILL 03

SITE 0004S - POND

SITE 0007S - FORMER AUTO CRAFT SHOP

SITE 0009S - ATLANTIC STREET GAS STATION



Source: ESRI, World Imagery; Navy 2016

Figure 5-6.
Installation Restoration Program Sites of JEB Fort Story

This page intentionally left blank.

5.9 Flora

A listing of flora identified at JEB Fort Story and for the Cape Henry region is provided in **Appendix G**. The communities and species present on the Installation are briefly described in the following paragraphs, and is based on previous survey work or other observations of these species.

5.9.1 Maritime Forest

The southeastern portion of JEB Fort Story is composed of approximately 500 ac (202 ha) of contiguous coastal maritime forest. The primary characteristic of this area is parallel vegetated sand dunes with interdunal wetlands (Stevenson 1996). Species characteristic of these maritime forest areas include loblolly pine, water oak, southern red oak, live oak, pignut hickory (*Carya glabra*), American holly, black gum (*Nyssa sylvatica*), sweetleaf, sassafras, muscadine grape, greenbrier (*Smilax glauca*), and yellow jessamine (*Gelsemium sempervirens*).

5.9.2 Forested Wetland

Most of the forested wetlands in the interior portion of JEB Fort Story are a young (45-year-old) swamp that is characterized as a black gum-red maple-bald cypress (*Nyssa biflora-Acer rubrum-Taxodium distichum*) forested swamp. The remaining wetland areas consist of tree-shrub forests. Species commonly occurring include loblolly pine, sycamore, wax myrtle, southern bayberry, black willow, black locust (*Robinia pseudoacacia*), black cherry, eastern red cedar, sweet gum (*Liquidambar styraciflua*), sweet pepper bush (*Clethra alnifolia*), Virginia willow (*Itea virginica*), deer berry (*Vaccinium stamineum*), grape, greenbrier, blackberry, and bracken fern (USACE 1996).

5.9.3 Sand Beach/Dune

The coastal ecosystem of JEB Fort Story consists of approximately 160 ac (65 ha) that lie adjacent to the Atlantic Ocean and the Chesapeake Bay. Species characteristic of this area include American beachgrass, broomsedge, sea oats (*Uniola paniculata*), panic grasses (*Panicum* spp.), dune sandbur, black cherry, live oak, scrub pine (*Pinus virginiana*), persimmon (*Diospyros virginiana*), and lespedeza (*Lespedeza* spp.) (USACE 1996).

An ecological assessment and dune restoration survey completed in 2012 documented dunes along 81 percent of the shoreline, encompassing 76 ac (31 ha) of the Installation. The dune survey identified five state-listed plant species: bluejack oak, dune groundcherry (*Physalis walteri*), seacoast marsh-elder (*Iva imbricata*), wild olive (*Osmanthus americanus*), and Darlington's oak (*Quercus hemisphaerica*) (see **Figure 2-9**) (Department of the Navy 2012a and Townsend 2012).

Based on the findings of the 2012 ecological assessment and dune restoration survey (Department of the Navy 2012a), three ecological community groups have been identified in the beaches and dunes areas at JEB Fort Story, including maritime dune grassland (43 ac [17 ha]), maritime dune scrub (5 ac [2 ha]), and maritime upland forests (3 ac [1 ha]). Ecological community groups were identified according to the VDCR-DNH ecological classification system, as described in *The Natural Communities of Virginia: Classification of Ecological Community Groups* (Fleming and Patterson 2017). According to this classification system, an ecological community group is an aggregation of community types with similar topographic, soil, physiognomic, and floristic characteristics. Primary characteristics of the three ecological community groups that have been documented in the beaches and dunes area at JEB Fort Story are described in the following sections.

Maritime Dune Grasslands

Maritime dune grasslands are characterized by low species diversity. Frequently observed species include American beach grass, sea oats, bitter seabeach grass (*Panicum amarum* var. *amarum*), beach panic grass (*P. a.* var. *amarulum*), seaside goldenrod, and sea-coast marsh-elder. Other common species observed include beach heather, dune bean, dusty miller, poorjoe, the highly invasive Japanese sedge, dune sandbur, seabeach evening primrose, sea rocket, and camphorweed (Department of the Navy 2012b).

Maritime dune grassland is classified as an imperiled natural community by VDCR-DNH (Fleming and Patterson 2017) (see **Table 5-4** in **Section 5.11**).

Maritime Dune Scrub

Maritime dune scrub occurs mainly on the secondary dune and is characterized by several tree and shrub species. The most common species observed within this community are live oak. Other tree and shrub species include black cherry, persimmon, northern bayberry, and beach heather. Common grasses, forbs, and vines within this community include seaside little bluestem, Gray's flatsedge, seaside goldenrod, greenbrier, wisteria, yellow jessamine, coral honeysuckle, and the nonnative Japanese honeysuckle (Department of the Navy 2012b).

Maritime dune scrub is classified as a critically imperiled/imperiled natural community by VDCR-DNH (Fleming and Patterson 2017) (see **Table 5-4** in **Section 5.11**).

Maritime Upland Forests

The majority of the forested communities within the Installation are dominated by live oak. Subcanopy species present include American holly, black cherry, and several species of oak. Understory species include wild olive, muscadine grape, Chinese privet, and greenbrier. The herbaceous layer was relatively sparse and included species such as Virginia creeper, and occasionally dense patches of English ivy (Department of the Navy 2012b). Maritime upland forest is classified as a critically imperiled/imperiled natural community by VDCR-DNH (Fleming and Patterson 2017) (see **Table 5-4** in **Section 5.11**).

5.9.4 Aquatic Habitat

The most significant rare plant in aquatic habitats (lakes) at JEB Fort Story is the viviparous spikerush (*Eleocharis vivipara*), a small, vegetatively proliferous graminoid that abounds in the shallow aquatic and drawdown zones. This species is known only from three lakes on JEB Fort Story in Virginia. The rare sedge, American halfchaff sedge (*Lipocarpa maculata*), which occurs on the wet, sandy shore of one of the lakes, is known to occur at only one other site in the state. Other vegetation documented in the drawdown zone of East Gate Lake includes creeping rush (*Juncus repens*), coast flatsedge (*Cyperus polystachyos*), warty panic grass (*Panicum verrucosum*), and Richard yellow-eyed grass (*Xyris jupicai*). Aquatic species in the lake include water-thread pondweed (*Pontamogeton diversifolius*) and a bladderwort species (*Utricularia* spp.). Substantial mats of algae were observed at the northern end of East Gate Lake in November 1995 (Stevenson 1996).

5.9.5 Developed Areas

There are 514 ac (208 ha) of developed areas of the Installation that have been planted with various landscape tree and shrub species. Turf grasses include Kentucky bluegrass (*Poa pratensis*), tall

fescue (*Festuca elatior*), domestic rye grass (*Secale cereale*), bermuda grass (*Cynodon dactylon*), redtop (*Agrostis alba*), crab grass (*Digitaria sanguinalis*), orchard grass (*Dactylis glomerata*), and white clover (*Trifolium repens*).

5.9.6 Invasive Plant Species

A serious threat to native vegetative communities on JEB Fort Story is the presence of nonnative and invasive flora. Nonnative plant species outcompete native vegetation for water and open space, and in some cases the nonnative vegetation girdle trees and “choke out” the native plants with their extensive root system. An invasive species survey was conducted at JEB Fort Story in 2013, and included the development of a control plan. This survey evaluated the presence and abundance of previously documented and additional invasive plant species occurring at JEB Fort Story, including: (listed in order of priority for control) kudzu (*Pueraria montana*), common reed, Japanese hops (*Humulus japonicus*), Japanese honeysuckle, mimosa tree (*Albizia julibrissin*), Chinese privet, autumn olive, Chinese lespedeza (*Lespedeza cuneata*), English ivy, and Japanese stiltgrass. The survey prioritized management of multiple invasive plants based on significance of impact and feasibility of control. Invasive plant management techniques were also evaluated for all identified species, and provided technical considerations for management at JEB Fort Story. A copy of the survey results and control plan are included in **Appendix N** (Tetra Tech 2013).

Kudzu is one of the more serious invasive species at JEB Fort Story because of its widespread occurrence throughout the Installation. Kudzu was planted more than 50 years ago to reduce erosion on Installation dunes since it establishes quickly. Although kudzu has not been planted since the 1950s, it has invaded many parts of the Installation (USACE 1996). Kudzu may impact cultural resources, such as the foundation of the Cape Henry Lighthouse and it is extensive over many of the bunkers, closed Landfill 03, and surrounding forested wetlands.

Funding for an invasive species control program was provided to treat kudzu and other invasive plants during the 2015 to 2017 growing seasons. Control treatments were applied to 45 ac (18 ha) of JEB Fort Story where kudzu was mapped from the 2013 invasive species survey. Infestations of kudzu were treated using mechanical and low-volume chemical treatments. The contractor reported a rate of 75 percent to 100 percent effectiveness at treating kudzu at 37 sites. However, new, emergent stands of kudzu were identified and pre-treated in each season. A final project monitoring report is due in 2018 for the 2017 growing season applications.

An ecological assessment and dune restoration survey completed in 2012 identified eight invasive plant species in the beaches and dunes areas at JEB Fort Story. These include common reed, Japanese sedge, autumn olive, English ivy, Japanese honeysuckle, kudzu, privet and tree of heaven (Department of the Navy 2012a). Invasive plant species that occur or have the potential to occur at JEB Fort Story are identified in **Appendix G and I** (VDCR-DNH 2009). Many of the invasive plant species were treated during the 2015 and 2016 contract treatment cycles with varying removal results, depending on the species.

5.10 Fauna

A list of faunal species occurring in the Cape Henry Region and those documented at JEB Fort Story is provided in **Appendix G**. This list is based on several surveys and studies (Department of the Navy 2010, Stevenson 1996, USACE 1993, and Department of the Navy 2012a); including an inventory conducted by the VDCR-DNH; breeding bird and spring migration surveys conducted in 1999 (Guilfoyle and Fischer 1999) and 2000 (Guilfoyle and Fischer 2000); and a planning level

survey for herpetofauna, mammals, birds, fish, and insects conducted in 2004-2005 (Versar 2006). An invasive species inventory survey and control plan was conducted at JEB Fort Story in December 2013.

5.10.1 Mammals

A list of mammal species occurring in the Cape Henry Region and those documented at JEB Fort Story is provided in **Appendix G**. At least 56 species of mammals have been recorded in the Cape Henry area where JEB Fort Story is located. Common species include the southeastern shrew (*Sorex longirostris longirostris*), Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*), least shrew (*Cryptotis parva*), short-tailed shrew (*Blarina brevicauda*), eastern mole (*Scalopus aquaticus* ssp. *aquaticus*), Rafinesque's eastern big-eared bat, little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus* ssp. *fuscus*), eastern red bat (*Lasiurus borealis* ssp. *borealis*), river otter (*Lontra canadensis*), mink, red fox, gray fox, raccoon, golden mouse (*Peromyscus nuttalli*), cotton mouse (*Peromyscus nuttalli gossypinus*), white-footed mouse, rice rat, muskrat, Virginia opossum (*Didelphis virginiana* ssp. *virginiana*), eastern cottontail rabbit (*Sylvilagus floridans* ssp. *mallurus*), and marsh rabbit (*Sylvilagus palustris* ssp. *mallurus*).

An ecological assessment and dune restoration survey conducted at JEB Fort Story in 2012 included a presence/absence survey for small mammals occurring within primary and secondary dune communities. Four mammal species were identified during a weeklong survey effort in February 2012 including house mouse, white-footed mouse, hispid cotton rat (*Sigmodon hispidus*), and southern short-tailed shrew. Although other mammals were not directly observed, sign including scat, tracks, and/or burrows was noted for several species including the eastern cottontail rabbit, red fox, raccoon, white-tail deer (*Odocoileus virginianus*), domestic dog (*Canis lupus familiaris*), and feral cats (Department of the Navy 2012a).

As part of a Navy regional contract effort, a biological survey was conducted at JEB Fort Story in 2016 to collect baseline data for the occurrence and composition of bat species at the Installation. Acoustic sampling was applied to sample species occurring at JEB Fort Story, resulting in the acoustic detection of 10 different bat species, with the presence of eight species confirmed through mist-net capturing. The confirmed eight bat species included: Rafinesque's eastern big-eared bat, big brown bat, eastern red bat, Seminole bat (*Lasiurus seminolus*), Southeastern bat (*Myotis austroriparius*), little brown bat, evening bat (*Nycticeius humeralis*), and tri-colored bat (*Perimyotis subflavus*). Northern long-eared bats were detected during the acoustic sampling, but were not confirmed through mist-netting (Tetra Tech 2016b). In 2016, the USFWS listed the northern long-eared bat as a federally threatened species, and established specific management measures under the final 4(d) rule to protect the species.

5.10.2 Marine Mammals

Marine mammals include dolphins, porpoises, whales, manatees, and seals, of which various species occur in the Chesapeake Bay and offshore from JEB Fort Story. Generally speaking, JEB Fort Story does not have routine conservation tasks concerning these species because these organisms are generally associated with pelagic habitat. Exceptions include JLOTS missions and exercises and marine mammal strandings.

JLOTS missions and exercises involve installation of temporary piers and movement of military vessels/equipment from open water to the shoreline. Such operations have not demonstrated any impact to marine mammals. Additionally, there are no known marine mammal calving grounds in

the vicinity of JEB Fort Story. Nonetheless, trainers and Installation natural resources staff remain cognizant of the potential presence and adjust operations if deemed necessary.

Occasionally dead or stranded marine mammals or sea turtles are found on the JEB Fort Story shoreline. Protocol for dealing with stranded marine mammals or sea turtles is discussed in **Section 6.5.2** and **Section 7.3.1**.

5.10.3 Birds

Multiple surveys of birds and annual bird counts have contributed to bird observation lists maintained at JEB Fort Story. Within the Cape Henry Region (including surveys and general observations at JEB Fort Story), at least 180 bird species have been documented, including passerines, raptors, wading birds, and shore birds. Of note, the last observation of brown booby at the Installation was on 05 August 2006. The latest bird survey conducted at Fort Story was the annual Audubon Christmas Bird Count conducted in December 2016. During this count, 38 species of birds were identified at JEB Fort Story. Bald eagles have been observed at JEB Fort Story; however, no nesting sites are known to exist.

An avian field survey was conducted at JEB Fort Story through all four seasons of 2013. During this period, 97 bird species were documented, including a single observation of two piping plovers foraging/sheltering on the Installation. The piping plover pair did not exhibit any breeding behavior during this observation. In addition to this observation, suitable habitat was identified on JEB Fort Story for piping plovers, roseate tern, and the rufa red knot (Gulf South Research Corporation 2013).

Common species observed throughout all seasons of the 2013 JEB Fort Story survey include American crow (*Corvus brachyrhynchos*), brown pelican (*Pelicanus occidentalis*), Carolina wren (*Thryothorus ludovicianus*), double-crested cormorant (*Phalacrocorax auritus*), great black-backed gull (*Larus marinus*), herring gull (*Larus smithsonianus*), and laughing gull (*Leucophaeus atricilla*).

A list of all documented bird species occurring in the Cape Henry Region and those documented at JEB Fort Story is provided in **Appendix G**.

5.10.4 Fish

The freshwater lakes on the Installation support populations of game fish such as bass, sunfish species, and brown bullhead (*Ameiurus nebulosus*) (**Appendix G**). The USFWS conducted a fish survey in 1991 of Snake, Hospital Road, and East Gate lake. This survey identified largemouth bass, bluegill, pumpkinseed (*Lepomis gibbosus*), mosquitofish (*Gambusia affinis*), brown bullhead, golden shiner (*Notemigonus crysoleucus*), bluespotted sunfish (*Enneacanthus gloriosus*), black crappie, and white perch. These species were confirmed within these lakes during the survey conducted in 2004 and 2005, with eastern mudminnow (*Umbra pygmaea*) and white catfish (*Ameiurus catus*) also identified (Versar 2006).

In 2016, the VDGIF conducted a fish data survey of Hospital Road Lake. Water quality parameters measured within the normal range, but only three species of fish were surveyed: largemouth bass, bluegill, and black crappie. All fish captured were adult size, indicating an unbalanced population, and reducing the number of predatory fish was advised for enhancing management. Fish surveys of Mulehead Lake indicated a good predator to prey ratio and no management changes were recommended (Boyce 2016).

Numerous species of marine fish were found to occur in the offshore waters of the Installation during the nearshore survey completed in 2016. Thirty-seven adult/juvenile fish species were observed in three of the four sampling seasons including the bay anchovy (*Anchoa mitchilli*), striped anchovy (*Anchoa hepsetus*), and weakfish (*Cynoscion regalis*) (Tetra Tech 2016a). Atlantic sturgeon was detected through a separate telemetry array survey being completed by NAVFAC Atlantic (Hagar 2017). The nearshore study conducted at JEB Fort Story involved several types of survey methods to develop a baseline of the nearshore habitat existing conditions (Tetra Tech 2016a). Additional telemetry studies were conducted to specifically examine the occupancy and migration patterns of the Atlantic sturgeon in the Lower Chesapeake Bay (Hagar 2017). These species occur in the nearshore habitat of the Installation, and are included in the list of fish species in **Appendix G**.

5.10.5 Reptiles and Amphibians

Herpetofauna surveys of JEB Fort Story have identified 16 amphibian species and 26 reptile species (**Appendix G**). Common amphibians identified include American bullfrog, Atlantic Coast slimy salamander, Cope's gray treefrog, eastern narrow-mouthed toad (*Gastrophryne carolinensis*), green frog, southern leopard frog, southern toad, spring peeper (*Pseudacris crucifer*), and squirrel treefrog (*Hyla squirella*) (Department of the Navy 2012d).

Common reptiles identified at JEB Fort Story include eastern fence lizard (*Sceloporus undulatus* ssp. *hyacinthinus*), eastern ratsnake (*Pantherophis alleghaniensis*), eastern six-lined racerunner (*Cnemidophorus sexlineatus*), little brown skink, northern black racer (*Coluber constrictor* ssp. *constrictor*), northern red-bellied cooter (*Pseudemys rubriventris*), southern five-lined skink (*Eumeces [Plestiodon] inexpectatus*), and yellow-bellied slider (Department of the Navy 2012d).

An ecological assessment and dune restoration survey conducted at JEB Fort Story in 2012 included a herpetological survey to document and inventory amphibian and reptile species occurring within the primary and secondary dune communities. Visual reconnaissance surveys, minnow trap surveys in aquatic and terrestrial habitats, and frog call surveys were conducted during two separate field events in 2012. Seventeen amphibian and reptile species were recorded during the survey, with squirrel treefrog, eastern ratsnake and southern five-lined skink representing three new occurrences for JEB Fort Story (Department of the Navy 2012d).

5.11 Rare, Threatened, and Endangered Species and Significant Ecological Communities

The VDCR-DNH establishes ranks for sensitive species and ecological communities in Virginia through a consensus of natural heritage program representatives, scientific experts, and The Nature Conservancy to designate a rarity rank based on the status of a species or variety within the political boundaries of the state. Factors that are considered include number of occurrences, number of individuals, and severity of threats (Roble 2010).

Lists of the special plants, animals, and ecological communities of Virginia may be accessed at the VDCR-DNH website: http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml.

A list of all of the state rarity codes, including those identified in **Table 5-4**, is available on the VDCR-DNH website.

Table 5-4. State Rare Species and Natural Communities Occurring at JEB Fort Story.

Common Name (Scientific Name)	State Rank	State Status
Plants		
Walter’s sedge (<i>Carex striata</i>)	S3	NL
Pineland tick-trefoil (<i>Desmodium strictum</i>)	S2	NL
Viviparous spikerush (<i>Eleocharis vivipara</i>)	S1	NL
Coastal bedstraw (<i>Galium hispidulum</i>)	S3	NL
Seacoast marsh-elder (<i>Iva imbricata</i>)	S1S2	NL
American halfchaff sedge (<i>Lipocarpha maculata</i>)	S1	NL
Wild olive (<i>Osmanthus americanus</i> var. <i>americanus</i>)	S1	NL
Dune ground-cherry (<i>Physalis walteri</i>)	S3	NL
Bluejack oak (<i>Quercus incana</i>)	S2	NL
Darlington’s oak (<i>Quercus hemisphaerica</i>)	S1	NL
Spanish moss (<i>Tillandsia usneoides</i>)	S1S2	NL
Mammals		
Rafinesque’s eastern big-eared bat (<i>Corynorhinus rafinesquii macrotis</i>)	S2	SE
Birds		
Peregrine falcon (<i>Falco peregrinus</i>)	S1B/S2N	ST
Insects		
Comet darner (<i>Anax longipes</i>)	S3	NL
S-banded tiger beetle (<i>Cicindela trifasciata</i>)	S1	NL
Fine-lined emerald (<i>Somatochlora filose</i>)	S2	NL
Natural Communities		
Maritime upland forests		
Maritime live oak forest	S1	NL
Maritime dune woodland		
Live oak-bluejack oak woodlands	S1	NL
Maritime dune grassland		
North Atlantic mixed dune grassland	S2	NL
Maritime dune scrub		
Northern bayberry dune scrub	S1	NL
Live oak dune scrub	S1	NL

Sources: Fleming and Patterson 2017, Department of the Navy 2012a, Townsend 2012, Department of the Navy 2010, Roble 2010, and Stevenson 1996

Plants and Natural Communities (State Rankings):

B – Breeding populations; NL – Not listed; ST – State Threatened; SE – State Endangered; SH – Formerly part of Virginia’s fauna with some expectation that it may be rediscovered; S1 – Extremely rare and critically imperiled with five or fewer occurrences or very few remaining individuals in Virginia; or because of some factor(s) making it especially vulnerable to extirpation in Virginia; S2 – Very rare and imperiled with six to 20 occurrence or few remaining individuals in Virginia; or because of some factor(s) making it vulnerable to extirpation in Virginia; S3 – Rare to uncommon in Virginia with between 20 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia; S#S# – Rank is uncertain, but considered to be within the indicated range of ranks

S? – Rank uncertain; SU – Possibly rare, but status uncertain and more data needed

As of September 2016, VDCR-DNH has identified 16 state-listed plant species and nine state-ranked invertebrate species that are known to occur within 2-mi (3.2-km) of the Installation. Of the 16 state-ranked plant species, five have been documented as occurring at JEB Fort Story: bluejack oak, dune groundcherry seacoast marsh-elder, wild olive, and Darlington's oak (Department of the Navy 2012a and Townsend 2012).

The VDCR-DNH has identified peregrine falcon, chicken turtle (*Deirochelys reticularia*), and Rafinesque's eastern big-eared bat as the only state-listed animal species within 2-mi (3.2-km) of JEB Fort Story. Both chicken turtle and Rafinesque's eastern big-eared bat are listed as endangered in Virginia and peregrine falcon is listed as threatened in Virginia. The chicken turtle has not been documented on JEB Fort Story. The peregrine falcon has been observed on JEB Fort Story (Department of the Navy 2010). Rafinesque's eastern big-eared bat utilizes abandoned buildings (Buildings 221 and 219) as roost and maternity roost sites as well as hibernacula (Carpenter 2008). In 2009 and 2010, the Rafinesque's eastern big-eared bat was found only in Building 221 (Tetra Tech 2016b).

Questions concerning Rafinesque's eastern big-eared bat habitat protection and improvement can be directed to J.D. Kleopfer, VDGIF Region I Wildlife Diversity Biologist, at (804) 829-6703 or by email at John.Kleopfer@dgif.virginia.gov.

Bald eagles have been observed at JEB Fort Story, but no nesting sites have been documented. The bald eagle was removed from the federal ESA on 07 July 2007 (72 FR 37346-37372). The USFWS established National Bald Eagle Management Guidelines in 2007 that include protective measures outlined in the BGEPA (16 USC §668a–668c) and the MBTA (16 USC §703–711). Both the BGEPA and MBTA protect bald eagles by prohibiting killing, selling or otherwise harming eagles, their nests or eggs. The BGEPA also protects eagles from disturbance. Due to the success of these protective measures, VDGIF determined in 2011 that the breeding population of bald eagles in coastal areas of Virginia was more than 730 pairs. Surveys in the Piedmont and Mountain regions of Virginia also have documented increases in nesting individuals. Based on these data, Virginia removed the bald eagle from the state list and ESA list in 2013 (VDGIF 2013b).

5.11.1 Piping Plover

The piping plover is listed both federally and by the State of Virginia as a threatened species and has been documented at JEB Fort Story (Schaeffer 2013). It is listed as threatened throughout its range, with the exception of the Great Lakes watershed population, which is federally listed as endangered. Those with the potential to occur at JEB Fort Story belong to the Atlantic coast population and are federally threatened. Piping plover is a small shorebird that inhabits open sandy beaches and salt flats. The Atlantic coast population of piping plover was estimated at 1,782 pairs in 2010 (USFWS 2011a). A review of survey data collected in 2011 by VDGIF indicated that the closest population of piping plover occurs at Fisherman Island, approximately 17 mi (27 km) northeast of the Installation, where several nesting pairs have been observed (VDGIF 2012). A survey conducted in April 2013 documented a non-breeding pair of piping plover at JEB Fort Story (Schaeffer 2013). General characteristics of piping plover are provided in **Table 5-5**.

Table 5-5. Piping Plover Characteristics.

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

Source: USFWS 2012a

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



Piping plover (*Charadrius melodus*)

Source: Wikipedia Commons 2013b

5.11.2 Roseate Tern

Roseate tern is a federally and state-listed species, with the northeastern U.S. population listed as endangered and the remaining population listed as threatened (VDGIF 2017). The federally endangered northeastern U.S. population has the potential to occur at JEB Fort Story. Roseate tern is a medium-sized bird that nests on small barrier islands and spends most of its life offshore and along the Atlantic coast. The species migrates in late August to early September to the waters off Trinidad and northern South America. Roseate tern populations declined greatly due to hunting in the late 19th century. Currently, populations remain in the low range of 2,500–3,300. Primary threats to roseate tern include habitat disruption and development along sensitive barrier island habitats the species relies on for nesting (USFWS 2011b). General characteristics of roseate tern are provided in **Table 5-6**.

Table 5-6. Roseate Tern Characteristics.

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

USFWS 2011b and 2012b



Roseate tern (*Sterna dougallii dougallii*)

Source: Wikipedia Commons 2013a

5.11.3 Rufa Red Knot

The rufa red knot is a federally and state-threatened species that has been documented at JEB Fort Story (VDGIF 2017). The rufa red knot is a medium-sized shorebird that inhabits intertidal habitats, particularly those located near coastal inlets and bays. Flocks of red knot converge on staging areas along the entire Atlantic coast and are faithful to specific sites, returning to the same location year after year. The spring migration is timed with the release of horseshoe crab eggs.

One of the primary threats to the red knot population is the increased take of horseshoe crabs for bait in commercial fisheries and habitat degradation along their migratory route. The species was listed as threatened by USFWS on 11 December 2014 (50 FR 73706-73748).

Individuals occurring at JEB Fort Story may be fall or spring migrants stopping to rest or forage on one of the longest yearly migrations of any bird – 9,300 mi (15,000 km) from the Arctic to Tierra del Fuego, Argentina, near the southernmost tip of South America. General characteristics of red knot are provided in **Table 5-7**.

Table 5-7. Rufa Red Knot Characteristics.

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

USFWS 2012c



Rufa Red knot (*Calidris canutus rufa*)

Source: Wikipedia Commons 2013c

5.11.4 Northern Long-eared Bat

The northern long-eared bat is a federally and state-threatened species that has been documented at JEB Fort Story through acoustic surveys, but was not identified during the mist-netting (Tetra Tech 2016b and VDGIF 2017). This medium-sized bat occupies several types of habitats. The preferred winter habitat is mines and caves used as hibernacula (USFWS 2015a). This species favors small cavities or crevices in live and dead trees, and is adaptable in selecting roosts. It is rarely known to occur in barns and sheds (USFWS 2015a).

Reproduction begins in late summer or early fall through a process call delayed fertilization. During the hibernation period, the females store sperm until spring. After they emerge from hibernation the females ovulate and the stored sperm fertilizes the eggs. The females will roost in small colonies where they will birth one pup (USFWS 2015a).

A severe threat to the northern long-eared bat is the presence of the fungal disease white-nose syndrome. Actions have been taken to help reduce the transmission of this fungus in caves and mine closures (USFWS 2015a). General characteristics of the northern long-eared bat are provided in **Table 5-8**.

Table 5-8. Northern Long-eared Bat Characteristics.

Attribute	Description
Size	Approximately 3–3.7 inches (7.62–9.4 cm) in length
Identification	Adult fur is medium to dark brown on the back and tawny to pale brown on the underside.
Roosting	After fertilization, pregnant females roost in small colonies. Most give birth around May or early June to late July.

Source: USFWS 2015a



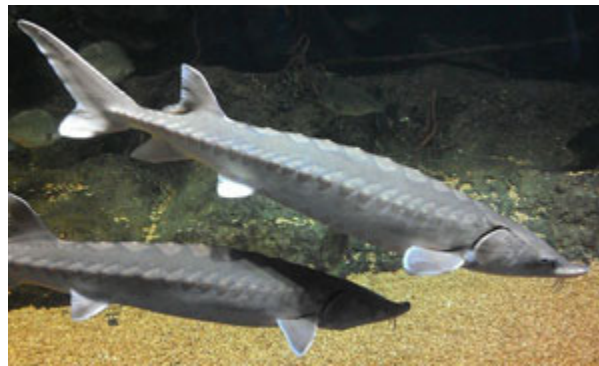
Northern Long-eared Bat (*Myotis septentrionalis*)

Source: USFWS 2015a

5.11.5 Atlantic Sturgeon

The Atlantic sturgeon is a federally and state-endangered species that has been documented in the nearshore habitat of JEB Fort Story (VDGIF 2017). It is anadromous, meaning it spawns in freshwater but adults spend most of their time in marine and estuarine waters. A fall spawning population was documented in Virginia (Hager et al. 2014 and Kahn et al. 2014). Males migrate into freshwater one month before females, in March and April. Females lay between one million and 2.5 million eggs in flowing water up to 60 feet deep (USFWS 2017a). Hatchlings remain in their freshwater nursery habitats for approximately one year. As juveniles age, their range extends farther downriver. The age at which juveniles transition to coastal wandering habitat varies (NAVFAC 2014). Once the fish transitions it will remain a coastal migrant using various coastal estuaries and rivers seasonally until maturity, which is reached between the age 11 and 18. Sturgeon’s diet consists of worms, snails, shellfish, crustaceans, and small fish which they acquire using their snouts and barbels to root around in bottom sediments, vacuuming up organisms (USFWS 2017a).

The Navy funded a tracking study of the Atlantic sturgeon in order to determine the fish’s use of the Chesapeake Bay near installations. Around JEB Fort Story, five receivers were deployed. Atlantic sturgeon were detected year-round around the Installation, peaking in spring and fall (Hagar 2017).



Atlantic Sturgeon (*Acipenser oxyrinchus*)

Source: NOAA 2017a

5.11.6 Sea Turtles

Three surveys for rare, threatened, and endangered sea turtle species have been conducted at JEB Fort Story, including a 1996 survey conducted by VDCR-DNH (Stevenson 1996) and a 2006 and 2016 survey conducted by Versar, Inc. (Versar 2006 and Department of the Navy 2016b).

Sea turtles are known to occur in the Chesapeake Bay during the warm months of the year, with peak abundance in mid-June (Lutcavage and Musick 1985). Sea turtles are known to come into the Chesapeake Bay to feed.

The federally and state endangered Kemp’s ridley sea turtle and the federally threatened loggerhead sea turtle are the most abundant in offshore areas of JEB Fort Story, followed by the federally endangered leatherback sea turtle and the federally threatened green sea turtle. **Table 5-9** presents a list of federally listed sea turtle species that may occur on the Installation. Loggerhead, leatherback, and green sea turtles have occasionally been documented on the beaches of JEB Fort Story (Department of the Navy 2016b). In 2013 three Loggerhead turtle nests were identified in the JEB Fort Story area (VDGIF 2017).

Table 5-9. Federally Listed Sea Turtle Species.

	Scientific Name	ESA Status
Order Testudines, Suborder Cryptodira		
Family Cheloniidae		
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened ¹
Green sea turtle	<i>Chelonia mydas</i>	Threatened ²
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Kemp’s ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Family Dermochelyidae		
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered

¹ Four DPSs of the loggerhead turtle are designated as threatened, while five DPSs are designated as endangered under the ESA. The Northwest Atlantic Ocean DPS, which occurs in Virginia, is designated as threatened.

² Although this species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle are listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations.

Since the 1970s VDGIF has maintained a statewide sea turtle nesting database, which includes all reported nesting events on the state’s southern mainland beaches and barrier islands (VDGIF 2017). A review of VDGIF data from 1970 to 2014 indicates that three loggerhead sea turtle crawls were documented at JEB Fort Story in August 1996, June 2002, and July 2002 (VDGIF 2017). The most recent loggerhead nesting occurrences were on 13 June 2013, 09 August 2013, and 23 July 2014 within the back beach area. The 13 June 2013 nest was within the high tide line. USFWS biologists moved 140 eggs from Fort Story to BBNWR on 13 June 2013 due to the threat of nest loss during high tides. (NAVFAC MIDLANT 2016 and VDGIF 2017).

JEB Fort Story signed a MOU with the BBNWR/USFWS in 2016 (**Appendix L**). In accordance with this MOU, volunteers and USFWS employees patrol the beachfront of the Installation between the areas of JEB Fort Story Gate 8 to the Cape Henry Lighthouse/Building 734 from 25 May (may start as early as 15 May) through 31 August each year. Of primary concern for

potential nesting along this shoreline are the federally threatened loggerhead sea turtle and the federally endangered Kemp’s ridley sea turtle. If a nest is located on JEB Fort Story, the nest will be left in situ and management strategies outlined in the *Virginia Sea Turtle Nesting Handbook* will be followed. USFWS will also be available to assist with any nest management measures the Installation needs assistance with. If the Installation determines the nest is in a sensitive area and has the potential to impact the mission, base representatives and the USFWS will coordinate with VDGIF to determine a course of action.

Kemp’s Ridley Sea Turtle

The Kemp’s ridley sea turtle is a federally and state-endangered species that has been documented at JEB Fort Story (VDGIF 2017). The Chesapeake Bay area has been reported as a nesting area for the Kemp’s ridley sea turtle. Two nests have been reported in Virginia – one in 2012 on NASO-DNA and one in 2014 on False Cape State Park near the North Carolina-Virginia border (VDGIF 2017). Between 2001 and 2013, more than 500 strandings were recorded in Virginia. According to the 2016 Biological Assessment, numerous strandings have been recorded on JEB Fort Story (NAVFAC MIDLANT 2016). No Kemp’s ridley turtle nests or false crawls have been recorded on this Installation; it is unlikely but possible that nesting would occur (Department of the Navy 2016b).

The Kemp’s ridley sea turtle is small with adults reaching two feet in length and weighing approximately 100 pounds. The carapace is oval in shape and is olive-gray in color with five pairs of costal scutes. The head is triangular with a hooked beak with a large crushing surface and two pairs of prefrontal scales. The nesting habitat is very different from its primary habitat of the nearshore and inshore waters of the northern Gulf of Mexico (USFWS 2015b). General characteristics of the Kemp’s ridley sea turtle are provided in **Table 5-10**.

Table 5-10. Kemp’s Ridley Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 24 inches (61 cm) in length
Identification	Coloration is olive-gray. The carapace is oval with five pairs of costal scutes, four inframarginal scutes with each perforated by a pore. The head is triangular with a hooked beak with a large crushing surface and two pairs of prefrontal scales.
Nesting	Nesting occurs from April into July with clutch sizes averaging 100 eggs per nest. The Kemp’s ridley nests during daylight hours an average of 2.55 times per season.

Source: USFWS 2015b



Kemp’s Ridley Sea Turtle (*Lepidochelys kempii*)

Source: NOAA 2017b

Loggerhead Sea Turtle

The loggerhead sea turtle is a federally and state-threatened species that has been documented at JEB Fort Story (VDGIF 2017). Records indicate 143 strandings have occurred on JEB Fort Story (NAVFAC MIDLANT 2016). The loggerhead sea turtle is the only sea turtle species that is known to regularly nest along Virginia’s beaches. Along the ocean-facing beaches of Virginia, five to 15 nests are reported annually (VDGIF 2017). VDGIF data from 1970 to 2014 recorded false crawls at JEB Fort Story in August 1996, June 2002, and July 2002. The most recent report of loggerhead nests on the Installation occurred on 13 June 2013, 09 August 2013, and 23 July 2014 (Department of the Navy 2016b). The June nest was located approximately 150 feet north of the JEB Fort Story and Virginia Beach Resort area border. The nest was relocated to a refuge nursery. The August nest was discovered 0.5 mile north of JEB Fort Story’s southern border and relocated to a refuge nursery. Conditions exist at JEB Fort Story that would support loggerhead sea turtle nesting.

The loggerhead sea turtle is medium in size averaging three feet in length and weighing 200 pounds. The flippers and the shell are reddish-brown in color and the underside of the loggerhead is yellow. The loggerhead carapace is intricate with five pairs of costal scutes, the first of which touches the nuchal scute. This species has a blunt jaw with a large head (USFWS 2015c). General characteristics of the loggerhead sea turtle are provided in **Table 5-11**.

Table 5-11. Loggerhead Sea Turtle Characteristics.

Attribute	Description
Size	Average 36 inches (91 cm) in length
Identification	Coloration is reddish brown/brown with a yellow underside. Carapace has five pairs of costal scutes, the first touches the nuchal scute. On each of the bridges between the underside and the shell are three large inframarginal scutes on each bridge. The loggerhead has a blunt jaw with a large head.
Nesting	Nesting occurs from April through September. The highest frequency of nesting is between June and July. Nesting occurs primarily at night one to seven times a nesting season. The average clutch size is 100–126 eggs per nest.

Source: USFWS 2015c



Loggerhead Sea Turtle (*Caretta caretta*)

Source: Wikipedia Commons 2017a

Leatherback Sea Turtle

The leatherback sea turtle is a federally endangered species that has been documented at JEB Fort Story. Leatherback turtle strandings were recorded on or near JEB Fort Story installation throughout the year 2016. A total of 92 leatherback strandings occurred in Virginia from 2001 to 2013 (NAVFAC MIDLANT 2016). No leatherback nests or false crawls have been recorded on this Installation and it is unlikely but possible nesting would occur (Department of the Navy 2016b).

The leatherback sea turtle is large with adults reaching eight feet in length and weighing 500 to 2,000 pounds. The shell is composed of small bones covered by rubbery, firm skin with seven longitudinal ridges. The skin is black with different pale spots with a pink spot on the dorsal surface of adult heads. The upper jaw is gray with a toothlike cusp on each side and the lower jaw is hooked anteriorly. The fins are paddle-like with pale spotting and white margins. The preferred habitat is open ocean. Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas (USFWS 2015d). General characteristics of the leatherback sea turtle are provided in **Table 5-12**.

Table 5-12. Leatherback Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 48–96 inches (122–244 cm) in length
Identification	Coloration is black with pale spotting. The upper jaw is gray with a toothlike cusp on each side and the lower jaw is hooked anteriorly. The fins are clawless and paddle-like with pale spotting and white margins.
Nesting	Nesting occurs from March to July with clutch sizes averaging 80–85 yolked eggs per nest. Female leatherbacks nest at night an average of five to seven times in a nesting season.

Source: USFWS 2015d



Leatherback Sea Turtle (*Dermochelys coriacea*)

Source: NOAA 2016e

Green Sea Turtle

The green sea turtle is a federally and state threatened species that has been documented at JEB Fort Story (VDGIF 2017). Two green turtle strandings were recorded on JEB Fort Story installation since 2004, and several more have been document near the Installation (VAQF 2014). No green sea turtle nests or false crawls have been recorded on this Installation and is unlikely but possible nesting would occur (Department of the Navy 2016b).

The green sea turtle commonly occurs in shallow waters such as reefs, bays, and inlets with an abundance of marine grass and algae. The green sea turtle is medium in size with adults reaching four feet in length and weighing up to 440 pounds. The shell is smooth and light to dark brown with dark mottling. The head is light brown with yellow markings. This species has four pairs of costal scutes and one pair of prefrontal scales on the head (USFWS 2017b). General characteristics of the green sea turtle are provided in **Table 5-13**.

Table 5-13. Green Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 36 inches (91 cm) in length
Identification	Coloration is variable. The heart-shaped carapace is smooth and light to dark brown with dark mottling. The head is small and there is one pair of prefrontal scales between the eyes.
Nesting	Nesting occurs from June to September with clutch sizes ranging from 75 eggs to upwards of 200 eggs per nest. The green sea turtle nests at night an average of 3.3 times per season.

Source: USFWS 2015e



Green Sea Turtle (*Chelonia mydas*)

Source: Wikipedia Commons 2017b

Hawksbill Sea Turtle

The hawksbill sea turtle is a federally and state endangered species that has been documented near JEB Fort Story (VDGIF 2017). According to the 2016 Sea Turtle Lighting Survey, the hawksbill sea turtle is considered extremely rare in Virginia waters, with only four reports of this species. Three were strandings in the Chesapeake Bay and one along the coast north of the Chesapeake Bay (Department of the Navy 2016b). There have been two hawksbill strandings recorded near JEB Fort Story since 2004; however, none have been recorded on the installation (VAQF 2014). The hawksbill sea turtle is unlikely to occur on the Installation.

The hawksbill sea turtle commonly feeds on sponges in coral reefs. The hawksbill is small to medium in size with adults reaching three feet in length and weighing up to 300 pounds. The shell is oval and elongated with overlapping scutes on the carapace. The head is small with a hawk-like beak with four flippers and two claws. This species is the only sea turtle with four pairs of costal scutes on the carapace and two pairs of prefrontal scales on the head (USFWS 2015e). General characteristics of the hawksbill sea turtle are provided in **Table 5-14**.

Table 5-14. Hawksbill Sea Turtle Characteristics.

Attribute	Description
Size	Approximately 27.5 inches (70 cm) in length
Identification	Coloration is brown with splashes of yellow, orange or reddish-brown on the upper portion of the shell or carapace. The carapace is round with five to six costal scutes. The head is triangular and relatively large and has two pairs of prefrontal scales.
Nesting	Nesting occurs between April and November with clutch sizes ranging from 140 eggs to upwards of 200 eggs per nest. The hawksbill nests at night an average of 4.5 times per season.

Source: USFWS 2015f

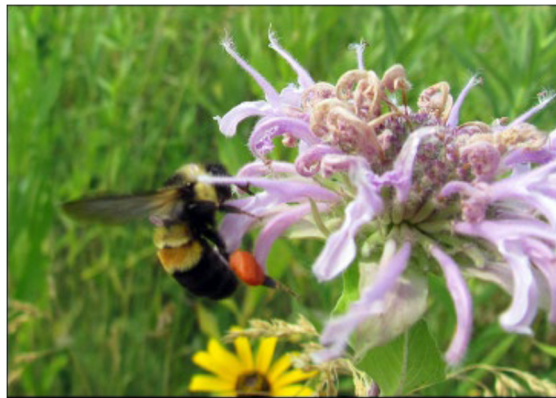


Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Source: Wikipedia Commons 2017c

5.11.7 Rusty-patched Bumble Bee

The rusty-patched bumble bee has been listed as endangered by USFWS due to widespread habitat degradation from intensive farming, global climate change, disease, and pesticide use, but the species is not listed by the State of Virginia (VDGIF 2017). This species lives in colonies with one queen and several workers. The rusty patch can be easily identified by its all-black head, but the workers and males can be distinguished by a rusty reddish patch located in the middle of their back on the second abdominal segment. The historical habitat of the rusty-patched bumble bee was within the grasslands and tallgrass prairies of the Upper Midwest and Northeast. Due to habitat degradation, many nesting sites are in less desirable locations, such as abandoned rodent cavities or aboveground clumps of grass and overwintering sites. This species is active from April through September (USFWS 2017c and USFWS 2017d). The rusty-patched bumble bee's current range does not include JEB Fort Story (USFWS 2017d). There have been no reports of the rusty-patched bumble bee being present on the Installation.



Rusty-patched Bumble Bee (Bombus affinis)

Source: USFWS 2017d

Photo courtesy of Christy Stewart

5.11.8 Yellow-banded Bumble Bee

The yellow-banded bumble bee is currently listed as a species of concern that is under review for listing by the USFWS. This species was historically known to occur in Virginia, including much of the northwestern portion of the state, extending southward into the Appalachians. This species is also historically known to exist in the upper Midwest to the Rocky Mountains, a large portion of southeastern Canada and extending to the northwest into British Columbia. The yellow-banded bumble bee is an important pollinator having the most common threat from disease, habitat loss and pesticide use (USFWS 2016a). JEB Fort Story is in the current range for the yellow-banded bumble bee; however, there are no records of the yellow-banded bumble bee on the Installation (USFWS 2017e).



Yellow-banded Bumble Bee

Source: USFWS 2016a

Photo Courtesy of Sandy Gillian

5.12 Conservation Sites and Dune Protection Areas

Based on the findings of the 1994–1995 inventory of rare species and significant natural communities (Stevenson 1996), the VDCR-DNH designated four conservation sites on JEB Fort Story that best encompass the occurrences of rare species and heritage resources (**Figure 5-7**). Conservation sites indicate the presence of one or more rare plant, animal, natural community, or geologic feature and associated habitat and buffer or other adjacent land thought necessary for the element's conservation.

The designation of a conservation site area is an important management tool for identifying the natural heritage resources and habitat in need of monitoring and protection (VDCR-DNH 2013). An ecological assessment and dune restoration survey conducted at JEB Fort Story in 2012 delineated 76 ac (31 ha) of JEB Fort Story dune habitat as a DPA and recommended that specific management practices be implemented to protect this sensitive habitat (**Figure 5-8**) (Department of the Navy 2012a). A brief description of the four conservation sites and the DPA is provided in the following paragraphs.

West Beach Dunes. This 150-ac (61-ha) conservation site encompasses beach, dune, and maritime scrub/forest habitats along the mouth of the Chesapeake Bay on Cape Henry (**Figure 5-7**). Moderate development has occurred at the site (e.g., road system, lodging facility, and residences) and the beach is used for amphibious training. The area is valued for its ecological diversity. Four state-ranked, rare plant species, including bluejack oak, dune ground-cherry, seacoast marsh-elder, and coastal bedstraw occur, and the area provides potential habitat for state rare s-banded tiger beetle (*Cicindela trifasciata*).

East Beach Dunes. The East Beach Dunes area is a 70-ac (28-ha) site encompassing beach, dune, and maritime scrub/forest habitats along the Atlantic Ocean and the mouth of the Chesapeake Bay (**Figure 5-7**). This area is located along the east entrance of JEB Fort Story. Two state-ranked, rare plant species are present including seacoast marsh-elder and coastal bedstraw. Dominant species include loblolly pine, live oak, black cherry, and wax myrtle. Erosion and invasive flora threaten this conservation site area. Erosion has destroyed the primary dune at the northern edge of the site. Foot traffic on the public beach at the southern end of the site has the potential to damage dune vegetation, particularly sea-coast marsh elder.

Interior Dunes and Wetlands. This 450-ac (182-ha) natural area along the southern and inland portion of the Installation contains interior dunes and low-lying wetlands, including a swamp blackgum-red maple-bald cypress forested swamp in the eastern and central portions (**Figure 5-7**). The conservation site area is undeveloped, but it is used for light military training and it contains sand roads. The east-central portion of the area lies within the impact area used for demolition training. Despite the somewhat degraded nature of the area, eight state rare plant species, three state rare animal species, and two rare vegetative community types have been identified in this conservation site. State rare plant species observed include American halfchaff sedge, pineland tick-trefoil (*Desmodium strictum*), Walter's sedge (*Carex striata*), Spanish moss, viviparous spikerush, wild olive, and bluejack oak. State rare animal species observed include Rafinesque's eastern big-eared bat, fine-lined emerald (*Somatochlora filosa*), and comet darner (*Anax longipes*).

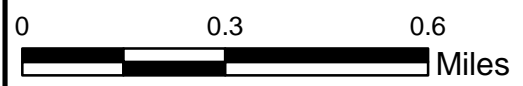
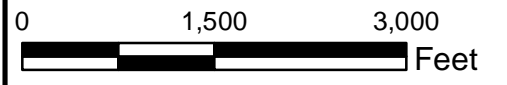


Chesapeake Bay

Atlantic Ocean

- Legend**
- Installation Boundary
 - Building
 - Dune Protection Area*
- Conservation Site Areas**
- East Beach Dunes
 - East Gate Lake
 - Interior Dunes and Wetlands
 - West Beach Dunes

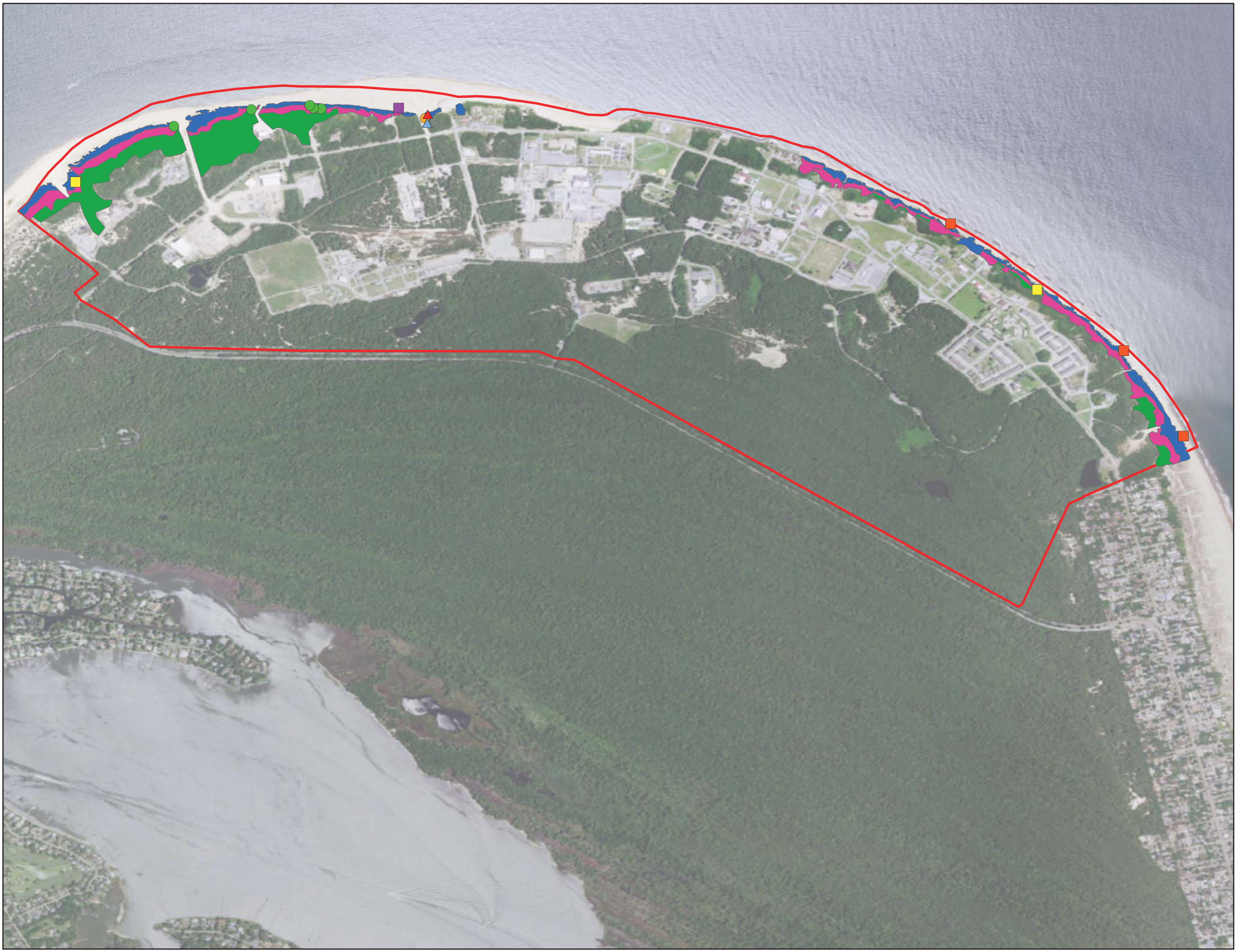
*The Dune Protection Area is not classified as a Virginia Department of Conservation and Recreation Conservation Site Area.



Source: ESRI, World Imagery; Navy 2016; FEMA, DFIRM ID 515531

Figure 5-7.
Conservation Site and Dune Protection Areas of JEB Fort Story

This page intentionally left blank.



- Legend**
- Installation Boundary
 - Special Species Status**
 - ▲ Blue Jack Oak
 - ▲ Darlington's Oak
 - Sticky Ground-cherry
 - Seacoast Marsh Elder
 - Wild Olive
 - Sea Turtle False Crawl
 - Sea Turtle Nest
 - Spurge Species
 - Dune Protection Area**
 - Primary Dune
 - Secondary Dune
 - Secondary Dune Field



0 1,500 3,000 Feet

0 0.3 0.6 Miles

Source: ESRI, World Imagery; Navy 2016

Figure 5-8.
Dune Protection Area and Special Status Species Locations JEB Fort Story

This page intentionally left blank.

East Gate Lake. The East Gate Lake conservation site is a 2.5-ac (1.0 ha) human-made lake located west of the east entrance gate (**Figure 5-7**). The southern edge of the lake hosts a moderate-sized population of viviparous spikerush. The only occurrences of this species in Virginia are on JEB Fort Story. Aquatic species identified in the lake include water-thread pondweed and a bladderwort species. Vegetation identified in the drawdown zone of the lake include creeping rush, coast flatsedge, warty panic grass, and Richard yellow-eyed grass. Dominant species in the surrounding dune forest include water oak, live oak, loblolly pine, and American holly.

Dune Protection Area. The JEB Fort Story DPA encompasses 23 ac (9 ha) of primary dune and 53 ac (21 ha) of secondary dune and dune field, located on the northern and eastern perimeter of the Installation (**Figure 5-7**) (Department of the Navy 2012a). The majority of the dunes at JEB Fort Story are intact with vegetated primary and secondary dunes exhibiting consistent slope and segment breaks created by vehicular or pedestrian access routes through the dunes. State rare plant species observed include seacoast marsh-elder, wild olive, dune groundcherry, and Darlington's oak.

This page intentionally left blank.

6.0 PROGRAM COMPONENTS – JOINT EXPEDITIONARY BASE FORT STORY

6.1 Ecosystem Management

This INRMP follows the direction set forth in the memorandum issued by the Deputy Under Secretary of Defense for Environmental Security (08 August 1994) regarding Implementation of Ecosystem Management in the DoD. The memorandum states that ecosystem management will become the basis for future management of DoD lands and waters. The publication *Conserving Biodiversity on Military Lands* (Benton et al. 2008) provides guidance for including conservation and ecosystem management within Installation natural resources programs. In this context, ecosystem management will include the following criteria:

- **Ecological Approach:** There will be a shift from individual species management to the management of ecosystems.
- **Partnerships:** Ecosystems cross political boundaries, making the need for cooperation, coordination, and partnerships essential for managing ecosystems.
- **Participation:** Public needs and desires will be emphasized in management decisions.
- **Information:** The best available scientific information will be used to select technologies to be used in managing natural resources.
- **Adaptive Management:** Adaptive management techniques will be incrementally applied as they are identified.

The DoD's goal regarding ecosystem management is to preserve, improve, and enhance ecosystem integrity. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies and communities. The specific principles and guidelines that DoD has identified to achieve this goal are listed as follows:

- Maintain and improve the sustainability and native biodiversity of ecosystems.
- Administer with consideration of ecological units and time frames.
- Support sustainable human activities.
- Develop a vision of ecosystem health.
- Develop priorities and reconcile conflicts.
- Develop coordinated approaches to work toward ecosystem health.
- Rely on the best science and data available.
- Use benchmarks to monitor and evaluate outcomes.
- Use adaptive management.
- Implement through installation plans and programs.

Ecosystem management recognizes that humans are ecosystem components and that sustainable human activity does not mutually exclude the preservation and enhancement of ecological

integrity. Therefore, it is ecosystem management that provides JEB Fort Story the means to protect biodiversity and provide high-quality military readiness.

6.2 Land Management

Overall real estate responsibility lies with the PWD. The Environmental Division provides support in ensuring compliance with environmental laws and regulations as well as natural resources conservation. The land management program supports the military mission, protects environmental quality, and supports range sustainability. Management concerns include erosion and sediment control, stormwater management, nonpoint-source pollution, wetlands, coastal zone protection, ERP support, shoreline management, and grounds and landscape management. Compliance with applicable laws and regulations of the VMRC, USACE, VDEQ, and Virginia Division of Soil and Water Conservation is a key component of the land management program. Other initiatives include reviewing preconstruction plans for proposed projects, conducting periodic site inspections for erosion and sedimentation control needs, participating in the NEPA review process, participating in the Chesapeake Bay Agreement programs, and using native plant species for landscaping. State and federal regulations pertinent to the land management program are briefly discussed in the following subsections. A list of native plants for the Coastal Plain region of Virginia is included in **Appendix I**.

6.2.1 Erosion and Sedimentation

Regulation of erosion and sedimentation is provided by the Virginia Erosion and Sediment Control Law (§62.1-44.15:51). This law requires an erosion and sedimentation plan be written and approved for any land-disturbing activity equal to or exceeding 10,000 ft² (929 m²) in area. If a construction project is located within a Chesapeake Bay Preservation Area, an erosion and sedimentation control plan must be developed for disturbed areas greater than 2,500 ft² (232 m²) (VDEQ 2014). Land-disturbing activities include, but are not limited to, clearing, grading, excavating, transporting, and filling of land. Regulated land-disturbing activities must comply with minimum standards outlined in the Virginia Erosion and Sediment Control Handbook (VDCR 1992).

6.2.2 Stormwater Management

JEB Fort Story has a Stormwater Pollution Prevention Plan (AH Environmental Consultants 2009) that is updated annually for management of stormwater runoff and pollution prevention. This plan identifies the locations of buildings in which regulated and nonregulated industrial activities occur, stormwater outfalls, and local drainage patterns. The plan does not address stormwater management in the training areas. In accordance with the Virginia Pollution Discharge Elimination System, the plan provides management information for industrial activities that could impact waters of Virginia. The primary objective of the plan is to prevent system failures for management of stormwater runoff, and pollution prevention. Integration of stormwater management activities and the INRMP include implementation of BMPs for drainage improvements in the training areas.

6.2.3 Coastal Zone Protection and Climate Change

The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources. Though federal lands are excluded from state coastal management areas, activities on federal lands that are reasonably likely to affect any land or water use or the natural resources of designated coastal resources management areas must be consistent with the enforceable policies of the Virginia Coastal Resources Management Plan. Consistency

reviews are triggered for all federal actions inside the coastal zone, and for actions outside the coastal zone that have the potential to affect Virginia’s coastal uses and resources. All federal development projects inside the coastal zone are automatically subject to consistency review and require a CCD in accordance with 15 CFR 930.

JEB Fort Story is within the designated coastal resources management area (VDEQ 2002). An outline of Virginia’s federal consistency review process is available on the VDEQ website (<http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/FederalConsistencyReviews.aspx>). Project proponents are required to coordinate with the Environmental Division regarding the preparation of a Federal CCD and submit the Federal CCD to the VDEQ. The VDEQ coordinates review of the CCD with other state and local agencies. The Commonwealth of Virginia has 60 days by law to review the CCD. If no response is received from the state within 60 days, their concurrence can be presumed.

The Virginia Coastal Resources Management Plan establishes policies and objectives to guide the use and development of coastal management areas to ensure their protection and preservation. Included are policies on fisheries management, subaqueous lands management, wetlands, primary dunes, point and nonpoint source water and air pollution, shoreline sanitation, and coastal lands management.

Protection and restoration of the Chesapeake Bay and Atlantic Ocean shoreline is an ongoing natural resources issue at JEB Fort Story. Protecting the shoreline is critical to the maintenance of the sand dune communities and beach training areas, and for providing recreational opportunities for Navy personnel and their families. Shoreline protection is the responsibility of the PWD. Stabilization practices that have been implemented for shoreline protection include revetments, bulkheading, geotextile containment tubes, dune toe protection, and beach stabilization. Construction of stone breakwaters offshore of the JEB Fort Story beach has been the most significant project that has been completed.

The DoD recognizes that regional partnerships are the most appropriate means to conduct climate change vulnerability and impact assessments. All DoD components shall, in a regionally consistent manner and to the extent practicable, and using the best science available:

- Utilize existing tools to assess the potential impacts of climate change to natural resources on DoD installations.
- Identify significant natural resources that are likely to remain on DoD lands or that may in the future occur on DoD lands.
- When not in conflict with mission objectives, take steps to implement adaptive management to ensure the long-term sustainability of those resources.

Assessing the impacts of climate change is best approached by identifying an environmental baseline for the future that considers the differences in landscape form and function caused by climate change and other stressors on the landscape (CNIC 2012).

JEB Fort Story is located in the South Atlantic Landscape Conservation Cooperative. The cooperative, established as part of the DOI’s Climate Change Response Strategy, is designed to provide a partnership in which the private, state, tribal, and federal conservation community can work together to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate (Strickland 2010). The JEB Fort Story NRM

should continue to pursue partnerships with SERDP, South Atlantic Landscape Conservation Cooperative, Society for Ecological Restoration International, and other regional conservation partners in an effort to develop adaptation strategies to deal with climate change.

6.2.4 Wetlands and Water Quality Protection

Due to their importance to the health of the ecosystem and the human environment, a large number of federal, state, and local laws regulate land uses and actions that have the potential to impact wetlands and water quality. EO 12088, *Federal Compliance with Pollution Control Standards*, EO 11990, *Protection of Wetlands*, and the CWA require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In accordance with these requirements, JEB Fort Story must obtain all appropriate federal, state, interstate, and local certifications and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, and stormwater management programs for any action that may impact water quality. USACE permits are required under Section 10 of the Rivers and Harbors Act of 1899 prior to commencing any work or building any structures in a navigable water of the U.S.

Under Section 404 of the CWA, discharge of dredged and fill material into waters of the U.S., including wetlands, is prohibited unless a permit is issued by the USACE, Norfolk District. State and local agencies may also have jurisdiction regarding impacts to wetlands. Such agencies include VMRC, VDEQ, Virginia Beach Wetland Board, and VIMS. Military construction, training, and other activities that could affect wetlands may require permits from these agencies. Permits are requested by submitting a Joint Permit Application (initiated by the proponent) through the Environmental Division to the VMRC. This application process will result in either an Individual or Nationwide/Regional permit issued by the USACE, and separate permits by the state and local agencies as appropriate or denial of the permit(s). If permits are issued that encompass loss of wetlands, the Installation works toward the goal of “no net loss” of wetlands. These may require creation of in-kind wetlands at other locations, including through offsite mitigation banking. Such projects that will or could impact wetlands require an environmental impact assessment in accordance with NEPA.

NWPs may be used to streamline the permitting process for activities that would have minimal adverse effects on aquatic environments. Activities such as the maintenance of existing structures, residential construction, reshaping existing drainage ditches, and construction of recreational facilities that do not substantially alter the existing landscape are permitted under NWPs. The maximum acreage limits for most NWPs is 0.5 ac (0.2 ha), with notification to the USACE District Engineer required for activities that result in the loss of greater than 0.1 ac (less than 0.1 ha) of waters of the U.S. (82 FR 1860-2008). If project impacts are expected to exceed these criteria or certain other criteria, an Individual permit must be sought.

Military construction and other projects with the potential to disturb wetlands are reviewed individually with regard to wetland impacts, and individual permits are sought as needed. Although permits may be obtained that allow for the filling of wetlands, in accordance with EO 11990, *Protection of Wetlands*, federal agencies may do so only after finding no practicable alternative. Navy policy is to avoid adverse impacts to existing aquatic resources, and offset adverse impacts that are unavoidable. Additionally, the Navy will strive to achieve a goal of no net loss of values and functions of existing wetlands.

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

- Filling or dumping
- Permanent flooding or impounding
- New activities that cause significant alteration or degradation of existing wetland acreages or functions

Information on individual and state permit requirements and application procedures (including joint permit application) is available on the VDEQ website:

(<http://www.deq.state.va.us/Programs/Water/WetlandsStreams/PermitsFeesRegulations.aspx>).

Water Quality Monitoring

Early detection of potential water quality problems in JEB Fort Story lakes requires periodic water quality monitoring. The data also provide a foundation on which to make future management decisions. It is important from a natural resources perspective for environmental personnel to be involved in water quality monitoring.

Pollutant Input Control

Pollutants can adversely affect the health of waterbodies by stressing fish and aquatic organisms that live in the water column and bottom sediments, and lead to bioaccumulation of pollutants within the food chain. The establishment or enhancement of wetland vegetation in these areas can assist in reducing pollutant input to waterbodies. Excess nutrients in waterbodies may cause algal blooms, increase nuisance plant growth and odors, disrupt species diversity, reduce dissolved oxygen levels, and cause health impacts. The most effective method of reducing pollutant levels in waterbodies is to limit the use of pollutants in the surrounding watershed, including herbicides, pesticides, and fertilizers, particularly in areas adjacent to waterbodies.

Wetlands and Vernal Pools

Wetlands and vernal pools are of critical importance to aquatic ecosystems due to their function of maintaining water quality and providing flood protection. Vernal pools may be regulated by USACE if connected to waters of the U.S., but vernal pools are not regulated if determined to be isolated wetlands. Vernal pools are protected by 9 VAC 25-210-10. Vernal pools lack many of the wetland indicators and therefore identification is often difficult, thus delineation of these seasonal wetlands is needed for proper classification. Wetlands and vernal pools provide essential breeding, spawning, nesting, and wintering habitats for many fish and wildlife species. Vernal pools are ephemeral habitats in shallow depressions of variable size that retain precipitation from winter through spring and tend to dry up by summer. These habitats generally do not support fish populations. Several amphibian species intolerant of fish predation on eggs and larvae are dependent on vernal pools for reproduction. JEB Fort Story is committed to protection of these important habitats. The Installation follows policies set forth in EO 11990 concerning identification and protection of wetlands.

The USACE Norfolk District completed a wetlands delineation on JEB Fort Story in 2010 and 2016. The current practice of maintaining a 100-foot (30-m) upland buffer around wetlands and vernal pools will be continued to protect these sensitive resources.

6.2.5 Floodplains Management

The USACE also regulates discharges of dredged or fill materials within 100-year floodplains. Few NWP's are available for this purpose and almost all of these require notification of the USACE District Engineer. Floodplains receive additional protection through EO 11988, *Floodplain Management*, which instructs federal agencies to reduce the risk of flood loss by avoiding building in floodplains, and to restore and preserve the natural and beneficial values served by floodplains. Appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken in floodplains.

6.3 Training Area Management

All training operations are evaluated through an environmental review process intended to bring up natural resource management concerns, and natural resources personnel are coordinating with training and range managers to develop a training area management plan. This INRMP section will be updated with the new training area management strategy once one is developed.

6.4 Urban Forestry

Urban forestry at JEB Fort Story comprises management of individual trees and forested areas that are in or near training areas and do not contain understory vegetation. Such areas comprise trees along roads, landscape trees, individual trees or stands of trees within developed locations, and are not considered commercial forests. The urban forest provides several benefits to the JEB Fort Story community. Landscaped and natural areas enhance the quality of life, protect property value, aesthetics, and provide necessary ecological and infrastructure services. The urban forest provides habitat for wildlife and recreational opportunities for Navy personnel and their families.

Navy policies on urban forests, as stated in NAVFAC P-73, Real Estate Operations and Natural Resources Management Procedural Manual, Volume II (Department of the Navy 1987) and NAVFAC P-904, Planting Design (Department of the Army and the Navy 1976) require consideration of both forest and landscape trees in all planning decisions. Currently, *COMNAVREGMIDLANT Tree Preservation and Replacement* is used to provide guidance for management and mitigation of trees at JEBLCFS.

6.4.1 Beneficial Landscaping

The 1994 Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837) provides the primary guidance on landscaping requirements on federal properties. EO 13148, *Greening the Government through Leadership in Environmental Management*, requires federal agencies to incorporate beneficial landscaping into landscaping programs, policies, and practices. The term beneficial landscaping describes practices that integrate native vegetation and wildlife habitat into the landscape and minimize the adverse effects that landscaping has on the natural environment. Specific directives of the memorandum are that, to the extent practicable, federal landscaping projects should:

- Use regionally native plants including plants that will attract pollinators (**Appendix I**).
- Use construction practices that minimize adverse effects on the natural habitat.

- Reduce fertilizer and pesticide use.
- Use water-efficient practices.
- Create outdoor demonstrations to promote awareness of the environmental and economic benefits of beneficial landscaping.

The basis for this guidance is to ensure that plants suited for local site conditions are selected, and the introduction or use of potentially invasive species is avoided. Using native plants ensures compliance with EO 13751, *Safeguarding the Nation from Invasive Species*. Furthermore, a plant properly selected for site conditions will require less intensive management, potentially reducing pesticide, fertilizer, and water usage. Other factors to consider when selecting plant material include rooting space, space for crown development, soil properties, tolerance for urban conditions, drip line, soil compaction, aesthetics, availability, quality, and expected maintenance. For more information about tree care, visit the International Society of Arboriculture website (<http://www.isa-arbor.com>).

The preferential use of regionally native plant species over nonnative species is particularly important as they are generally better suited for local site conditions and reduce the need for intensive maintenance and use of fertilizers and pesticides. Native plant species better serve as sources of food and cover for native wildlife. The overuse of nonnative species, such as Bradford pear and crepe myrtle, is not consistent with beneficial landscaping practices and should be avoided. These species offer few environmental benefits and, in the long run, increase maintenance costs because of pruning and care requirements. A list of native landscaping species suitable for the Coastal Plain region of Virginia is in **Appendix I**.

6.4.2 Landscape Design and Installation

General design, security issues, and standards are considered in the development of landscapes on JEB Fort Story. Landscape improvements and modifications are designed to coordinate with the existing landscape patterns for consistency and unity. Providing for passive and active surveillance of perimeter and landscape areas is a primary consideration in plant selection and layout. Landscapes are installed to include opportunities for low impact development. These management strategies incorporate landscape design practices to reduce the volume of stormwater runoff and decentralize flows. Landscape design and installation are conducted in accordance with the ANSI for Nursery Stock (ANSI Z60.1) and Tree Care Operations (ANSI Z133.1).

6.4.3 Inventory and Maintenance

Inventory and maintenance activities are conducted to determine program requirements and to minimize landscape maintenance whenever possible. General observations on species diversity (number of species present), regeneration (relative presence of young trees), age distribution (regeneration, immature, mature), and tree condition (excellent, good, fair, poor, dead, and hazard) are recorded during landscape inventories.

Newly planted areas must have a watering and maintenance plan in place before installation of the new landscape. Landscaping contracts/work performed by contractors should include a maintenance plan as part of the contract cost. Failure to include a maintenance plan usually leads to death of the landscape vegetation. This is wasteful and, in some instances, requires the given area to be landscaped again. Drip irrigation should be included for all areas to be landscaped to cut labor cost, conserve water, and ensure survival of plantings. Additionally, the Environmental

Division is the sole approval authority for landscape designs, ensuring that only drought-tolerant plants are used, that no monoculture sites are created as these would increase the risk of disease, and that only native plants be used (**Appendix I**). Guidance for proper selection of landscaping and trees, including spacing from streets, buildings, and walkways, is maintained in the 2013 Installation Appearance Plan for JEBCFS.

Management activities on JEB Fort Story are conducted in accordance with the DoD Urban Forestry Manual (DoD 1996). Prescribed burning is not a management tool for urban forestry and is not allowed at JEB Fort Story because of the small size of the Installation and proximity to important public areas such as First Landing State Park and the resort area of Virginia Beach, as well as sensitive natural habitats.

Management of hazard trees is included in urban forestry. Hazard trees and limbs are those trees/limbs deemed by the Environmental Division to pose a risk to human safety or property. The Environmental Division uses criteria to determine the degree of risk and assigns this to given hazard trees as a means of prioritizing removal (or pruning). Removal of hazard trees by contractors with certified arborists on staff is preferred, but can be costly. Funding for hazard tree removal is requested as part of the Annual Work Plan operated by PWD.

More information on native plants for conservation, restoration, and landscaping is available from the VDCR-DNH at http://www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

6.5 Wildlife and Marine Resources Management

An important function of the natural resources management program is to maintain and enhance habitats that support wildlife species, including mammals, birds, herpetofauna, fish, and invertebrates. The basic objectives of fish and wildlife management at JEB Fort Story are to:

- Conserve and promote conservation of game and nongame fish and wildlife and their habitats.
- Balance wildlife population levels with habitat carrying capacity.
- Provide recreational opportunities for Installation personnel, their dependents, retired military, and community members, as permitted by mission and safety constraints.

Due to the high level of development at JEB Fort Story and in the region, conservation and enhancement of remaining natural habitats is important to protecting Installation wildlife resources.

The Virginia State Wildlife Action Plan is available for viewing and downloading at: <http://bewildvirginia.org/wildlifeplan/>.

Conservation efforts focus on maintaining a diversity of forested habitats that provide year-round food and cover (such as coniferous stands) as well as seasonal food and cover (such as deciduous stands) for wildlife. Providing supplemental habitat in urban areas is another management action that enhances wildlife habitat at JEB Fort Story. Providing nest boxes is particularly effective in improving habitat for the Installation's avian community.

6.5.1 Wildlife

Wildlife management on JEB Fort Story is focused on providing a diversity of habitats for nongame wildlife. An important function of the natural resources program is to maintain populations and enhance habitats to support native fish and wildlife species. Restoration of degraded areas to natural conditions benefits wildlife. There are numerous locations on the Installation where the ground cover has been degraded by training activities, foot traffic, or natural erosion. Restoring vegetation on these sites will not only reduce erosion, but will enhance wildlife habitat value in the immediate area, improve biodiversity on the Installation, and rehabilitate these areas to conditions suitable for training.

Maintaining edge habitat is one means of enhancing biological diversity on JEB Fort Story. Edge habitat occurs wherever two different plant communities or successional stages meet. Wildlife species richness in edges is typically higher than in surrounding areas as a result of the increased plant and habitat diversity. Many bird species are attracted to edge habitats because of the greater structural diversity found there. Another method of enhancing biodiversity on JEB Fort Story and providing grassland habitat for wildlife species is to maintain some areas in early successional stages using native warm and cool season grasses.

Dead and dying trees (called snags) and live trees with natural cavities provide important habitat for many wildlife species. Snags and cavity trees provide foraging, nesting, roosting, and perching sites. The abundance of woodpeckers, raptors, passerines, small mammals, and bats in an area is often directly related to the availability of snags and tree cavities. All snags on JEB Fort Story, consistent with personnel safety, forest health, and the protection of facilities, will be retained for wildlife value.

The small size of JEB Fort Story, the existence of several habitat types, and proximity to the natural areas of First Landing State Park sometimes brings wildlife into contact with people. Small carnivores such as red fox, gray fox, and raccoon can lose their fear of humans if fed or if pet food is left outside. Such practices are unauthorized due to the increased risk of zoonotic disease transmission to people, and adverse effects on the foraging ability and health of wildlife.

Nuisance Wildlife

The DoD's Armed Forces Pest Management Board defines nuisance wildlife as wildlife that, because of their feeding or nesting habits, interferes with the military mission or well-being of domestic animals, other wildlife, or humans (Armed Forces Pest Management Board 2012). The Armed Forces Pest Management Technical Board Information Memorandum Number 37 assigns responsibility for human health and safety to the Commander, JEBLCFS. An Integrated Pest Management Plan (IPMP) for JEBLCFS was recently completed in 2016 (NAVFAC 2016). Authority and responsibility for nuisance wildlife resides with the NRM who will coordinate with the regional Game Warden, as necessary.

Wildlife damage issues are best resolved by applying an integrated approach (application of multiple methods) for effective resolution to human-wildlife conflicts. The JEBLCFS Environmental Division should be contacted for technical assistance. JEBLCFS Environmental Division normally utilizes internal resources to resolve human-wildlife conflicts, or may initiate an interagency agreement with USDA WS. Large trapping efforts for feral cats (*Felis catus*) are handled by the NAVFAC MIDLANT Environmental Services Pest Controller, which applies follow-up maintenance trapping if needed.

The Installation NRM or appointed delegate is responsible for maintaining any permits necessary for controlling species protected by federal or state law. For management of state wildlife species, 4 VAC 15-30-50 (Possession, Transportation, and Release of Wildlife by Authorized Persons) the VDGIF Administrative Code defines authority of wildlife management duties to natural resources staff in performance of official duties.

The VDGIF defines nuisance wildlife species in 4 VAC 15-20-160, and includes several wildlife species that could occur at JEB Fort Story, including coyotes (*Canis latrans*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English (house) sparrow (*Passer domesticus*), and pigeons. Capture and relocation of mammalian wildlife species is prohibited by Code of Virginia §23.1-521. Authority of local animal shelters to “receive, temporarily confine, and humanely euthanize wildlife” is defined in 4 VAC 15-30-50.

The NRM and all other personnel involved in lethal control activities must be properly trained and certified for all weapons employed in accordance with applicable regulations. It should be noted that the use of pesticides (poisoned baits) to control vertebrate pests, other than mice and rats, is strictly prohibited.

4 VAC 15-30-50 permits department employees while in the “performance of their official duties” to capture, temporarily hold or possess, transport, release, and when necessary humanely euthanize wildlife, given the action is done in accordance with board policy. Recognizing the threat to native wildlife, an aggressive feral cat trapping, as well as an education and surveillance program, was established on base. Over the past two years, over 80 cats were trapped by NAVFAC MIDLANT Environmental Services: Pest Control Shop and taken to local animal shelters. This program will stay in place for the foreseeable future to ensure eradication is maintained. Bird nesting in buildings and concentrations of resident Canada geese can damage property at JEB Fort Story. Most bird species, to include bird nests and their eggs, are protected under the MBTA. Therefore, coordination and possible permitting through the USFWS and VDGIF is required if control is applied to manage migratory birds. JEB Fort Story environmental should be consulted prior to controlling any bird or nest on the Installation to ensure compliance with all applicable MBTA regulations.

Pursuant to 4 VAC 15-30-50 the following mammal and bird species are designated as nuisance species: house mouse, Norway rat, black rat (*Rattus rattus*), coyote, feral hog (*Sus scrofa*), nutria, woodchuck, European starling, house sparrow, and rock dove (*Columba livia*). Other nonnative species as defined in the Migratory Bird Treaty Reform Act of 2004 and regulated under 50 CFR 10.13 also are included as nuisance species.

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

<https://law.lis.virginia.gov/admincode/title4/agency15/chapter30/section50/>

Only one venomous snake species, the eastern cottonmouth (*Agkistrodon piscivorus*), has been documented at JEB Fort Story. The eastern cottonmouth typically occurs in the forested wetlands along the southern end of the Installation and is generally not likely to occur in built-up areas. If

an eastern cottonmouth is encountered in training areas, it should be left alone. Destruction of snake species in natural areas is unauthorized. No venomous snake bites have been documented at JEB Fort Story.

Other snake species are sometimes observed in or around occupied buildings. The eastern hognose snake is relatively frequently encountered. This species may display a unique defense behavior if encountered by people, where it may flatten its head into a triangular shape and hiss loudly. If this behavior fails to deter a potential predator, it may then play dead. Persons encountering snakes should contact the Environmental Division or NRM if concerns exist.

6.5.2 Migratory Birds

The MBTA of 1918 is the primary legislation in the U.S. established to conserve migratory birds. It implements the United States' commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. The species of birds protected by the MBTA appear in Title 50, Section 10.13, of the CFR. On 02 December 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense.

Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include the following:

- Routine operation of installation operating support functions, such as administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; MWR activities; shops; and mess halls
- Operation of industrial activities
- Construction or demolition of facilities used for the purpose described in the above two bullets.

The authorization of take incidental to military readiness activities was published in the Federal Register on 28 February 2007 (50 CFR Part 21.15). The regulation provides that the Armed Forces must confer and cooperate with the USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of a military readiness activity if it determines that such activity may have a significant adverse effect on a population of a migratory bird species.

The requirement to confer with the USFWS is triggered by a determination that the military readiness activity in question will have a significant adverse effect on a population of migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. Assessment of impacts should take into account yearly variations and migratory movements of the affected species.

Non-military readiness activities that are likely to have a measurable negative effect on migratory bird populations are addressed separately in a MOU with USFWS developed in accordance with

EO 13186, signed 10 January 2001, “Responsibilities of Federal Agencies to Protect Migratory Birds.” The MOU between the DoD and the USFWS was signed on 21 July 2006 and defines each party’s requirements to help promote the conservation of migratory bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations, where practicable (**Appendix J**). DoD responsibilities include, but are not limited to, the following:

- Obtaining permits for import and export, banding, scientific collection, taxidermy, special purposes, falconry, raptor propagation, and depredation activities
- Encouraging incorporation of comprehensive migratory bird management objectives in the planning of DoD planning documents
- Incorporating conservation measures addressed in regional or state bird conservation plans in the INRMP development process
- Inventorying and monitoring bird populations on DoD lands to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts
- Avoiding or minimizing impacts on migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds, where practicable
- Minimizing vegetation removal and manipulation during the breeding season, where practicable
- Developing, striving to implement, and periodically evaluating conservation measures for management actions to avoid or minimize incidental take of migratory birds, and if necessary, conferring with the USFWS on revisions to these conservation measures, where practicable

During annual INRMP reviews, the Navy must report any migratory bird conservation measures that have been implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds. Migratory bird management at JEB Fort Story includes provision of migratory bird data in support of programs including the USFWS’s North American Waterfowl Management Plan, USFWS’s Neotropical Migratory Bird Conservation, and Watchable Wildlife (DoD Partners in Flight n.d.) and various habitat enhancement projects.

6.5.3 Marine Resources Protection

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

In accordance with the MMPA, and NAVFAC’s Interim Environmental Policy No. 10-001, “Marine Mammal Protection Act Compliance for In-Water Construction” (February 2011), the Installation should evaluate any action that produces sound in water where marine mammals are present to determine if a “take” authorization is required in the form of an Incidental Harassment Authorization or a Letter of Authorization from the NMFS Office of Protected Resources. Accordingly, all training and other Installation activities that have the potential to impact marine resources are coordinated and permitted through the appropriate federal and state agencies. Operations personnel are responsible for preparing NEPA documentation and obtaining permits for training activities, whereas natural resources personnel are responsible for preparing NEPA documentation and facilitating and coordinating the receipt of required natural resources permits for Installation-related natural resources activities.

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

In 2016, a biological assessment was submitted to USFWS to evaluate the effects of sea turtle nest and stranding management and relocation at JEB Fort Story. Current management of sea turtle nesting and relocation is performed within the scope of the 2016 MOU between the USFWS/BBNWR and JEBCFCS. The MOU details partnership roles, communications, and response to turtle nesting (**Appendix L**).

In 2015, lighting surveys were performed to document light sources visible from the beaches of JEB Fort Story. Literature on sea turtle nesting indicates that artificial lighting on shores can affect nest site selection by female turtles, and also can affect the seaward orientation of female turtles and hatchlings emerging from nests. Most lighting observed in the survey had an indirect effect on the beaches of JEB Fort Story, and included elevated fixtures around buildings, roads, and parking lots. Many of these lights are necessary for safety and security of personnel on the Installation.

Marine Animal Stranding Protocol

Stranded sea turtles and/or marine mammals may be encountered at JEB Fort Story. If discovered, the following procedures are followed for required and consistent reporting:

- If a marine mammal (dolphin, porpoise, whale, seal, or manatee) or sea turtle is discovered on JEB, immediately contact the CDO:

Working hours: (757) 462-7385/86 (Quarterdeck)
After hours: (757) 438-3930 (CDO)

- And then the JEBLCFS Environmental Division at:
 - (757) 462-5351 or (757) 636-4313
 - (757) 462-5350
- CDO will immediately secure the area (if animal is dead, secure above high tide line) and contact:
 - a) Virginia Aquarium Stranding Response Team:
 - (757) 385-7576 (Alive animals) or (757) 385-7575 (Dead animals)
 - b) Regional Stranding Coordinator (Hotline: 1-866-755-6622 or 978-282-8478)
- Be prepared to supply location, species, condition of the animal (dead or alive) and contact the number of person who will be near a phone. If dead, please secure the animal above high tide line.
- CDO will notify CNO N45 Washington D.C. (per OPNAVINST 3100.6J) via a Navy Blue in OPREP-3 Reporting System **ONLY** when:
 - A manatee or whale impact occurs
 - **MULTIPLE** marine mammals (such as dolphins, porpoises, or seals) are impacted
- Notification by Navy Blue is **NOT** required for injured or dead turtles since these species are not marine mammals.
- Stranded marine mammals and turtles should be monitored from a minimum of 100 yards (274 m) away. Crowding the animal is unsafe for the observer as well as the animal. Do not touch the animal, alive or dead, as wild animals can carry many diseases, parasites, and bacteria, some of which can be transmitted to humans. Do not attempt to push the animal back into the water and if it goes back into the water on its own, do not attempt to follow after or swim with it.
- Carefully observe the stranded animal and note the position of the alive or dead animal. Wait for responders from Virginia Aquarium Stranding Response Team to arrive and direct them to the animal. Relay all observations to the responders so that they can provide the best possible care for the stranded mammal or sea turtle.

To report a stranded marine animal to the Virginia Aquarium's Stranding Response Team, call (757) 385-7575 (dead animals) or (757) 385-7576 (alive animals).

These lines are open 24 hours a day.

More information is available on the Virginia Aquarium website:

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

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

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

The Virginia Aquarium, formerly the Virginia Marine Science Museum, has studied the large populations of bottlenose dolphins which inhabit the waters of JEB Fort Story from spring to autumn (**Appendix L**). The Virginia Aquarium is an excellent resource for marine mammal questions concerning habitat and management. The NRM will coordinate with the Virginia Aquarium regarding management of marine mammals at JEB Fort Story as necessary.

6.5.4 Fisheries Management

In accordance with the JEBLCFS Fishing Instruction 11015.1D (17 February 2017) and EO 12962, *Recreational Fisheries*, the goal of fisheries management at JEB Fort Story is to maintain balanced and diverse aquatic ecosystems, which in turn provide sustainable recreational fishing opportunities. Freshwater fishing opportunities are limited to the lakes on JEB Fort Story, as authorized by Installation authorities. Saltwater fishing from the Installation beaches in the Chesapeake Bay and Atlantic Ocean is authorized for personnel who have personal identification and a valid Virginia saltwater fishing license. Fishing at East Gate Lake has been discontinued.

Creel limits on JEB Fort Story follow the JEBLCFS Fishing Instruction 11015.1D (17 February 2017). These regulations limit the maximum daily allowable number and size for freshwater fishing with geographic exceptions across the state. Surface waters at JEB Fort Story are managed through coordination with the Environmental Division. Release of fish species by unauthorized persons is prohibited to prevent disease transmissions through the ecosystem and adverse impacts to natural ecosystem functions.

6.6 Rare, Threatened, and Endangered Species Management

6.6.1 Federal and State Regulations

ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for listed species. The ESA requires that every federal agency ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of federally designated critical habitat. The ESA also requires federal agencies to consult with the USFWS or the NMFS, as appropriate, on any action that is likely to jeopardize the continued existence of species proposed for federal listing under the ESA, or result in the destruction or adverse modification of habitat that supports federally listed species.

Federal candidate species for listing, or species listed under state ESAs, are not protected under the federal ESA. Because federal candidate species for listing may be listed in the future, installations are required to avoid taking actions that result in the need to list these species, and are encouraged to participate in conservation agreements with the USFWS. At a minimum, installations are required to document the distribution of federal candidate species on the installation and monitor their status. Installations are encouraged to cooperate with state authorities in efforts to conserve state-listed species.

Rare plants and animals in Virginia have been designated as such by the VDCR-DNH based on the number of individuals of a particular species that are estimated to occur within the state. Although the state rarity ranking itself does not mandate protection, JEB Fort Story and the Navy view management of rare species and species of special concern as a matter of good stewardship. The VDGIF has regulatory and enforcement jurisdiction over all species listed under the state ESA, excluding listed insects. In addition, VDGIF manages an online database, the Virginia Fish and Wildlife Information Service that contains current and comprehensive information on all of Virginia's wildlife resources. The VDCR-DNH recommends coordination with the Virginia Fish and Wildlife Information Service staff during initial project review to identify potential adverse impacts to critical wildlife resources.

The Virginia Fish and Wildlife Information Service online database is available at:
<http://vafwis.org/fwis>.

6.6.2 Rare, Threatened, and Endangered Species

State rare, threatened, and endangered species that have been observed at JEB Fort Story are identified in **Table 5-4**. Observations of rare, threatened, and endangered species should be reported to the Installation NRM, and the observer should gather as much information as possible. Protected species observed should not be approached, as it is a violation of the ESA to harass or otherwise disturb a listed species. If possible, without approaching the protected species, observers should record location information (with GPS data if possible), time, photographs, weather conditions, and bird behavior information if possible. In addition to providing this information to the NRM, provide this information immediately to the JEBCFS Environmental Division NRM at (757) 462-5351.

In 2013, surveys for piping plover, roseate tern, and rufa red knot, along with other species that could occur at JEB Fort Story were documented in the *Field Summary Report Species Survey at JEB Fort Story* (Gulf South Research Corporation 2013). As part of this survey effort, permanent sample plots were established which will allow the NRM to gather data on rare, threatened, and endangered birds in subsequent years. Results of the rare, threatened, and endangered bird species survey were included in this INRMP update (see additional details on these species in **Section 5.11**).

Additionally, five federally listed species of sea turtle, including loggerhead, green, Kemp's ridley, hawksbill, and leatherback sea turtle are known to occur on or near JEB Fort Story. Loggerhead turtles have occasionally been documented on the beaches of JEB Fort Story. (VAQF 2014 and NAVFAC MIDLANT 2016). The federally protected bald eagle and the federally endangered Atlantic sturgeon are also known to occur near JEB Fort Story.

Protective measures for piping plover, roseate tern, and rufa red knot that can be implemented in the event any of these species are identified as nesting at JEB Fort Story include:

- Avoiding human activities within fenced or posted wildlife protection areas
- Restricting approaching or lingering near piping plovers, roseate tern, and rufa red knot or their nests if detected
- Requiring all dogs be kept on a leash and keeping cats indoors

- Requiring beachgoers to dispose all trash and food scraps in appropriate receptacles, as trash/food scraps left on the beach can attract predators, which may prey upon eggs or chicks
- Controlling predators, including but not limited to gulls, mink, and raccoons
- Managing native vegetation and controlling exotic vegetation
- Establishing and maintaining an emergency response plan for oil and chemical spills
- Establishing permanent sample plat and annually monitor avian species populations
- Surveying and monitoring potential habitat for federally threatened and endangered species or other species at risk
- Continuing annual survey at the point locations set in the 2013 survey as well as long the meandering survey transects (Gulf South Research Corporation 2013)

Piping Plover

Piping plover is a federal and state threatened species and is ranked as a Tier III Species of Greatest Conservation Concern in the SWAP. Piping plover was observed at the Installation in March and April 2013 (Gulf South Research Corporation 2013). Essential habitat for piping plover includes beaches near dunes and elevated areas, particularly barrier islands. Major threats to the Atlantic Coast piping plover population include human disturbance (especially during nesting), and mammalian predators such as red foxes, raccoons, and feral cats. Piping plover habitat is continually being degraded throughout most of its range from dune disturbance and residential development. Critical conservation strategies for protection of this species include management and protection of barrier islands, which in addition to providing essential habitat, reduce the potential for mammalian predation. SWAP recommendations for protection of piping plover include performing annual population surveys and conducting research on habitat use, population dynamics, and impacts from avian predation and disturbances in their wintering grounds (VDGIF 2005). Several management measures are in place for protection of this species because of the presence of suitable nesting habitat and the two piping plovers' observation at the Installation in the 2013 survey.

Roseate Tern

Roseate tern is a federally endangered species for populations occurring in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, and Virginia. Other populations of roseate tern are federally threatened (52 FR 42064-42068). The roseate tern is a state-endangered species in Virginia and is ranked as a Tier IV Species of Greatest Conservation Concern in the SWAP. Essential habitat for roseate terns includes barrier islands where nesting takes place in April and May. Major threats to the northeastern U.S. roseate tern population include habitat loss due to erosion and human activity and predatory mammals and seabirds that either directly harm roseate tern eggs and young or compete with the species for nesting sites and food in the northeastern U.S. (USFWS 2011b).

Although roseate terns have not been observed at JEB Fort Story, several management measures are in place for protection of this species because of the presence of suitable nesting habitat.

Rufa Red Knot

The rufa subspecies of the red knot is a federally threatened, state imperiled (S2) species, and is ranked as a Tier I Species of Greatest Conservation Concern in the Virginia SWAP. Essential habitat for rufa red knot includes muddy or sandy coastal environments with large areas of intertidal sediments, specifically the mouths of bays and estuaries, unimproved tidal inlets, and tidal flats. The primary threat to the rufa red knot population is the reduced availability of horseshoe crab eggs due to the elevated harvest of adult crabs for bait in the fishing industry. Horseshoe crab eggs along the mid-Atlantic coast provide essential nutrition to migrating rufa red knot (USFWS 2007).

Rufa red knot habitat is continually being degraded throughout most of its range from dune stabilization and residential development. Critical conservation strategies for protection of this species include beach closures to prevent disturbance, enclosures to reduce competition from gulls, and efforts to conserve horseshoe crabs (USFWS 2007).

Although rufa red knot have not been observed at JEB Fort Story, several management measures are in place for protection of this species, due to the presence of suitable foraging and nesting habitat.

Projected climate change impacts to natural resources, as described in **Section 5.5.1**, could result in significant impacts to rare, threatened, and endangered species and their habitat. The effects of climate change on wildlife are highly variable, including geographic range shifts, changes in relative species abundance, phenology, and other ecological aspects of their biotic communities. There is already evidence of disruptions in community dynamics, such as predator-prey and plant-insect interactions, alterations in biogeochemical cycles, and increased disease, pest, and nonnative species invasions. The rapid pace of recent environmental change has increased the threat of extinction, as species are not able to adapt to changing environments quickly enough. Specific climate change stressors that can impact threatened and endangered species include increases in sea level; increases in surface and ocean temperatures; increases in carbon dioxide concentrations; changes in precipitation; increases in diseases, pests, and nonnative species; and increases in the frequency and severity of storm events (Society for Ecological Restoration International 2009).

Bald Eagle

The bald eagle was removed from the Virginia ESA in 2013 (VDGIF 2013b); however, this species is provided protection under the BGEPA and MBTA which prohibit take of the species without a permit. Bald eagles have been observed at JEB Fort Story though no known nesting sites have been documented. Based on results of consultation with the USFWS on the 2010 INRMP, the USFWS requested that if future nesting of bald eagles is documented at the Installation, that these be identified in updates to the INRMP.

Kemp's Ridley Sea Turtle

The Kemp's ridley turtle is a federally endangered species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. The Kemp's ridley utilizes the Chesapeake Bay area as a seasonal foraging ground (NAVFAC MIDLANT 2016). A nest has not been reported on the Installation, but two nests have been found in Virginia – one in June 2012 at NASO-DNA and one in July 2014 on False Cape State Park (NAVFAC MIDLANT 2016). Nesting occurs from April to July. The primary nesting habitat is off the Tamaulipas and Veracruz coasts of Mexico. On average, females nest 2.5 times in one season. Outside of the nesting season the typical habitat is

from the Gulf of Mexico to as far north as Nova Scotia and Newfoundland. The Kemp's ridley is the most endangered of the sea turtles primarily as a result of human activities and disturbances and incidental capture from commercial fishing (USFWS 2015b).

Loggerhead Sea Turtle

The Loggerhead is a federally threatened species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. The Chesapeake Bay is considered one of the most important development habitats for juvenile loggerhead sea turtles (NAVFAC MIDLANT 2016). Nesting primarily occurs along open beaches or along narrow bays. Nesting season occurs from April through September with the highest reproduction during June and July. Loggerheads have the ability to nest up to seven times during one nesting season. The loggerhead sea turtle primarily occurs in the Atlantic, Pacific and Indian Oceans in the temperate and tropical region. Essential habitat includes inshore areas such as bays, lagoons, salt marshes, creeks, ship channels and the mouth of large rivers as well as areas hundreds of miles out to sea. Major threats to loggerheads include the degradation or loss of nesting habitat from coastal development and beach armoring, as well as the incidental take of turtles for longline fishing vessels (USFWS 2015c).

JEB Fort Story signed a MOU with USFWS in 2016 that outlined monitoring and management activities for sea turtle nests and strandings on the Installation. USFWS representatives and volunteer staff will conduct daily patrols from mid-May until the end of August. Identified nests will be handled with in situ nest management strategies outlined in the Virginia Sea Turtle Nesting Handbook. All sea turtle and marine mammal strandings will be reported to the Virginia Aquarium Stranding Response Team.

Leatherback Sea Turtle

The leatherback sea turtle is listed as an endangered species and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. Data dating back to 1991 indicate that the leatherback sea turtle is known to strand in Virginia (NAVFAC MIDLANT 2016). Critical habitat for this species is in the U.S. Virgin Islands, California, and the Oregon/Washington area but no critical habitat has been designated on JEB Fort Story. The leatherback sea turtle is known worldwide to occur in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The species prefers nesting on beaches with proximity to deep water and rough seas. U.S. nesting occurs from March to July an average of five to seven times within a nesting season. Nesting occurs along the Atlantic coast of Florida, Sandy Point in the U.S. Virgin Islands, Puerto Rico's islands of Culebra and Vieques, and the Fajardo and Manuabo areas on the main island of Puerto Rico. Factors contributing to the status of the leatherback include incidental takes in commercial fisheries, coastal development resulting in the loss and degradation of habitat, beachfront lighting, nest predation, degradation of foraging habitat, watercraft strikes and marine pollution and debris (USFWS 2015d).

Green Sea Turtle

The green sea turtle is listed as a threatened species near the Installation, but the breeding colony populations in Florida and on the Pacific coast of Mexico are listed as endangered (USFWS 2015f). This species is also ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. In 2005 one nest was found in southeastern Virginia at Sandbridge Beach and was relocated to BBNWR (NAVFAC MIDLANT 2016). A false crawl was identified at NASO DNA and a nest was identified at False Cape State Park in the summer of 2017 (Bassi 2017). Nesting season within

the U.S. is primarily between June and September, occurring nocturnally at two-, three-, or four-year intervals. The primary habitat outside of the migration season is in shallow waters within reefs, bays and inlets. This species is also known to occur in lagoons that have an abundance of marine grass and algae. The critical habitat for this species is in the Caribbean Sea and no designated critical habitat occurs on JEB Fort Story. During nesting season, this species prefers open beaches with a sloping platform and minimal disturbance. The largest threat to the green sea turtle is the commercial harvest of eggs and meat, and a disease called fibropapillomatosis that causes the development of tumors on the skin and internal organs resulting in mortality. Other factors resulting in mortality of this species include degradation or loss of nesting habitat from coastal development and beach armoring, beachfront lighting, degradation of foraging habitat, watercraft strikes, and incidental takes from commercial fishing and channel dredging (USFWS 2017b).

Hawksbill Sea Turtle

The hawksbill sea turtle is listed as an endangered species. This species is considered extremely rare in Virginia waters with three recordings of this species in the Chesapeake Bay and is also known to strand along the Virginia coast (NAVFAC MIDLANT 2016). The critical habitat for this species is in the Caribbean Sea and no designated critical habitat occurs on JEB Fort Story. The hawksbill often occurs in rocky areas, coral reefs, shallow coastal areas, lagoons or oceanic islands and narrow creeks and passes. Nests mainly occur on any undisturbed deep-sand beach in the tropics, and females can climb over reefs and rocks to nest in beach vegetation. Nesting occurs between April and November but varies with locality occurring on average 4.5 times per season. The main threats to the species include human exploitation for tortoiseshell along with the loss or degradation of nesting habitat from coastal development and beach armoring, beachfront lighting, nest predations, degradation of foraging communities, marine pollution, watercraft strikes and incidental take from commercial fishing operations (USFWS 2015e).

Atlantic Sturgeon

The Atlantic sturgeon is anadromous, meaning it spawns in freshwater but adults spend most of their time in marine and estuarine waters. Males migrate into freshwater one month before females, in March and April. Females lay between one million and 2.5 million eggs in flowing water up to 60 feet deep (USFWS 2017a). Hatchlings remain in their freshwater nursery habitats for approximately one year. As juveniles age, their range extends farther downriver. The age at which juveniles transition to coastal wandering habitat varies (NAVFAC 2014). Once the fish transitions, it will remain a coastal migrant using various coastal estuaries and rivers seasonally until maturity, which is reached between ages 11 and 18. The Atlantic sturgeon has been harvested for centuries, primarily for their eggs which are prepared as caviar. In 1998, the Atlantic Marine Fisheries Commission prohibited Atlantic sturgeon fishing along the Atlantic coast for four decades in an effort to recover the species populations. The Chesapeake Bay DPS was listed as endangered in 77 Federal Register No. 24; Monday; February 6, 2012; pp 5880-5912; Effective date April 6, 2012. Critical habitat was designated in 82 Federal Register No. 158; Thursday August 17, 2017; pp 39160-39274; Effective date September 18, 2017 (USFWS 2017a). No Atlantic sturgeon critical habitat is designated on or near JEB Fort Story.

Northern Long-eared Bat

The northern long-eared bat is federally listed as a threatened species. During the 2015 bat baseline survey, this species was documented on the Installation through an acoustic survey (Tetra Tech

2016b). The typical winter habitat is hibernating in caves and mines. The preferred caves and mines remain at a constant temperature, high humidity, and no air current. During the summer, the preferred habitat is in colonies underneath bark, or cavities and crevices in live and dead trees. Typically, from late May or early June to late July most females will birth and rear a pup. Adults and post-lactating juveniles feed at dusk, typically in the understory of forested areas, with moths, flies, leafhoppers, caddisflies, and beetles making up the typical prey. The northern long-eared bat's range is much of eastern and north central U.S. and all of the Canadian province from the Atlantic Ocean west to the southern Yukon Territory as well as eastern British Columbia. The main threat to this species is the white-nose syndrome (USFWS 2015a).

Rafinesque's Eastern Big-eared Bat

The Rafinesque's eastern big-eared bat is listed as an endangered species in Virginia and is ranked as a Tier I Species of Greatest Conservation Concern in the SWAP. This species is known to occur in the southeast corner of Virginia. In July 2015 during a mist-net survey, 12 percent of the bats captured on the installation included the Rafinesque's big-eared bat. The history of this species is unknown. Capture data indicate that the Rafinesque's big-eared bat frequently uses closed canopy roads and trails for travel. Both a presumptive roosting colony and a presumptive maternity colony have been identified in concrete bunkers on the Installation. Due to the weather patterns at the Installation, the use of human-made hibernacula is presumed to be more common (Tetra Tech 2016b).

Southeastern Bat

The southeastern bat is listed as an endangered species in the State of Virginia and is ranked as a Tier IV Species of Greatest Conservation Concern in the SWAP. During the 2015 bat baseline survey, this species was documented on the Installation through acoustic surveys and mist-netting surveys (Tetra Tech 2016b). This species was found in low activity rates on the Installation, and has been captured at multiple Navy installations (Tetra Tech 2016b). The southeastern bat occurs in similar habitat to the northern long-eared bat and has been known to carry the white nose syndrome fungus, but the southeastern bat is presumed to have some resistance to the disease. Outside of caves this species roosts in crevices of bridge timbers, culverts and drain pipes, boat houses, hollow trees, and attics of houses. This species is associated with water and forages at nearby ponds and streams. In late March or April, mothers typically birth twin pups. The most common predators are rat snakes, corn snakes, opossums, and certain owl species (The Mammals of Texas, n.d.) (Figure 6-1).

6.7 Invasive Species and Pest Management

The primary objective of invasive species and pest management at JEB Fort Story is to uphold the military mission by protecting infrastructure, real property, and ensuring human safety for all personnel on the installation. Invasive species threaten the integrity of natural resources on the installation which compromises the mission.

Pest management is performed by the NAVFAC MIDLANT Environmental Services: Pest Control Shop pest controller in accordance with the 2016 JEBCFS IPMP (NAVFAC 2016). The IPMP addresses the relationship of pest management activities to other natural resources management activities at JEB Fort Story. The IPMP should be referenced for detailed information on aspects of pest control operations or pest problems at JEB Fort Story. The relevant pest management policy regulations are provided in DoDI 4150.7, Pest Management Program. Pest management is

integrated with many other natural resources management issues covered in this INRMP, especially wildlife management, to ensure compliance and success of recommended actions.

In accordance with the Navy's Pest Management Programs (OPNAVINST 6250.4C), the 2016 JEBLCFS IPMP employs IPM principles to avoid and minimize use of pesticides (NAVFAC 2016). The objective of IPM is to use ecologically, economically, and socially sound strategies to keep pests at tolerable levels. In IPM the full range of pest control options (cultural, mechanical, biological, and chemical) may be employed after careful consideration of the pest's biology, the damage or infestation thresholds that require action, and the impacts each control alternative will have on the environment. A variety of biological, cultural, and mechanical pest management strategies used in IPM are included in the following discussions of the major types of pest issues occurring at JEB Fort Story.

The Armed Forces Pest Management Board has useful information about DoD pest management policy and issues on their website: <http://www.afpmb.org/>

6.7.1 Invasive Plant and Wildlife Species

Many nonnative species of plants used in agriculture or erosion control, as ornamentals, or accidentally introduced have become problematic weed species. These nonnative species are considered one of the leading threats to natural ecosystems and biodiversity. Several statutes and EOs, including the Chesapeake Bay Preservation Act, EO 11987 *Exotic Organisms*, and EO 13751 *Safeguarding the Nation from Invasive Species* address the control of invasive, nonnative species on federal facilities. EO 11987 specifically restricts the introduction of harmful exotic species onto native ecosystems, whereas EO 13751 requires federal facilities, to the extent practicable and permitted by law, to:

- Prevent the introduction of invasive species
- Detect and control such species
- Accurately monitor invasive species populations
- Provide for restoration of native species and habitats that have been invaded
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control
- Promote public education on invasive species

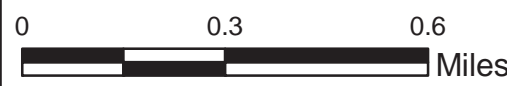
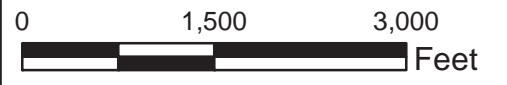
EO 13148, *Greening the Government through Leadership in Environmental Management*, also requires federal agencies to incorporate the principles and practices of beneficial landscaping as specified in the Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837) (see **Section 6.4.1**).

Invasive Plants

A number of nonnative and invasive plant species have been identified and mapped at JEB Fort Story (**Figure 6-2**). Of these, the primary invasive species of concern is kudzu. This aggressive plant species occupies approximately 45.71 ac (18.5 ha), with 2.7 ac occurring in the beaches and dune areas and 43 ac occurring in the maritime forest (Tetra Tech 2013).



- Rare Species**
- Installation Boundary
- Species Specific Observation**
- Avian Observation Details
- Special Status Species Observation**
- ✱ Blue Jack Oak
 - ✱ Darlington's Oak
 - Seacoast Marsh Elder
 - Spurge Species
 - ▲ Sticky Ground-cherry
 - ▲ Wild Olive
 - ★ Sea Turtle False Crawl
 - ★ Sea Turtle Nest



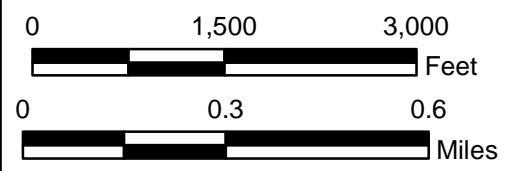
Source: ESRI, World Imagery; Navy 2016

Figure 6-1.
State Rare Species Locations of
JEB Fort Story

This page intentionally left blank.



- Legend**
- Installation Boundary
 - Invasive and Non-Native Species**
 - ▲ Autumn olive
 - ▲ Chinese privet
 - Common reed
 - English ivy
 - Japanese honeysuckle
 - Japanese sand sedge
 - Kudzu
 - Tree of heaven



Source: ESRI, World Imagery; Navy 2016

Figure 6-2
 Invasive and Nonnative Plant
 Locations of JEB Fort Story

This page intentionally left blank.

Other invasive species that are problematic at JEB Fort Story are Chinese privet, English ivy, Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass, Asiatic sand sedge (*Carex kobomugi ohwi*), tree of heaven (*Ailanthus altissima*), mimosa tree, autumn olive, sweet clover (*Genus Melilotus*), multiflora rose, Chinese lespedeza and phragmites (Tetra Tech 2013). Priorities for controlling these species are based on ecological significance, the severity of infestation, and the likelihood of successful control with available resources.

Kudzu was planted approximately 50 years ago at JEB Fort Story for erosion control. Chinese privet was found across 17 point locations and of those locations 10 were within kudzu patches. English ivy was not as widely distributed across the installation but three of the 19 point locations were located within kudzu patches as well. The English ivy is not mapped on **Figure 6-2** because it occurs as naturalized on JEB Fort Story. Japanese honeysuckle co-exists with several vines species serving as a vegetative fabric blanketing the dune habitat helping prevent erosion (Tetra Tech 2013).

One isolated patch of Japanese stiltgrass was located near the intersection of First Landing Road and Coast Artillery Road. Small clusters of Asiatic sand sedge are mapped on **Figure 6-2** in the northwest beaches and dune area at the end of the boardwalk. The tree of heaven was located in 18 point locations; six of the locations were in dune habitats with the largest cluster in the southwest corner of Hospital Circle (Tetra Tech 2013).

It is recommended that populations of the invasive, nonnative, and weedy species observed in the dune habitats be removed, and impacted areas of the dunes be restored using clean, coarse-grained material from terrestrial sources. Planting exposed dunes with native species will stabilize the steep slopes and protect remaining sections of the dune. A list of regional native landscaping species is included in **Appendix I**. After the completion of a comprehensive flora survey, including the identification of invasive species populations, an invasive species management plan will be developed, which will assist in protection and improvement of the natural resource conditions across the Installation.

VDCR-DNH published an Invasive Alien Plant Species of Virginia guide to inform land managers of potential risks associated with certain plant species known to exhibit invasive behavior. The Virginia Native Plant Society and VDCR-DNH have combined their resources in an Invasive Alien Plant Project available at: <http://www.dcr.virginia.gov/natural-heritage/invspinfo>.

Invasive Wildlife

Nutria are an invasive mammal species native to South America. Nutria are prolific, year-round breeders with no natural predators in coastal Virginia. Nutria populations in Virginia have negatively impacted economic and ecological resources of the state, which prompted a multi-year, interagency project to identify effective solutions for eradicating nutria (USFWS 2012d and USFWS 2016b). Nutria frequent habitat utilized by other native Virginia aquatic mammals, including muskrats, otters, and beaver, and have been documented in areas around JEB Fort Story. Environmental staff and the regional Game Warden routinely visit natural sites on base to observe flora and fauna conditions. While nutria have been sited at other installations in the area over the last eight years, no nutria have been reported at JEBLCFS. Patrols for nutria at the Installation will continue quarterly. Contact with the Virginia Tech Conservation Management Institute has been made to gather information on control methods and reporting of nutria locations. The NRM will conduct inspections of favorable habitat on the Installation. The regional Game Warden will conduct control operations if nutria are encountered.

The NRM coordinates with the NAVFAC MIDLANT Environmental Services: Pest Control Shop to manage feral cat populations. Feral cats are the primary pest management issue in the beaches and dunes (TetraTech 2013).

6.7.2 Pest Management

Pest management at JEB Fort Story includes the control and management of feral domestic animals, rodents in buildings, and nonnative birds not regulated by MBTA (such as the European starling and rock pigeons). NAVFAC MIDLANT Environmental Services: Pest Control Shop personnel provide pest management services at JEB Fort Story.

6.7.3 Feral Domestic Animals

Abandoned domestic cats and dogs can become serious pests on military installations. Feral pets such as domestic cats may carry diseases such as rabies, distemper, and feline leukemia, as well as transport biting arthropods that transmit other zoonotic diseases that can pose serious health threats to humans and family pets. Feral pets are a health and safety risk for Installation personnel and threaten wildlife populations, especially migratory birds. Feral cats in particular are an ongoing management issue at JEB Fort Story.

The CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property identifies the Navy policy on feral pets. In accordance with this policy, the Installation must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations. Additionally, the Installation must ensure the humane capture and removal of feral cats and dogs, and every effort should be made to find homes for adoptable animals. At JEB Fort Story, captured feral pets are taken to the local animal control facility.

JEB Fort Story also controls feral cat populations by encouraging responsible pet ownership and limiting access to food and shelter. Vaccination, registration, and tags are required for every pet on the Installation. The feeding of strays is prohibited and all dumpsters have to be secured. The NRM provides pet and wildlife information to Installation personnel through the regional outreach specialist.

6.7.4 Invasive Control Methods

General control methods that are used to combat invasive plant species infestations include mechanical methods such as cutting, mowing, and burning, and chemical applications of herbicides. Herbicide applications are most effective with species that have a larger percentage of foliage in comparison to stems and roots, such as grasses and nonwoody vines. For woody species, a combination of practices that includes cutting the larger woody materials and treating resprouting vegetation with a foliar application of herbicides is frequently recommended. To ensure proper identification of species and use of appropriate control methods, natural resources personnel should periodically attend invasive species control workshops and training.

Herbicides may only be applied by licensed DoD employees or contractors in a manner consistent with all label instructions and DoD policy. The 2016 JEBCFS IPMP gives further guidance on herbicide application, storage, and protective measures. All herbicides used must be approved by the regional entomologists and must be on the authorized user list in accordance with the 2016 JEBCFS IPMP (NAVFAC 2016). In addition, all outdoor pesticide use that is conducted in remote areas must be coordinated with the NRM to ensure wildlife, plants, or their habitats are not affected.

A list of Virginia's invasive species, methods of control and fact sheets are available on the VDCR-DNH website: http://www.dcr.virginia.gov/natural_heritage/invspinfo.shtml

Multiple control methods exist for managing nutria. Management is typically achieved through shooting or trapping. If nutria control is necessary (particularly trapping), coordination with the regional game warden will ensure that methods are being applied consistent with Virginia laws and regulations. Some exclusion methods may also be appropriate to deter nutria from smaller-scale bodies of water. Relocation of live nutria is not authorized.

A three-year invasive species management project was initiated at JEB Fort Story in 2015 to target prioritized, high-ranking species, including kudzu, Chinese privet, tree of heaven, Japanese stiltgrass, common reed, multiflora rose, and Asiatic sand sedge (Tetra Tech 2017). The control schedule was approved by NAVFAC MIDLANT and was consistent with the policy in the IPMP. Control treatments were applied to 45 ac (18 ha) of JEB Fort Story where kudzu was mapped from the 2013 invasive species survey. Infestations of kudzu were treated using mechanical and low-volume chemical treatments. The contractor reported a rate of 75 percent to 100 percent effectiveness at treating kudzu at 37 sites. However, new, emergent stands of kudzu were identified and pretreated in each season. A final project monitoring report is due in 2018 for 2017 growing season applications.

6.7.5 Zika Virus

In accordance with [OPNAVINST 6250.4C](#), the Installation's Naval Branch Health Clinic, PMD is responsible for conducting inspections and surveys aboard installations to determine the species, source, location, and density of medically important arthropods and provide the results to the public works and facilities departments for use in planning pest control operations. Moreover, per [OPNAVINST 6250.4C](#), the Navy Bureau of Medicine and Surgery entomologists, based at the Navy Entomology Center of Excellence and the Navy Environmental and Preventive Medicine Units, is responsible for guidance relating to disease vectors and medical pests.

In July 2016 JEBLCFS organized surveillance efforts to detect mosquito carriers of the Zika virus. *Aedes* mosquitoes feed during the day and breed in any container of water. Based on surveillance procedures, the NAVFAC MIDLANT Environmental Services Pest Control organized efforts to monitor for the detection of *Aedes* and apply ultra-low volume treatments applied during early dawn and evening hours to target Zika-carrying mosquitoes. Moreover, JEBLCFS PMD initiated an outreach initiative to educate residents of Installation housing and Installation personnel to reduce the amount of standing water used by mosquitoes to lay larvae.

6.8 Habitat Conservation and Restoration

Large portions of JEB Fort Story are developed and the Installation is located in a densely developed area. Conservation and restoration of remaining natural habitats are high priorities of the natural resources management program. Habitat conservation and restoration are particularly important in areas with significant natural communities; rare, threatened, or endangered species; or exceptional biodiversity. JEB Fort Story has several designated conservation site areas that help protect such resources, including the DPA, the East Gate Lake Conservation Site Area, and the Inland Dune and Wetland Conservation Site Area (**Figure 5-7**). Protection and restoration of the

Chesapeake Bay and Atlantic Ocean shoreline is another important conservation priority for the Installation. Additionally, habitat and conservation efforts at JEB Fort Story should account for projected impacts from climate change, as described in **Section 5.5.1**, which could result in altered habitat, especially along the coast.

Designation and protection of conservation site areas on DoD installations that warrant special conservation efforts are authorized in DoDI 4715.03. Conservation site areas include botanical areas, ecological reserve areas, geological areas, riparian areas, scenic areas, zoological areas, watchable wildlife areas, and traditional cultural places having officially recognized special qualities or attributes. Efforts will be made to minimize impacts to such areas. No timber harvest will occur in these areas unless required to maintain or restore suitability for training, such as salvage logging following a severe storm event, insect/disease outbreak or the need for a timber stand improvement. High-impact training activities, such as excavation of fighting positions and bivouac areas or other troop concentrations, will be minimized as practically possible. Wildfires will be suppressed and invasive plant populations will be controlled. Vegetative communities will be monitored to determine long-term population trends as well as impacts from exotic species and human use in the area. Specific management measures to protect the conservation site areas of JEB Fort Story were developed by the VDCR-DNH and are described in the following sections (Stevenson 1996).

6.8.1 Dune Protection Area

Primary dune systems are protected under the Virginia Coastal Primary Sand Dune Protection Act, which is an enforceable policy under the Virginia Coastal Zone Management Program. The primary and secondary dunes at JEB Fort Story are particularly important because they provide protection from storm surges to portions of the Installation and its infrastructure located immediately behind the dunes. The dune system and its habitats, however, are extremely sensitive to natural disturbances such as storms and wave action, and human disturbances such as vehicular traffic and excessive foot traffic. In an effort to protect these significant resources, a portion of JEB Fort Story dunes has been designated as a DPA.



Dune Restoration Project

Source: L. Eiser

The overall goal of restoration activities within the DPA is to create more extensive and stabilized dunes. This can only be accomplished by minimizing the number of beach access roads and routes, and restoring or rebuilding the primary and secondary dunes. Site-specific dune restoration and protection recommendations for Sites 2, 4, and 5 (**Figure 5-8**) are described in the 2012 Dune Delineation Report for the Dune Ecological Assessment (Joint Venture et al. 2015). One recommendation is to continue the use of sand fencing applications for restoration of primary and secondary dunes in areas with shortened dunes caused by erosion. Other recommendations include planting of native dune species to hasten revegetation and stabilization of restored dunes, installation of educational signs that describe ongoing and completed restoration efforts, and installation of fences to prevent pedestrians from accessing dune areas.

Additional annual efforts to reduce erosion and stabilize dunes in the beaches and dunes areas include the placement of sand fencing and discarded Christmas trees around the bases of existing dunes and a limit placed on foot traffic on the public beach at the southern end of the site. Sand fencing and discarded Christmas trees act to entrap windblown sand causing it to accumulate and add to the dune's diameter. Clean Christmas trees (no tinsel or ornaments) are from military personnel and civilians who have access to the Installation and Christmas tree lots. Installation commands assist the NRM, who coordinates the sand fencing and Christmas tree placement program. Roads will be closed and access consolidated when able. Annual maintenance and monitoring of these efforts are important to the success of establishing vegetation, stabilizing the dunes, and reducing sand migration in the dunes. Limiting foot traffic decreases the potential to damage dune vegetation, especially sea-coast marsh elder.

6.8.2 Interior Dunes and Wetlands Conservation Site Area

The Interior Dunes and Wetlands Conservation Site Area supports rare plant communities (oligotrophic forest and oligotrophic woodland) as well as numerous plant and wildlife species listed under the Virginia ESA. Mowing is avoided in areas adjacent to populations of pineland tick-trefoil during the growing season to protect this species (July to November).

6.8.3 East Gate Lake Conservation Site Area

The only known occurrence of viviparous spikerush in the state of Virginia occurs at JEB Fort Story, within the East Gate Lake Conservation Site Area, which contains a moderate-sized population of viviparous spikerush. Although the Installation is not required to conserve state-ranked species, protection of these species is an important component of stewardship work at the Installation and will help prevent these species from becoming federally listed in the future. The population is monitored periodically for trends, as well as long-term viability.

6.9 Outdoor Recreation and Environmental Awareness

The outdoor recreation program administered by MWR is designed to provide military, civilian staff, and local residents with ample opportunity to participate in enjoyable, high-quality, outdoor-related activities. The objectives of outdoor recreation and environmental awareness management at JEB Fort Story are to:

- Provide for outdoor recreation opportunities to the maximum extent possible within the constraints of the military mission and capability of the natural resources with the goal of improving the quality of life for Installation personnel, their dependents, and the military community
- Foster understanding and awareness of the environment through educational conservation programs

6.9.1 Outdoor Recreation

The primary mission of JEB Fort Story is amphibious/logistical/transportation training, and as such, the provision of outdoor recreation opportunities on military lands is secondary. Outdoor recreation in designated training areas is prohibited during times of actual training use, and access to these areas must be scheduled in advance to avoid interference with the military mission. In addition, the program must be consistent with the Installation's mission, while maintaining ecosystem integrity and function.

The outdoor recreation program at JEB Fort Story includes many activities such as picnicking, camping, fishing, and wildlife watching. The level of enjoyment derived from these activities is directly related to the quality of the natural resources. Maintaining a quality outdoor recreation program is dependent on proper management of natural resources and efficient program administration and oversight.

Off-road vehicles are prohibited from recreational use on JEB Fort Story because they have the potential to damage natural resources and training areas; however, designated off-road vehicles are used for military purposes, land management activities, and law enforcement.

Numerous indoor and outdoor recreational facilities are available at JEB Fort Story. These facilities are open to military personnel, their dependents, and authorized guests. The beach houses and year-round campground are the most popular facilities. Natural areas and open space on JEB Fort Story include coastal primary sand dunes, upland woodlands on secondary dunes, and freshwater forested wetlands. These areas are sensitive areas, and are generally not available for outdoor recreational activities.

JEB Fort Story is accessible to the public based on its designation as a Historic District (**Section 6.10** and **Appendix M**) and events/functions held by the First Landing Foundation. The City of Virginia Beach has a renewable lease for use of the beach area located on the eastern end of the Installation. The Cape Henry Lighthouse and the Cape Henry Memorial are both open to the public throughout the year. This 1.2-ac (0.49-ha) area includes a handicapped-accessible ramp that leads to an overlook of the Chesapeake Bay and Atlantic Ocean. In the past, the Boy Scouts of America has been granted permission to use certain parts of the Installation for camping and other scouting events.

Fishing

Saltwater and freshwater fishing are permitted along the shore and freshwater lakes at JEB Fort Story. Saltwater shore fishing is allowed from the East Gate (Gate 8) at Inchon Beach to the staircase leading to Officer Housing. Year-round freshwater fishing is permitted at Hospital Road Lake. An appropriate Installation fishing permit is required for freshwater fishing, and can be purchased at MWR. This permit is not required for saltwater fishing. State freshwater and saltwater licenses are also required for all fishing activities but are not available for purchase through the Installation. Fishing on JEB Fort Story is currently regulated by Commander, JEBLCFS and the JEBLCFS Fishing Instruction INST 11015.1D, dated 2017 February.

Hunting

Hunting and trapping at JEB Fort Story is prohibited because of the small size of the Installation, proximity to residential areas, inadequate populations of target game animals, and the sensitive habitats at the Installation. However, hunting opportunities for JEBLCFS personnel are available locally at other Hampton Roads Naval facilities. Hunting seasons in these areas correspond to state hunting seasons, and a valid state hunting license and an Installation permit are required.

6.9.2 Environmental Awareness

Environmental education and outreach efforts at JEB Fort Story are coordinated by the NRM, and annually include events such as Arbor Day, Earth Day, and Clean the Bay Day. Through such activities, Installation residents and volunteers have the opportunity to learn about environmental stewardship as well as contribute to the protection and enhancement of local ecosystems.

JEB Fort Story residents and volunteers are also encouraged to participate in habitat conservation efforts in the beaches and dunes area. Dune stabilization efforts that rely on the participation of volunteers include collecting and installing discarded Christmas trees and planting native beach grasses on sections of the training beaches for dune stabilization. The need to plant native beach grasses is evaluated annually and can be implemented as needed using volunteers. If needed, these plantings can be incorporated into National Public Lands Day events.

If protected species are identified as occurring on the Installation, the NRM will evaluate the need for development of educational outreach materials such as informational handouts. These materials can be distributed to visitors and those living and working on the Installation to increase awareness about threatened and endangered species that occur on JEB Fort Story.

Environmental awareness and education also must extend to planners and project managers throughout NAVFAC MIDLANT installations. Developing instructional materials to inform planners, project managers, and others of natural resources issues that need to be considered when developing project and construction plans would benefit the environment by ensuring that environmental concerns are addressed early in the planning stage and would benefit planners by ensuring compliance with environmental legislation and avoiding possible litigation.

6.10 Community Awareness

Conservation education is the primary tool used to promote community awareness. At JEB Fort Story, this is accomplished through various media, community lectures, classroom activities, and special events. The Environmental Division and other Installation staff participate in the following initiatives and events for community awareness:

- *The Flagship*, the official newspaper of the Navy Mid-Atlantic Fleet, is the most accessible and efficient method of conveying environmental awareness on the Installation. Natural resources activities on JEB Fort Story, such as Clean the Bay Day and Christmas tree recycling, are published in this newspaper.
- The Environmental Division conducts talks and presentations by request to community groups.
- JEB Fort Story participates in Clean the Bay Day each year. Volunteers learn about larger pollution challenges facing the Chesapeake Bay, and how to become better stewards of this important watershed.
- The Environmental Division conducts an annual Arbor Day tree planting at the Child Development Center as an outreach event. The event includes a VDOF staff member who discusses the importance of trees, and helps JEB Fort Story maintain Tree City USA status, which is achieved by meeting the four standards of: maintaining a tree board or department, having a community tree ordinance, spending at least \$2 per capita on urban forestry and celebrating Arbor Day.
- In 2016, educational outreach signs are deployed at multiple locations at JEB Fort Story. Informative signs include the Chesapeake Bay marine life. These signs are placed at frequently visited areas of the installation applicable to the Installation resource (near the NPS/Cape Henry Memorial, East Gate Lake).

Due to the presence of the federally threatened piping plover, and the potential for other protected bird species to occur at JEB Fort Story, including roseate tern and rufa red knot, the NRM will

evaluate the need for development of educational outreach materials such as informational handouts. These materials can be distributed to visitors and those living and working on the Installation to increase awareness about rare, threatened, and endangered species that occur on JEB Fort Story.

6.11 Cultural Resources Protection

Protection of cultural resources will be specified in the Regional Integrated Cultural Resources Management Plan prepared for Navy installations located in the Hampton Roads region of Virginia.

JEB Fort Story was designated as the Fort Story Historic District in 2003 and is considered eligible for the NRHP by the DOI (**Figure 6-3** and **Appendix M**). Installation personnel will consult and coordinate through the NEPA process and by completing the environmental checklist for planned activities or projects that could have the potential to affect historic or cultural resources. For example, the CRM will be contacted for coordination prior to conducting modifications to structures or soil disturbance. The CRM reviews proposed projects for compliance with the various cultural resources laws and requirements, EOs and DoD and Navy policies. The CRM handles all the consultation with the appropriate parties, including the Virginia SHPO, to obtain their concurrence on proposed actions with the potential to affect cultural resources. Two concrete bunkers (Buildings 221 and 219) are of particular importance, as these structures are used as hibernacula, roosting sites and maternity roosts for Rafinesque's eastern big-eared bat, a Virginia endangered species (Tetra Tech 2016b).

A Phase I Reconnaissance Survey of Architectural Resources at Fort Story occurred in September and October 2010. This survey built upon all previous cultural resources reports and research of past studies to ensure all architectural resources constructed prior to 1965 were documented and captured. Thirty-three new buildings and structures were captured during this survey. The field inspection identified 27 buildings constructed between 1953 and 1964 and six newly recorded resources classified as World War II temporary buildings. Because of the addition of new resources, loss of previously documented resources, and the expanded historical context, it is determined that the period of significance be limited to 1916–1974. The VA SHPO and the Keeper concurred with the findings of the report and the boundaries of the historic district. The list of contributing resources reflected in the report is the current list of historic buildings and structures at Fort Story.

6.12 Conservation Law Enforcement

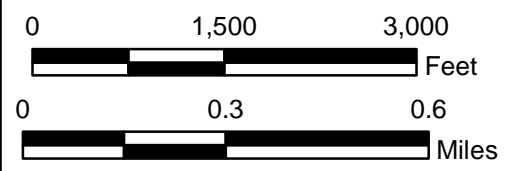
The Sikes Act requires that natural resources law enforcement be provided on military lands (Benton et al. 2008). The DoD developed a law enforcement policy in DoDI 4715.03, which mandates that all DoD components must coordinate with the appropriate agencies to support conservation law enforcement and enforce federal and applicable state laws and regulations that pertain to the management and use of the natural resources under their jurisdiction; however, comprehensive DoD conservation law enforcement policy is lacking and each branch of the military has historically addressed the subject individually on an installation-by-installation basis. This has included a variety of conservation law enforcement options including employment of civilian game wardens, military police, or combinations of civilian game wardens and military police. The DoD does not have a standard for conservation law enforcement training, firearms, or civilian job descriptions. Although the USMC has developed a standard conservation law



Legend

- Individually NRHP - Eligible Buildings*
- Cultural Resource Potential Area
- Installation Boundary
- Historic District

*The Weather Bureau Building and both old and new Cape Henry Lighthouses are not the responsibility of the Navy.



Source: ESRI, World Imagery; Navy 2016

Figure 6-3
Historic District of JEB Fort Story

This page intentionally left blank.

enforcement policy, and the Department of the Air Force is making strides to develop a similar program, a standard DoD policy on natural resources law enforcement has yet to be developed. Currently, a local Navy Game Warden is stationed at NAS Oceana, and has jurisdictional authority within the region at all Hampton Roads Naval facilities.

Law enforcement at JEBCFCS is provided by the JEB Security Precinct (CNIC n.d.). If any stranding of marine wildlife is discovered by security personnel along the coastline of JEB Fort Story, the stranding should be reported to the CDO immediately, who will follow the stranding protocol outlined in **Section 6.5.3** of this INRMP.

All Installation fishing permitting, regulations, and creel limits are subject to enforcement by the local game warden. No persons are authorized to kill, collect, or capture any wildlife species on JEB Fort Story. Effective enforcement of laws and regulations applicable to natural resources enhances the overall natural resources program, protects natural and cultural resources, and provides public safety by enforcing off-limit areas and protecting against criminal destruction of natural resources (i.e., trespassing and poaching).

This page intentionally left blank.

7.0 NATURAL RESOURCES MANAGEMENT UNITS – JOINT EXPEDITIONARY BASE FORT STORY

For natural resources management purposes, land and water resources at JEB Fort Story may be divided into three management areas based on ecological and land use considerations. These are the Urban and Training Areas Management Unit, the Natural Areas Management Unit, and the Beaches and Dunes Management Unit (**Table 7-1** and **Figure 7-1**). Although the beaches and dunes area is a natural area, there are unique management considerations that separate the beaches and dunes area from other natural areas at JEB Fort Story. Therefore, the beaches and dunes area is treated as a separate management unit. The Mid-Atlantic RSIP (Department of the Navy 2002) describes zoning classifications in the shoreland zone based on the services provided in an area, without regard for ecological considerations and natural resources management. The RSIP classifications are described for the Natural Areas Management Unit and Beaches and Dunes Management Unit in this INRMP (see **Section 7.2** and **Section 7.3**).

Table 7-1. JEB Fort Story Natural Resources Management Units.

Natural Resources Management Unit	Acres
Urban Areas	514
Natural Areas	784
Beaches and Dunes	160
Total	1,458

The management procedures and actions described for each unit will help JEB Fort Story meet its management goals and objectives, maintain regulatory compliance, and ensure an ecosystem approach to natural resources management is implemented. Although management issues may be common to the different management units, practical management solutions and actions are tailored to meet the specific constraints of each unit.

The goals established by the Environmental Division for the natural resources management program are to maintain ecosystem viability and support the Sustainable Range Program. The Environmental Division has identified a number of objectives necessary to achieve these goals:

- Provide realistic and healthy habitat in the training areas.
- Conduct a natural resources management program that utilizes the principles of ecosystem management.
- Use adaptive management techniques to provide the flexibility to adapt management strategies based on increased knowledge and data gained from monitoring programs and scientific literature.
- Seek to maintain or increase the level of biodiversity of native species.
- Protect forest resources from unacceptable damage and degradation resulting from insects and disease, invasive species, and wildfire, and manage the resources in a manner that supports the military mission.

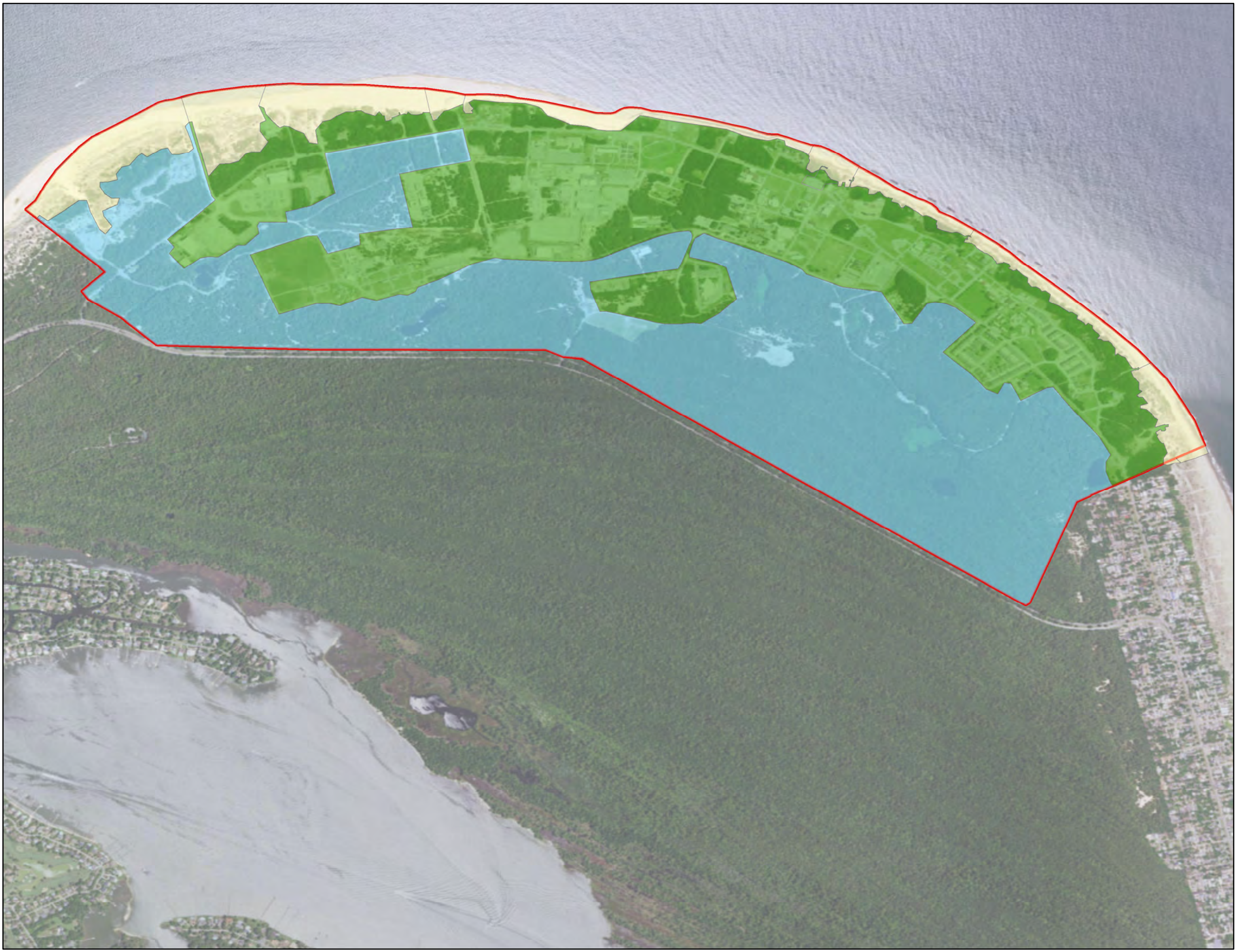
- Prevent the degradation of water quality, protect wetland, aquatic and riparian habitats, and identify and restore degraded habitats.
- Protect soil resources from erosion and destabilization through prevention and restoration efforts.
- Protect and preserve cultural resources in accordance with state and federal laws.
- Provide special protection, conservation, and management for rare, threatened, and endangered plant and wildlife species.
- Protect sensitive and ecologically significant habitats located in conservation site areas on JEB Fort Story.
- Manage wildlife and fisheries resources within the principles and guidelines of ecosystem management to maintain productive habitats and viable populations of native species if funding is available.
- Provide outdoor recreational opportunities in consideration of military mission requirements.
- Provide a positive contribution to the community by offering informative and educational instruction and opportunities.

These objectives are reflected in the management actions and techniques described in the following sections. Implementation of projects may require coordination with various organizations including USDA NRCS, USACE, USFWS, VDEQ, VDGIF, First Landing State Park, VDCR-DNH, VMRC, and other applicable agencies and organizations. The Installation and Regional NRMs will oversee all management projects recommended in this INRMP (**Appendix A**). Management of natural resources is grouped within three management focuses: Urban and Training Areas Management, Natural Areas Management, and Beaches and Dunes Management.

7.1 Urban and Training Areas Management Unit

7.1.1 Land Management

Land management at the Installation includes soil conservation to avoid disturbance of soils, implement BMPs, stabilize and repair eroded areas, avoid development on excessive erosion sites considered to be moderately or severely susceptible to erosion, and comply with Virginia erosion and sediment control regulations. Areas that are disturbed, both as a result of human activities or due to natural causes, will be stabilized and repaired in a timely manner. Sources of erosion, sedimentation, runoff, and dust will also be controlled to prevent damage to land, water resources, equipment, and facilities on the Installation and adjacent properties.



Natural Resource Management Units
[Red Outline] Installation Boundary

Land Management Zone
[Yellow Box] Beaches and Dunes Management Unit
[Light Blue Box] Natural Areas Management Unit
[Green Box] Urban Areas Management Unit



0 1,500 3,000 Feet

0 0.3 0.6 Miles

Source: ESRI, World Imagery; Navy 2016

Figure 7-1.
Natural Resources Management Units
of JEB Fort Story

This page intentionally left blank.

Erosion and Sedimentation

Soil erosion at JEB Fort Story is a problem in localized areas used for military training activities and where land disturbance has occurred. Many of the current or planned projects are designed to address erosion problems resulting from land disturbance. A comprehensive soil conservation approach is necessary because of the high potential for soil erosion on JEB Fort Story. The current policy of addressing erosion areas will be continued, including implementation of the following soil conservation management recommendations within training areas:

- Implement projects for soil erosion control.
- Implement projects to monitor soil erosion and sedimentation in training areas.
- Prioritize erosion control sites for implementing corrective action.

Coastal Zone Protection

The City of Virginia Beach is located within Virginia's coastal management area. Although JEB Fort Story is statutorily excluded from Virginia's coastal management area, a CCD may be required for development projects or actions that are reasonably likely to affect a coastal use or resource of Virginia's coastal zone. The NRM must review plans and proposed actions to (1) determine if the action will have a reasonable, foreseeable impact on a land use, water use, or natural resource of Virginia's coastal zone and (2) assist with the preparation of a CCD for submittal to VDEQ if determined to be necessary.

Wetlands and Water Quality Protection

Management of wetlands and water quality at JEB Fort Story is focused on water quality monitoring in lakes, pollutant input control, and wetland and vernal pool protection. The objectives of wetland and water quality management are to identify and restore degraded aquatic habitats, protect aquatic and riparian habitats, prevent degradation of water quality, and conserve wetlands and vernal pools. The Environmental Division will coordinate with resource specialists at First Landing State Park whenever beneficial to implement management recommendations for water quality monitoring.

Monitoring in aquatic habitats should be conducted to prevent potential water quality problems from going unnoticed, determine whether runoff or seepage is contaminating wetlands or lakes, and evaluate the potential for adverse impacts on aquatic habitats. JEB Fort Story will implement the following management recommendations for wetlands and water quality:

- Monitor water quality in Installation lakes to prevent and control algal blooms.
- Monitor water quality and ecological function of forested wetlands located along the southern boundary (along Shore Drive) for potential impacts from runoff associated with Shore Drive, demolition range area, closed Landfill #3, Landing Zone Hotel, and trail use.
- Implement projects to ensure that design, construction, and maintenance of training trails across wet areas provide maximum protection to wetlands and water quality.
- Conduct planning level surveys to assess species biodiversity and habitat conditions.
- Conduct lake habitat assessments to evaluate structure of surrounding physical habitat that influences the quality of the water resource, and the condition of the resident aquatic community.

- Establish and maintain 100-foot (30-m) buffers around lakes and wetlands to restrict incompatible activities.
- Obtain and enforce appropriate federal, state, and local permits for coastal non-vegetated wetlands, isolated and adjacent wetlands, and subaqueous lands.
- Maintain and manage the 1.7-ac (0.7-ha) wetland mitigation site for perpetuity as required by permits received following fill of 0.85 ac (0.34 ha) of wetlands for the SATEC. No alterations can be made to the 1.7 ac wetland mitigation system without coordination and approval from VDEQ.
- The City of Virginia Beach’s CBPAO is intended to help address the nonpoint source pollution problem by encouraging the redesign of development projects to eliminate or reduce nonessential nonpoint source runoff (City of Virginia Beach 2012b). The CBPAO also requires development and redevelopment projects in the Chesapeake Bay watershed to implement BMPs to reduce the detrimental effects of nonpoint source pollution. This ordinance affects all property in the City of Virginia Beach that discharge waters within the Chesapeake Bay watershed, including JEB Fort Story. The CBPAO strives to improve water quality by protecting environmentally sensitive areas such as buffers adjacent to waterways, tidal shores, wetlands, and highly erodible soils.
- Update the wetlands inventory data for the Installation, and obtain jurisdictional determinations from USACE as needed.
- Conduct a baseline watershed assessment for JEB Fort Story lakes, including monitoring of water quality and wetlands, especially along the southern boundary where there is an elevation risk of impacts from runoff associated with Shore Drive. Assessment should include an evaluation of structures surrounding physical habitat that may influence water quality, and condition of the resident aquatic community. Snake Lake, Hospital Road Lake, and East Entrance Lake should be included in the assessment to update data collected in a 1991 study (USFWS 1991).
- Publish Wetland and Aquatic Sites Restrictions.

7.1.2 Urban Forestry Management

The training areas of JEB Fort Story have the highest concentration of land uses, transportation systems, and infrastructure. Management of the improved grounds is administered by PWD using contractor support, and consists of grounds maintenance, urban plant management, turf management, and tree and shrub management. Training areas management is focused on documenting the condition and maintenance needs of the urban forest (urban forest inventory), creating an urban forest data layer in GIS with associated attribute files, and developing short- and long-term management recommendations.

An urban forest inventory is required to facilitate efficient, scientific urban forest management, and writing more specific grounds maintenance contracts. This inventory can be simple, but should be GIS-based and include the following minimum information for each tree: species, diameter, condition, and primary maintenance needs. Such information will allow the Environmental Division to assess the composition, health, and deficiencies of the urban forest. Every effort should be made to reduce the need for high input grounds maintenance in all but the most aesthetically sensitive areas. Mowing, weed control, and fertilizer usage can be reduced by actively or passively

converting unused open space to natural areas containing trees, warm season grasses, or wildflowers. Grouping new plants in large beds of mulch also will reduce the need for mowers to maneuver between plants, thus saving gas and protecting plants from mechanical damage. This practice also will improve the soil environment and contribute to successful plant establishment and growth. JEB Fort Story will implement the following recommendations for training area management:

- Conduct an urban forest inventory to identify management needs.
- Identify opportunities and convert open space to natural areas containing trees, warm season grasses, or wildflowers, including planting of native species that will attract pollinators.
- Document the condition and maintenance needs of the urban forest (urban forest inventory) and create an urban forest data layer in GIS with associated attribute files.

7.1.3 Habitat Conservation and Restoration Management

Habitat conservation and restoration management in urban and training areas would best be accomplished by limiting development to previously disturbed sites and avoiding the remaining patches of forests, wetlands, and wetland buffers. As part of the NEPA process, all Installation planning will be coordinated with the NRM and other regional environmental group personnel. This will help ensure that conservation issues associated with the project site are identified and considered early in the planning process. In addition, Installation planners should consult with the natural resources personnel to identify and prioritize potential development sites on the Installation. Development of a planning-level GIS layer indicating potential sites would benefit the planning process. JEB Fort Story will implement the following recommendations for habitat conservation and restoration management:

- Conduct planning level surveys to assess species biodiversity and habitat conditions.
- Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators
- Reduce the need for high input grounds maintenance in all but the most aesthetically sensitive areas by actively or passively converting unused open space to natural areas containing trees, warm season grasses, or wildflowers, and by grouping new plants in large beds of mulch.
- Identify opportunities and convert open space to natural areas containing trees, warm season grasses, or wildflowers, including planting of native species that will attract pollinators.

7.1.4 Cultural Resources Management

To avoid unauthorized or accidental disturbance, the CRM and SHPO should be consulted during the planning process regarding any activity that has the potential to impact cultural resources at JEB Fort Story. The NRM will help facilitate cultural resources assessments when necessary.

7.1.5 Nuisance Wildlife

Feral pets and miscellaneous nuisance wildlife, such as opossums, raccoons, and Canada geese, are the major pest management issues in the Urban Areas Management Unit. Public education, Installation newsletters, and public service announcements are used to inform housing residents

and personnel about spaying and neutering pets and not feeding feral animals. Although these measures reduce their occurrence, nuisance wildlife and feral pets are still pest management issues that need to be dealt with on an occasional basis. The NRM and regional Game Warden will assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas. Feral cats and dogs will be taken to local animal shelters.

Requests for services involving animals, such as sea turtles, marine mammals, game animals, and migratory birds or raptors not under the purview of the NAVFAC MIDLANT Environmental Services: Pest Control Shop will be directed to contact the installation NRM.

7.1.6 Invasive Species and Pest Management

Pest management is conducted to provide maximum pest control at the Installation while minimizing the use of pesticides. IPM, which stresses the use of a variety of control methods to reduce dependence on pesticides, is a key factor in pest management on JEB Fort Story. The objectives of IPM are to use mechanical and physical control (physical removal and exclusion of pests), cultural control (altering specific environmental features to make an area less suitable for or attractive to pests), and biological control (use of natural predators to control a pest) methods before using chemical controls (use of pesticides). Reduced use of pesticides has positive environmental and human health benefits; however, judicious use of pesticides is sometimes necessary to avoid detrimental effects on landscape plants. The NRM will coordinate with natural resources specialists at First Landing State Park, as needed, to implement management recommendations for invasive species control and utilize regional pest control if necessary.

Pest management activities at JEB Fort Story include weed control; mosquito control; tick control in training, recreational, and family housing areas; nuisance animal control; forest and landscape pest control; and invasive species control. JEB Fort Story will implement the following recommendations for pest management:

- Implement pest control operations in accordance with the IPMP.
- Monitor the condition of invasive species at JEB Fort Story. Implement the Invasive Species Management Plan for JEB Fort Story.
- Coordinate with natural resources specialists at First Landing State Park, as needed, and implement management recommendations for invasive species control.
- Conduct an invasive fauna species survey to collect baseline information on the invasive and nuisance wildlife located at the Installation.
- Remove feral cats and dogs from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.

7.1.7 Summary of Urban and Training Areas Management Objective

- Avoid disturbance of soils, implement BMPs, stabilize and repair eroded areas, avoid development on excessive erosion sites considered to be moderately or severely susceptible to erosion, and comply with Virginia erosion and sediment control regulations.
- Review plans and proposed actions at JEB Fort Story to ensure consistency with the Virginia Coastal Zone Management Program and help to obtain a consistency determination when required.

- Identify and restore degraded aquatic habitats, protect aquatic and riparian habitats, prevent degradation of water quality, and conserve wetlands and vernal pools.
- Coordinate with resource specialists at First Landing State Park, as needed, whenever beneficial to implement management recommendations for water quality monitoring or for invasive species control as funding permits.
- Monitor aquatic habitats to prevent potential water quality problems, determine whether runoff or seepage is contaminating wetlands or lakes, and evaluate the potential for adverse impacts on aquatic habitats.
- Conduct a baseline watershed assessment for Installation lakes.
- Conduct planning level surveys to assess species biodiversity and habitat conditions.
- Conduct lake habitat assessments to evaluate structure of surrounding physical habitat that influences the quality of the water resource, and the condition of the resident aquatic community.
- Establish and maintain 100-foot (30-m) buffers around lakes and wetlands to restrict incompatible activities.
- Obtain and enforce appropriate federal, state, and local permits for coastal non-vegetated wetlands, isolated and adjacent wetlands, and subaqueous lands.
- Maintain and manage the 1.7-ac (0.7-ha) wetland mitigation site for perpetuity as required by permits received following fill of 0.85 ac (0.34 ha) of wetlands for the SATEC. No alterations can be made to the 1.7 ac wetland mitigation system without coordination and approval from VDEQ.
- Document the condition and maintenance needs of the urban forest (urban forest inventory) and create an urban forest data layer in GIS with associated attribute files.
- Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators.
- Identify and prioritize potential development sites on the Installation.
- Develop a planning-level GIS layer indicating potential sites for habitat conservation and restoration.
- Identify opportunities and convert open space to natural areas containing trees, warm season grasses, or wildflowers, including planting of native species that will attract pollinators.
- Consult with CRM and SHPO during the planning process regarding any activity that has the potential to impact cultural resources at JEB Fort Story and facilitate cultural resources assessments when necessary.
- Implement pest control operations in accordance with the IPMP.
- Monitor the condition of invasive species at JEB Fort Story Implement the Invasive Species Management Plan for JEB Fort Story.

- Conduct an invasive fauna species survey to collect baseline information on the invasive and nuisance wildlife located at the Installation.
- Update the wetlands inventory data for the Installation, and obtain a jurisdictional determination from USACE as needed.
- Conduct a baseline watershed assessment for JEB Fort Story lakes, including monitoring of water quality and wetlands, especially along the southern boundary where there is an elevation risk of impacts from runoff associated with Shore Drive. Assessment should include an evaluation of structures surrounding physical habitat that may influence water quality, and condition of the resident aquatic community. Snake Lake, Hospital Road Lake, Mulehead Lake, and East Entrance Lake should be included in the assessment to update data collected in a 1991 study (USFWS 1991).
- Publish Wetland and Aquatic Sites Restrictions.
- Reduce the need for high input grounds maintenance in all but the most aesthetically sensitive areas by actively or passively converting unused open space to natural areas containing trees, warm season grasses, or wildflowers, and by grouping new plants in large beds of mulch.
- Remove feral cats and dogs from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.

7.2 Natural Areas Management Unit

7.2.1 Land Management

Coastal Zone Protection

As with the management of the coastal zone as described for urban and training areas management, a proposed project that is reasonably likely to affect a coastal use or resource of Virginia's coastal zone may require the submittal of a CCD to VDEQ. The NRM must review plans and proposed actions to (1) determine if the action is reasonably likely to affect a land use, water use, or natural resource of Virginia's coastal zone and (2) assist with the preparation of a CCD for submittal to VDEQ if determined to be necessary.

Wetlands and Water Quality Protection

A large portion of the wetlands on the Installation occur within natural areas. Preventing further loss of wetlands through development is the primary focus of wetlands protection within natural areas of the Installation. The NRM will review plans for projects that have the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits. As described in **Section 7.1.1** the Installation will comply with the requirements of CBPAO to help address the non-point source pollution problem by encouraging the redesign of development projects to eliminate or reduce nonessential nonpoint source runoff, and requirements for development and redevelopment projects in the Chesapeake Bay watershed to implement BMPs to reduce the detrimental effects of nonpoint source pollution.

7.2.2 Wildlife and Fisheries Management

Wildlife management at JEB Fort Story is focused on maintaining wildlife populations for biodiversity and providing outdoor recreation opportunities. The Environmental Division will

coordinate with natural resources specialists at First Landing State Park to implement management recommendations for field inventories of mammals, birds, amphibians, reptiles, and invertebrates, as appropriate.

The following management recommendations are provided to improve habitat conditions for wildlife. JEB Fort Story will implement the following recommendations for wildlife management:

- Manage common species in accordance with the Virginia SWAP, as feasible to support prevention of listing under the federal or state ESAs that would otherwise affect military readiness and incur significant funding requirements.
- Advise the Installation community against intentionally feeding wildlife, especially mammalian species such as fox and raccoon and on measures to take to reduce negative interactions with wildlife.
- Advise the Installation community of measures to take to reduce negative interactions with wildlife.
- Monitor furbearer populations to track trends in predation of ground-nesting birds. Coordinate with the VDGIF to develop watchable wildlife areas.
- Coordinate with the regional Game Warden for nuisance control of furbearers.
- Assess potential site locations and install artificial bird boxes and bat roosts, and monitor use annually.
- Continue to provide training to selected military police and other employees on the safe removal of snakes from urban areas, and the proper relocation to natural areas on the Installation.
- Establish permanent sample plots, which will allow repeated surveying efforts at the same location, and annually monitor avian species populations.
- Conduct planning level surveys for presence/absence of wildlife species and update Installation species inventory.
- Perform surveys for rare reptile and amphibian species such as mud snakes (*Farancia abacura abacura*) and amphiumas (*Amphiuma means*), as needed.

The availability and protection of suitable habitat are essential for successful fisheries management (USEPA 1993). The NRM will coordinate with resource specialists at First Landing State Park to implement management recommendations for field inventories of fish populations, as appropriate.

JEB Fort Story will implement the following recommendations for fisheries management:

- Survey fish populations in Installation lakes to monitor size, structure, and biological integrity of fish communities.
- Develop and implement a lake management program for JEB Fort Story to enhance the health of fisheries and recreational opportunity at the Installation.

7.2.3 Rare, Threatened, and Endangered Species Management

Management for rare, threatened, and endangered species management on JEB Fort Story are focused on identifying and preserving rare, threatened, and endangered species and conservation

site areas on the Installation. Management goals for listed species are to balance mission requirements with species protection, cooperate with regulatory agencies, and conserve biological diversity within the context of the military mission. Maintaining conservation site area boundaries, erecting gates to prevent unauthorized access, and presenting these areas on planning-level maps will aid in conservation site area and species protection. The NRM will coordinate with First Landing State Park to implement management recommendations for field inventories of rare, threatened, and endangered species on JEB Fort Story, as needed.

Protection of federally listed species is mandated by federal law and protection of federal candidate species for listing, state-listed species, and other rare species demonstrates good stewardship on behalf of the Navy. The following recommendations are designed to facilitate the military mission, while voluntarily protecting federal and state-listed species, and other rare species that have the potential to occur in the natural areas of JEB Fort Story:

- Coordinate with First Landing State Park to implement management recommendations for field inventories of rare, threatened, and endangered species on JEB Fort Story, as needed.
- Manage federal candidate species for listing and other species at risk in accordance with the Virginia SWAP as feasible to support prevention of species listing that would otherwise affect military readiness and incur significant funding requirements.
- Manage for rare, threatened, and endangered species known or with the potential to occur at the Installation, including federal candidate species for listing and other species at risk identified in the Virginia SWAP.
- Survey and monitor potential habitat for federally listed species, candidate species, or other species at risk to include (but not limited to) Rafinesque's eastern big-eared bat, chicken turtle, southern short-tailed shrew, and eastern harvest mouse.
- Reduce the need for high input grounds maintenance in all but the most aesthetically sensitive areas by actively or passively converting unused open space to natural areas containing trees, warm season grasses, or wildflowers, and by grouping new plants in large beds of mulch.
- Survey and monitor habitat that supports federally listed species, candidate species for listing, or other species at risk to include (but not limited to) Rafinesque's eastern big-eared bat, piping plover, chicken turtle, southern short-tailed shrew, and eastern harvest mouse as needed and as funding is available.
- Monitor Rafinesque's eastern big-eared bat roosting sites (including known artificial roosts, hibernacula, and maternity roost sites located within abandoned Buildings 221 and 219), other roost sites as they become identified, and natural roost sites. Implement actions to protect this species, and the known natural and artificial hibernacula, roosting and maternity roosting sites mentioned above.
- Provide information annually to VDGIF regarding Rafinesque's eastern big-eared bat use of the Installation.
- Perform surveys for rare reptile and amphibian species, such as mud snake and two-toed amphiuma.

7.2.4 Nuisance Wildlife

The NRM will continue to implement educational measures against intentionally feeding wildlife, especially fox and raccoon, to reduce negative interactions with wildlife. The NRM will coordinate with the regional Game Warden for nuisance control of furbearers. Habitat Conservation and Restoration Management

Terrestrial habitat conservation and restoration management is conducted to manipulate habitats to benefit native flora and wildlife and to maintain or improve the biological diversity of native flora and wildlife of JEB Fort Story. Management measures include rehabilitation of degraded areas to natural conditions, enhancing biological and structural diversity of native plants, preserving snags and trees with natural cavities, increasing use of nest and roost boxes, and increasing habitat diversity. The Environmental Division will coordinate with natural resources specialists at First Landing State Park to benefit from plant inventories conducted at permanent plots, and updates and monitoring of plant communities, as appropriate.

Recommendations listed below provide benefits for terrestrial habitat management when combined with other management actions recommended in this INRMP. JEB Fort Story will implement the following recommendations for management of terrestrial habitat:

- Review project requirements for opportunities to include habitat restoration and enhancement into planned projects.
- Develop a planning-level GIS layer indicating potential sites for habitat conservation and restoration.
- Locate with a GPS any additional nest boxes or platforms that are installed or moved, enter the information into the GIS database, and update the nest box monitoring form with the new nest box information.
- Conduct planning level surveys to inventory and characterize the flora of terrestrial habitats.
- Restore lands with plants that attract pollinators, and include pollinator-friendly plants in landscaping projects and grounds maintenance activities.
- Install artificial bird boxes and bat roosts, and monitor use annually.

7.2.5 Outdoor Recreation and Environmental Awareness Management

- Outdoor recreation at JEB Fort Story is focused on providing military, civilian staff, and local residents with ample opportunity to participate in enjoyable, high-quality, outdoor-related activities. The outdoor recreation program at JEB Fort Story includes activities such as picnicking, camping, fishing, and wildlife watching.
- Environmental awareness management at JEB Fort Story is focused on providing conservation awareness and fostering an understanding and awareness of the environment through educational programs. The conservation awareness program sponsors or cooperates in a number of outreach programs that build community ties and partnerships, and teaches environmental responsibility in the community.
- Conservation education is instrumental in creating the conditions needed to conduct sound, professional practices that produce both user opportunities and resources protection. Conservation education also promotes awareness of critical natural resources projects and

an appreciation of the rationale behind them. JEB Fort Story will implement the following recommendations for management of the conservation awareness:

- Continue to provide training to selected military police and other employees on the safe removal of snakes from urban areas, and the proper relocation to natural areas on the Installation.
- Participate annually in Clean the Bay Day activities.
- Keep the public aware of natural resources issues through *The Flagship* and other publications.
- Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.
- Provide natural resources conservation training at Officer/Non-Commissioned Officer Professional Development classes during special events and upon request.
- Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing or destroying any wildlife species.

7.2.6 Invasive Species and Pest Management

Invasive species and pest management within natural areas of JEB Fort Story are similar to those described for Urban and Training Areas Management in **Section 7.1**.

Pest management activities at JEB Fort Story include weed control; mosquito control; tick control in training, recreational, and family housing areas; nuisance animal control; forest and landscape pest control; and invasive species control. JEB Fort Story will implement the following recommendations for pest management:

- Implement pest control operations in accordance with the IPMP.
- Monitor the condition of invasive species at JEB Fort Story. Implement the Invasive Species Management Plan for JEB Fort Story.
- Coordinate with natural resources specialists at First Landing State Park and implement management recommendations for invasive species control as needed.
- Remove feral cats and dogs (regional pest controller) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.
- Coordinate with the regional Game Warden for control of furbearers threatening ground nesting birds and/or human health/safety.
- Monitor for presence of invasive nutria and coordinate removal with the regional Game Warden if detected.

7.2.7 Summary of Natural Areas Management Objective

- Implement stormwater management projects to support shoreline erosion control, including fertilization of dune vegetation and related vegetation management practices.

- Monitor and prioritize erosion control sites and implement soil erosion control projects as needed.
- Conduct a climate change assessment to determine potential effects from climate change related impacts such as sea level rise.
- Review plans and proposed actions in this unit to ensure consistency with the Virginia Coastal Zone Management Program and help to obtain a CCD when required.
- Review plans for projects that have the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.
- Coordinate all natural resource issues with natural resources specialists at First Landing State Park, as needed or as appropriate.
- Manage federal candidate species for listing, other species at risk, and common species in accordance with the Virginia SWAP, as feasible to support prevention of listing under the federal or state ESAs that would otherwise affect military readiness and incur significant funding requirements.
- Advise the Installation community against intentionally feeding wildlife, especially mammalian species such as fox and raccoon, and on measures to take to reduce negative interactions with wildlife.
- Monitor furbearer populations to track trends in predation of ground-nesting birds.
- Coordinate with the regional Game Warden for control of furbearers threatening ground nesting birds and/or human health/safety.
- Monitor for presence of invasive nutria and coordinate removal with regional Game Warden if detected.
- Continue to provide training to selected military police and other employees on the safe removal of snakes from urban areas, and the proper relocation to natural areas on the Installation.
- Establish permanent sample plots, which will allow repeated surveying efforts at the same location, and annually monitor avian species populations as needed and as funding is available.
- Conduct planning level surveys for presence/absence of wildlife species and update Installation species inventory.
- Survey fish populations in Installation lakes to monitor size, structure, and biological integrity of fish communities.
- Develop and implement a lake management program for JEB Fort Story to enhance the health of fisheries and recreational opportunity at the Installation.
- Survey and monitor potential habitat for state-listed species, candidate species for listing, or other species at risk when funding is available to include (but not limited to) Rafinesque's eastern big-eared bat, chicken turtle, southern short-tailed shrew, and eastern harvest mouse.

Natural Resources Management Units – JEB Fort Story

- Monitor Rafinesque’s eastern big-eared bat roosting sites and implement actions to protect this species, and known natural and artificial hibernacula, roosting and maternity roosting sites.
- Perform surveys for rare reptile and amphibian species, as needed.
- Review project requirements for opportunities to include habitat restoration and enhancement into planned projects.
- Develop a planning-level GIS layer indicating potential sites for habitat conservation and restoration.
- Locate with a GPS any additional nest boxes or platforms that are installed or moved, enter the information into the GIS database, and update the nest box monitoring form with the new nest box information.
- Continue to provide training to selected military police and other employees on the safe removal of snakes from urban areas, and the proper relocation to natural areas on the Installation.
- Participate annually in Clean the Bay Day activities and other outreach activities.
- Keep the public aware of natural resources issues through *The Flagship* and other publications.
- Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.
- Provide natural resources conservation training at Officer/Non-Commissioned Officer Development classes during special events and upon request.
- Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing, or destroying any wildlife species.
- Implement pest control operations in accordance with the IPMP.
- Implement and monitor the Invasive Species Management Plan for JEB Fort Story.
- Remove feral cats and dogs (regional pest controller) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.
- Coordinate with the regional Game Warden for nuisance control of furbearers.
- Conduct planning level surveys to inventory and characterize the flora of terrestrial habitats.
- Restore lands with plants that attract pollinators, and include pollinator-friendly plants in landscaping projects and grounds maintenance activities.
- Conduct planning level surveys for presence/absence of wildlife species and update the Installation species inventory.

- Assess potential site locations and install artificial bird boxes and bat roosts, and monitor use annually.

7.3 Beaches and Dunes Management Unit

7.3.1 Marine Resources Management

Sightings of stranded marine mammals or sea turtles on JEB Fort Story beaches or in the bay will be reported to the NRM who will adhere to the JEBLCFS Marine Mammal and Turtle Stranding Procedures. Natural resources staff will act as the liaison between the activity and regulatory agencies in such instances. The NRM will also assist Installation personnel with the identification of marine mammals as needed.

If any planned Installation activities have the potential to impact marine or nearshore resources, natural resources personnel will coordinate with and obtain the required permits from the appropriate federal and state agencies.

A survey was completed to establish baseline conditions of the Installation's nearshore environment and the results were included in this INRMP. Continue to monitor the nearshore environment as appropriate and incorporate the data into management decisions. Implementation of this project ensured compliance with the requirement for the Installation to collect baseline flora/fauna inventories that are to be included in the INRMP. In addition, the information collected will be used to fill in important informational gaps in understanding the roles of the various species and habitats occurring within the nearshore environments of the Installation. Collected data will benefit EFH and managed fishery species, known and proposed threatened and endangered species (e.g., the Atlantic sturgeon, which is federally endangered and a state species of concern, and the loggerhead sea turtle which is both federally and state-threatened), various migratory birds, and cetaceans.

JEB Fort Story will implement the following recommendations for management of the marine resources associated with the Installation:

- Periodically monitor beaches for stranded and/or dead marine mammals and sea turtles, and report related findings to appropriate authorities and monitor beaches for nesting sea turtles as required by the 2016 MOU between the USFWS/BBNWR and JEBLCFS (**Appendix L**). Report marine animal strandings to the Virginia Aquarium's Stranding Response Team.
- Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.
- Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities with the potential to impact marine resources.
- Complete a habitat assessment and species inventory of the nearshore environment. The survey findings will be applied to management decisions as appropriate.
- Coordinate with NMFS if any activities would adversely affect EFH identified under the MSFCMA.

7.3.2 Land Management

Coastal Zone Protection

Coastal zone protection includes monitoring areas where excessive shoreline erosion is occurring; evaluating the feasibility of implementing BMPs to stabilize the shoreline; and designing, installing, and maintaining shoreline stabilization practices where it is determined that they will be effective in controlling erosion with minimal impacts on existing downshore or upshore habitats. Where excessive coastal erosion is occurring, the shoreline must be stabilized and repaired in a timely manner to avoid impacts to adjacent habitats or existing infrastructure. The NRM will coordinate, whenever beneficial and as appropriate, with natural resources specialists at First Landing State Park to implement management recommendations for dune stabilization.

Many of the current or planned projects are designed to address problems resulting from shoreline erosion due to natural causes, training activities, recreation, or storm events that affect training areas. These projects are implemented to monitor shoreline conditions, establish shoreline erosion control, and stabilize dunes. Additionally, JEB Fort Story will implement similar projects for shoreline areas outside given training areas to include implementing stormwater management projects to support shoreline erosion control. Fertilization of dune vegetation and related vegetation management practices are included.

JEB Fort Story is located within the Chesapeake Bay watershed, which is recognized as one of the most important and productive estuarine ecosystems in the world and is protected by federal, state, and local regulations. The Chesapeake Bay watershed is home to more than 3,600 species and over 15 million people all competing for resources and space within this 64,000-mi² (165,759-km²) region. The Chesapeake Watershed Cooperative Ecosystem Studies Unit, which includes university/research institutions and federal agency partners such as the DoD, promotes stewardship and integrated ecosystem management of natural and cultural resources within the Chesapeake Bay watershed through collaborative research, technical assistance and education.

Navy management actions implemented at JEB Fort Story that directly support the goals of the Chesapeake Bay agreements include restoring and protecting water quality and wetlands, establishing riparian buffers, implementing dune restoration and shoreline stabilization measures, and promoting education and outreach.

Wetlands and Water Quality Protection

Wetland communities in the beaches and dunes habitat of JEB Fort Story include the shoreline and a number of small interdunal wetlands. Protection of this rare habitat type is important to the area's biodiversity and its faunal communities. These ponds serve as the only freshwater sources in the area and support a number of amphibian species. Protection from the major threats to these wetlands – migrating sand dunes and vehicular traffic – will be implemented through habitat conservation and restoration. The NRM will review plans for projects and actions with the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits. As described in **Section 7.1.1** the Installation will comply with the requirements of CBPAO to help address the nonpoint source pollution problem by encouraging the redesign of development projects to eliminate or reduce nonessential nonpoint source runoff, and requirements for development and redevelopment projects in the Chesapeake Bay watershed to implement BMPs to reduce the detrimental effects of nonpoint source pollution.

7.3.3 Wildlife and Fisheries Management

The MSFCMA establishes policies for the sustainable management of fishery resources and the protection of EFH. The MSFCMA is the primary law governing marine fisheries management in waters of the U.S. The MSFCMA requires that the NMFS, the regional fishery management councils, and the Secretary of Commerce describe and identify EFH for important marine and anadromous fish species under Federal Fishery Management Plans. EFH includes all types of aquatic habitat, including wetlands, coral reefs, seagrasses, and rivers where fish spawn, breed, feed, or grow to maturity, and extends from offshore habitats to inland areas, where the saltwater influence subsides. The MSFCMA requires that any federal activity that may have an impact on EFH be coordinated with NMFS, and that if such activities would adversely affect any EFH identified under the MSFCMA, the Secretary of Commerce shall recommend measures that can be taken to conserve the EFH in question.

7.3.4 Rare, Threatened, and Endangered Species Management

Management for rare, threatened, and endangered species management within the beaches and dunes area of JEB Fort Story is similar to management described for natural areas management, but is focused on marine and nearshore species that would occur in this habitat. Protection of federally listed species is mandated by federal law and protection of federal candidate species for listing, state-listed species, and other rare species demonstrates good stewardship on behalf of the Navy. The following recommendations are designed to facilitate the military mission, while voluntarily protecting state-listed and other rare species that have the potential to occur in the beaches and dunes areas of JEB Fort Story:

- Coordinate with First Landing State Park to implement management recommendations for field inventories of rare, threatened, and endangered species on JEB Fort Story, as needed.

7.3.5 Habitat Conservation and Restoration Management

Habitat conservation and restoration management in the beaches and dunes area of the Installation include identification of sensitive dune habitats, which provide important physical and ecological functions for estuarine species, adjacent ecosystems, and human inhabitants. The three primary ecosystem services performed by dunes and beaches at JEB Fort Story include habitat, coastal hazard protection, and water quality (Department of the Navy 2012a).

The following management techniques and projects will create more extensive and more stable dunes at JEB Fort Story, especially at the 17 potential problem areas identified in the 2012 ecological assessment (Department of the Navy 2012a). JEB Fort Story will implement the following recommendations for dune enhancement:

- Minimize impacts in conservation site area and the DPA from training and other activities.
- Repair, and if necessary install new, exclusion and informational signage, including permeable fencing (e.g., rope and wood posts) to prevent continued access. Identify and maintain a few critical beach access routes.
- Control, free-ranging feral cats and remove sources of garbage and food for native wildlife (e.g., raccoons and skunks).
- Conduct sand trapping measures such as the installation of sand fencing and placement of clean discarded Christmas trees.

- Plant native dune vegetation to stabilize steep slopes, encourage revegetation, and protect remaining sections of the dunes (Department of the Navy 2012a).
- Maintain the Invasive Species Management Program for JEBLCFS that includes monitoring of all invasive species sites within the DPA.
- Conduct additional mammal surveys to gain a better understanding of population densities and ranges of the southern short-tailed shrew (and other possible shrews) within the DPA. Due to the low efficacy of Sherman and Fitch live traps at capturing shrews, a combination of drift fence and pitfall traps should be used. Surveys should focus on maritime grassland communities; however, additional vegetative communities should also be targeted for other shrew species.
- Conduct additional mammal surveys to gain a better understanding of the population densities and ranges of the eastern harvest mouse within the DPA. Perform transect and grid surveys in areas of potentially productive habitat (i.e., maritime grassland communities).
- Implement dune restoration and enhancement recommendations outlined in the 2012 ecological assessment (Department of the Navy 2012a), including recommendations that should be implemented Installation-wide to protect sensitive dune habitats.
- Coordinate with natural resources specialists at First Landing State Park to implement management recommendations for dune stabilization, as needed and as appropriate.
- Participate annually in conservation awareness events including Clean the Bay Day activities.
- Disseminate educational outreach information related to natural resources activities and management at JEB Fort Story through *The Flagship* and other publications.
- Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.
- Provide natural resources conservation training at Officer/Non-Commissioned Officer Professional Development classes during special events and upon request.
- Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing or destroying any wildlife species.
- Continue to train selected military police and other employees on safe removal of snakes from urban areas, and proper relocation in natural areas on the Installation.
- Plant native grasses on eroding dunes and fertilizing dune vegetation as deemed necessary.

7.3.6 Outdoor Recreation and Environmental Awareness Management

Recreational use of off-road vehicles is prohibited on JEB Fort Story because they have the potential to negatively impact natural resources and damage DPAs and other training areas. However, designated off-road vehicles are used for military purposes, land management activities, and law enforcement. There are no formal outdoor recreation activities permitted within the DPA.

7.3.7 Invasive Species and Pest Management

The NRM coordinates with pest control to manage feral cat populations. Feral cats are the primary pest management issue in the beaches and dunes areas of the Installation. Captured cats will be turned over to a local animal shelter.

Several invasive, nonnative, and weedy plant species, including Japanese sedge, have been observed in the maritime dune grassland community. It is recommended that invasive species in this habitat, especially those identified in the DPA, be removed. Restoration of the areas targeted for invasive species removal and post-construction monitoring for success should also be conducted. It is recommended the JEB Fort Story develop and implement an invasive species management plan that identifies short- and long-term management measures for control of invasive plant species at the Installation. The following invasive species and pest management approaches are recommended for JEB Fort Story:

- Implement the Invasive Species Management Plan for JEB Fort Story.
- Coordinate with natural resources specialists at First Landing State Park and implement management recommendations for invasive species control, as needed.
- Remove feral cats and dogs (NAVFAC MIDLANT Environmental Services: Pest Control Shop) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife. Garbage is managed at the recreational beach area for JEB Fort Story to reduce available food to predators. Environmental Division also posts outreach stickers on all dumpster doors, advising to manage waste at dumpsters to reduce presence of wildlife.
- Monitor for presence of invasive nutria and coordinate removal with the regional Game Warden if detected.

7.3.8 Summary of Beaches and Dunes Management Objective

- Periodically monitor beaches for stranded and/or dead marine mammals and sea turtles, and report related findings to appropriate authorities and monitor beaches for nesting sea turtles as required by the 2016 MOU between the USFWS/BBNWR and JEBLCFS (**Appendix L**). Report marine animal strandings to the Virginia Aquarium's Stranding Response Team.
- Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.
- Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities with the potential to impact marine resources.
- Conduct a habitat assessment and species inventory of the nearshore environment as needed.
- Coordinate with NMFS if any activities would adversely affect EFH identified under the MSFCMA.
- Coordinate with natural resources specialists at First Landing State Park to implement management recommendations for dune stabilization and other natural resources issues, as needed or as appropriate.

- Implement projects for shoreline areas outside given training areas to include implementation of stormwater management projects to support shoreline erosion control and fertilization of dune vegetation.
- Review plans for projects and actions with the potential to impact Installation wetlands and assist the proponent of an action in applying for and obtaining all required federal and state wetlands protection permits.
- Implement dune restoration and enhancement recommendations outlined in the 2012 ecological assessment (Department of the Navy 2012a), including recommendations for dune stabilization that should be implemented Installation-wide to protect sensitive dune habitats.
- Plant native grasses on eroding dunes and fertilizing dune vegetation as deemed necessary.
- Continue to manage invasive species according to recommendations in the 2013 survey.
- Implement and monitor the Invasive Species Management Plan for JEB Fort Story.
- Remove feral cats and dogs (NAVFAC MIDLANT Environmental Services: Pest Control Shop) from the Installation as per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.
- Monitor for presence of invasive nutria and coordinate removal with the regional Game Warden if detected.
- Participate annually in conservation awareness events including Clean the Bay Day activities.
- Disseminate educational outreach information related to natural resources activities and management at JEB Fort Story through *The Flagship* and other publications.
- Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.
- Provide natural resources conservation training at Officer/Non-Commissioned Officer Professional Development classes during special events and upon request.
- Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing or destroying any wildlife species.
- Continue to train selected military police and other employees on safe removal of snakes from urban areas, and proper relocation in natural areas on the Installation.
- Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures identified in the 2012 JEBLCFS Dune Assessment report, including identifying and maintain only a few critical beach access routes, installing rope and sand fencing, posting informational signs, planting native beach grasses, and conducting additional flora and wildlife surveys.

- Implement stormwater management projects to support shoreline erosion control, including fertilization of dune vegetation and related vegetation management practices.
- Monitor and prioritize erosion control sites and implement soil erosion control projects as needed.
- Conduct a climate change assessment to determine potential effects from climate change related impacts such as sea level rise.

This page intentionally left blank.

8.0 ENVIRONMENTAL MANAGEMENT STRATEGY, INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN IMPLEMENTATION, AND MISSION SUSTAINABILITY – JOINT EXPEDITIONARY BASE LITTLE CREEK – FORT STORY

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

- Funding is secured for completion of all ERL 4 projects, as described in **Section 8.5**.
- Installation is staffed with a sufficient number of professionally trained natural resources management staff needed to perform the tasks required by the INRMP.
- Annual coordination with all cooperating offices is performed.
- Specific INRMP accomplishments that are undertaken are documented each year as part of the annual review.

The following sections provide an overview of natural resources consultation requirements, achieving no net loss, NEPA compliance, project development and classification, funding sources, commitment, and use of cooperative agreements. **Appendix A** provides information on the implementation schedule, prime legal driver and initiative, class, Navy assessment level, cost estimate, and funding source for each of the projects proposed in this INRMP.

8.1 Supporting Sustainability of the Military Mission and the Natural Environment

8.1.1 Integrated Military Mission and Sustainable Use

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

The Navy understands the role INRMPs play in identifying potential conflicts between a facility's mission and natural resources, and identifying actions necessary to maintain the availability of mission-essential properties and acreage. An INRMP balances the management of natural resources unique to the installation with military mission requirements and other land use activities affecting an installation's natural resources (DoD and USFWS 2002). The JEBLCFS NRM is responsible for ensuring the accomplishment of the military mission in a way that sustains and enhances the natural resources on the installation (Stein 2008). JEBLCFS's NRM accomplishes

this requirement by working in close cooperation with military operators to ensure mutual support and understanding.

8.1.2 Define Impact to Military Mission

To protect and maintain natural resources while ensuring the continuation of the military mission, JEBLCFS has implemented an ecosystem management approach for environmental stewardship of the Installation's natural resources. The management strategy maximizes the use of suitable lands for the military mission while minimizing impacts to natural resources.

Most endangered or threatened species, or species of special concern that exist within the Installation, do so in habitats that naturally coincide with ongoing mission activities. Therefore, the JEBLCFS military mission is compatible with the conservation and rehabilitation of natural resources, and may be accomplished with minimal restrictions and mitigation of natural resources. Constraints to the military mission described in **Section 2.4** and **Section 5.4** (e.g., limitation on new construction in surface waters, wetlands, floodplains, and riparian buffer areas conservation of protected and rare species habitat, forest buffers and special interest areas) restrictions on allowable uses of the beaches and dunes habitat, especially habitat conservation and restoration areas but do not prevent the continuance of JEBLCFS's military operations.

Natural resources constraints on training or other mission-related activities at JEBLCFS are minor, though access to portions of the beaches and dunes is restricted during rifle range live firing exercises. The small arms range firing fans are directed toward the Chesapeake Bay and have little effect on natural resources management. Natural resources management, development, and most other land uses are also constrained by explosive safety quantity distance arcs associated with ordnance loading and storage in the western portion of the Installation.

As is discussed further under **Section 8.3**, the installation is achieving *no net loss* in the capability of military lands to support the mission of the installation through the implementation of the INRMP.

8.1.3 Relationship to Other Operational Management Plans

This INRMP is not intended to replace existing installation policy, operations protocols, or military management plans. Rather, this INRMP is meant to facilitate the integration and coordination of natural resources management actions (plans and programs) with other plans and programs, and, moreover, with JEBLCFS's military mission.

8.2 Natural Resources Consultation Requirements

Section 7 of the ESA requires federal agencies to consult (formally or informally, depending on the level of effects to species from the proposed action) with USFWS (inland fish, wildlife, [including manatees], and nesting sea turtles) or NMFS (marine mammals [excluding manatees], sea turtles in the ocean, fish, or EFH) when any proposed activity authorized, carried out, or conducted by that agency may affect a listed species or designated critical habitat. If adverse effects to listed species are anticipated as the result of proposed actions, formal consultation would be required. As a result of formal consultation, USFWS or NMFS would issue a biological opinion (BO), which would include actions that the federal agency must complete to conduct the proposed activity. If proposed actions may affect, but are not likely to adversely affect listed species, Section 7 consultation can be done informally and without the need to conduct a comprehensive

biological assessment. In this case a letter of concurrence would be provided by the interested agency.

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

- 1. The plan provides a conservation benefit to the species.** The cumulative benefits of management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan (i.e., those areas deemed essential for conservation of the species). A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.
- 2. The plan provides certainty that the management plan will be implemented.** Persons charged with plan implementation are capable of accomplishing the objectives of the management plan and have adequate funding for implementing the management plan. They have the authority to implement the plan and have obtained all the necessary authorizations or approvals. An implementation schedule (including completion dates) for conservation effort is provided in the plan.
- 3. The plan provides certainty that the conservation effort will be effective.** The following criteria are considered when determining the effectiveness of the conservation effort. The plan includes: (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort; and (5) a duration sufficient to implement the plan and achieve the benefits of its goals and objectives.

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

The USFWS online project review process is available at:

<https://www.fws.gov/northeast/virginiafield/endangered/projectreviewprocess.html>

The Navy provided the 2010–2014 JEB Little Creek INRMP to USFWS for review and comment, and comments were received from USFWS on 15 October 2012 (USFWS 2012e). In their review of the INRMP the USFWS found the last comprehensive species inventory conducted by the VDCR-DNH in 1989 to be out of date and provided their recommendation that these inventories be conducted every 10 years. The USFWS also advised that the federally listed threatened piping plover be discussed in the INRMP due to their potential to occur at the Installation. This INRMP update has addressed these comments by including several species survey projects, including an Installation-wide species survey; a threatened, endangered and species of concern survey; and additional mammal surveys for the DPA. As recommended, supplemental information has been included in this update for protection of the federally threatened piping plover (see **Section 2.11.1**, **Section 3.6.2**, **Section 5.11.1**, and **Section 6.6.2**), and management measures identified in this INRMP will also benefit sea turtles, which have rarely been observed at JEB Little Creek, as well as benefit the rufa red knot, which has the potential to occur. To ensure that this INRMP update has addressed all the concerns identified by USFWS in their review of the 2010–2014 INRMP, this INRMP will be submitted to USFWS for review via their online project review system.

JEB Fort Story signed a MOU between the USFWS/BBNWR and JEBLCFS in 2016 (**Appendix L**). In accordance with this MOU, volunteers and USFWS employees patrol the beach front of the Installation between the areas of Gate 8 to the Cape Henry Lighthouse from 25 May through 31 August each year. Of primary concern for potential nesting along this shoreline are the federally threatened loggerhead sea turtle and the federally endangered Kemp’s ridley sea turtle. If a nest is located on JEB Fort Story, the nest will be left in situ or USFWS staff will relocate the entire nest to their nursery, in accordance with all specifications of the USFWS’s MOU issued to BBNWR in 2016 (**Appendix L**). The MOU between JEB Fort Story and BBNWR also stipulates that monitoring be conducted for the presence of stranded sea turtles and/or marine mammals (dead or alive). Any strandings observed will be reported to the Virginia Aquarium Stranding Response Team and the Installation Natural Resources Office.

The USFWS commented that the 2010 INRMP did not adequately identify and provide management recommendations for rufa red knot, a federally threatened species; the federally threatened piping plover; and the federally endangered roseate tern. Of these three federally listed species, piping plover is the only one known to occur at the Installation. Additionally, the USFWS commented that if future nesting of bald eagles is documented at the Installation, that these be identified in future updates to the INRMP, and that the Installation consider how Installation activities would negatively impact nesting sites, as required under the BGEPA. This INRMP update has been revised to address comments received from USFWS on the 2010 INRMP prepared

for the Installation, including the addition of several species survey projects, including an Installation-wide species survey; a threatened, endangered and species of concern survey; and additional mammal surveys for the DPA. As recommended, supplemental information has been included in this update for protection of the federally listed and candidate species for listing (**Section 2.11, Section 3.6, Section 4.3.5, Section 5.3.7, Section 5.11, Section 6.6, Section 7.2.3, and Section 7.3.4**), and management measures identified in this INRMP will also benefit sea turtles, which are occasionally observed at JEB Fort Story. To ensure that this INRMP update has addressed all the concerns identified by USFWS in their review of the 2009–2013 INRMP, this INRMP will be submitted to USFWS for review.

8.3 Achieving No Net Loss

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

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

8.4 National Environmental Policy Act Compliance

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

Statement (EIS) is required. Annual updates and revisions are covered by the original NEPA documentation unless a major change in installation mission or program scope occurs.

Decisions that affect future land or resource use that are associated with an INRMP require NEPA analysis. The NRM should refer to Secretary of the Navy Instruction 5090.6A and Chapter 5 of OPNAVINST 5090.1D for basic guidance on the preparation of NEPA documents. CEQ's "Regulations for Implementing NEPA" and "NEPA's 40 Most Asked Questions" (available at: http://ceq.hss.doe.gov/nepa/regs/ceq/toc_ceq.htm and <http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm>, respectively) provide further information. The INRMP and associated NEPA documentation should be prepared as individual documents to ensure that the viability, integrity, and intent of each are maintained. The intent of the INRMP is to outline projects that would fulfill Navy compliance and stewardship obligations, whereas the intent of the NEPA documentation is to analyze the impacts of the various program management options outlined within the INRMP. Although each of these documents are prepared as separate documents, they should be prepared simultaneously, as it is important for the Installation NRM to coordinate the two documents at the earliest possible stage to ensure that decisions reflect current environmental values, and avoid potential conflicts.

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

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

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

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

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

8.5 Project Development and Classification

This INRMP is a public document that requires the mutual agreement of the Installation, USFWS, and state fish and wildlife agencies. It is crucial therefore, that these entities reach a common understanding as to which projects are most likely to be funded through the sources identified in **Section 8.6**. An annual strategy must be adopted for INRMP funding that addresses the Installation's legal requirements. The Navy programming hierarchy is described in **Section 8.5.1** and Project Classification is described in **Section 8.5.2**.

8.5.1 Programming and Budgeting Classification

The Navy programming hierarchy is based on the following DoD funding level classifications, in accordance with DoDI 4715.03.

- **Class 0: Recurring Natural Resources Conservation Management Requirements.** Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing DoD's conservation program that are necessary to meet applicable compliance requirements (federal and state laws, regulations, presidential EOs, and Navy and DoD policies), or which are in direct support of the military mission.
- **Class I: Current Compliance.** Includes projects and activities needed because an installation is currently out of compliance (has received an enforcement action from a duly authorized federal or state agency, or local authority); has a signed compliance agreement or has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, presidential EOs, or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission. "Class I" also includes projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standards, DoD policies, or presidential EOs, but deadlines have not passed or requirements are not in force) but shall be if projects or activities are not implemented in the current program year.
- **Class II: Maintenance Requirements.** Includes those projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standards, presidential EOs, or DoD policies, but deadlines have not passed or requirements are not in force), but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Class II projects are those in which facilities will be out of compliance at a specific, impending published deadline if action is not taken. If not accomplished by the deadline, projects become Class I.
- **Class III: Enhancement Actions Beyond Compliance.** Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

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

ERL 4 – Environmental Compliance:

- Supports all actions specifically required by law, regulation or EO (DoD Class I and II requirements) just in time
- Supports all DoD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, and reporting and record keeping

- Supports recurring administrative, personnel and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DoD Class 0)
- Supports DoD policy requirement to comply with overseas Final Governing Standards and Overseas Environmental Baseline Guidance Document
- Supports minimum feasible Navy executive agent responsibilities, participation in Office of the Secretary of Defense (OSD) sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts

ERL 3 – Navy Proactive Involvement:

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

ERL 2 – Navy or DoD Policy Requirement:

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

ERL 1 – Navy Environmental Stewardship:

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

8.5.2 Project Classification

The list of projects described in this INRMP consist of both “must fund”, compliance-type projects and stewardship-type projects. “Must fund” conservation requirements are those projects and activities that are required to meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including EOs. These projects are designated ERL 4 or 3 in the Navy funding classification system, described in **Section 8.5.1**.

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

- Developing, updating, and revising INRMPs
- Salaries and annual training of professional personnel involved in the development and implementation of INRMPs, in accordance with Individual Development Plans
- Terms and conditions of BOs issued by USFWS or NMFS
- Baseline surveys needed to keep INRMPs current
- Biological surveys to determine population status of endangered, threatened and sensitive species
- Survey and monitoring programs to support MBTA and related permits
- Wetland surveys for planning, monitoring and/or permit applications
- Erosion control measures required to remain in compliance with natural resources protection regulations and to maintain land condition for realistic training operations
- Support of leadership roles or executive agent responsibilities such as for the Coastal America, and Chesapeake Bay agreements
- Memorandums of Agreement/Understanding commitments

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

INRMP projects are developed based on the unique circumstances facing an installation. INRMPs should include only valid projects and programs that enhance an installation’s natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership and proactive environmental stewardship. These projects are considered “stewardship” projects and fall under ERL 1 or 2 in the Navy classification system. Examples of stewardship projects include:

- Community outreach activities, such as Earth Day and Migratory Bird Day activities
- Education and public awareness projects such as interpretive displays, oral histories, watchable wildlife areas, nature trails, wildlife checklists, and conservation teaching materials
- Biological surveys or habitat protection for non-listed species
- Management and execution of volunteer and partnership programs
- Demonstration plantings of native plant materials
- Experimental conservation techniques
- Agriculture outlease improvements
- Forest stand improvements and other management efforts
- Wildlife management efforts

All INRMP Projects must be entered into the environmental program requirements network (EPR-web) system and receive approval up the chain of command prior to soliciting any signatures on

the INRMP. CNO N45 is the final authority for designating the appropriate ERL for a given INRMP Project.

8.6 Funding Source

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

8.6.1 Operations and Maintenance, Navy Environmental Funds

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

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

O&MN environmental funds are expected to be the primary source of funding for JEBLCFS INRMP Environmental Compliance Projects.

8.6.2 Sikes Act Revenues

Sikes Act Revenues include funds received for hunting and fishing permits and fees that are primarily collected as part of installation hunting, fishing or trapping programs. These fees are deposited and used in accordance with the Sikes Act and DoD financial management regulations. The Sikes Act specifies that user fees collected for hunting, fishing or trapping shall be used only on the installation where they are collected, and be used exclusively for fish and wildlife conservation and management at that installation. It is unlikely that JEBLCFS would implement a hunting program; however, fees are collected as part of the fishing permits issued for recreational fishing in the lakes and coastal areas. These fees may be used to support natural resource management projects.

8.6.3 The Legacy Resource Management Program

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

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

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

Legacy funds should be considered a potential funding source for JEBLCFS INRMP Projects.

8.6.4 Navy Forestry Revenues

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

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

- Fish and wildlife habitat improvements or modifications
- Range rehabilitation where necessary for support of wildlife
- Control of off-road vehicle traffic
- Specific habitat improvement projects and related activities
- Adequate protection for species of fish, wildlife, and plants considered threatened or endangered

The amount of funds available through Forestry Revenues varies from year to year. It is important to note that the amount of funds remaining for natural resources management is relatively small, and although installations are not required to have a timber harvesting plan to be eligible for funds from the DoD Forestry Reserve Account, Reserve Account funds cannot be used for “must fund”

environmental compliance projects. DoD Forestry Reserve Account funds are a potential source of funding for JEBLCFS INRMP Projects that are not classified as environmental compliance projects.

8.6.5 Agriculture Outleases

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

8.6.6 Recycling Funds

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

8.6.7 Strategic Environmental Research and Development Funds

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

8.6.8 Non-Department of Defense Funds

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

8.7 Commitment

This INRMP will require formal adoption by the Regional Commander or Installation Commander to ensure commitment for pursuing funding, and to execute all ERL 4 Projects, subject to the availability of funding. Funding of ERL 4 Projects should be pursued within the specific timeframes identified in **Appendix A** of this INRMP.

8.8 Use of Cooperative Agreements

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

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

JEBLCFS does not currently have any cooperative agreements in place.

8.9 Project Implementation Schedule

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

Relevant legal drivers and initiatives that were identified for each management issue in this INRMP are also summarized in the project table provided in **Appendix S**. Primary statutes and regulations identified in the project table include the CWA, Sikes Act, ESA, NEPA, and MBTA; state conservation laws; Navy and DoD instructions and policies; and presidential EOs.

9.0 MANAGEMENT RECOMMENDATIONS – JOINT EXPEDITIONARY BASE LITTLE CREEK – FORT STORY

This section presents a summary of the management recommendations that were described for each of the JEBLCFS Management Units in **Section 4.0** and **Section 7.0**. The recommendations have been organized by ERL, and then by natural resource management issues described in **Section 3.0** and **Section 6.0**.

For prioritization and budgeting purposes, each action or project recommended in this INRMP is listed in the project table provided in **Appendix A**. The prime legal drivers, programming and budgeting classification including the Navy assessment level, cost estimate, potential funding source, and schedule for each action or project is identified in the **Appendix A** project table. Natural resources program administration and day-to-day program activities are not included in the table. Policy guidance provided in DoDI 4715.03 states that each military service will be responsible for obtaining funding for natural resources projects. The prioritized natural resources summarized in this section and **Appendix A** utilizes the program hierarchy described in **Section 8.5.1** and the project classification system described in **Section 8.5.2**.

Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers (Benton et al. 2008) provides background information for NRM, as well as examples and tools to aid in the development of ecosystem-based biodiversity conservation strategies in the context of the military mission and preparations of INRMPs. This guide is useful source of assistance and guidance, and should be consulted for additional information when implementing any of the following management recommendations. Due to the inherent difficulties of improving conservation and management of natural resources, while still meeting the military mission, there will always be opportunities to improve management practices in some way, promote stewardship, and contribute to the military mission through biodiversity conservation.

9.1 Joint Expeditionary Base Little Creek Management Recommendations

Each of the following recommendation or guideline falls within one of four ERLs, as listed below in descending order of priority:

- ERL 4: Environmental Compliance
- ERL 3: Navy Proactive Involvement
- ERL 2: Navy or DoD Policy Requirement
- ERL 1: Navy Environmental Stewardship

Refer to **Section 8.5.1** for the specific descriptions that are associated with each of the ERLs.

9.1.1 Environmental Readiness Level 4: Environmental Compliance

Marine Resources Protection

- Report all marine mammals or sea turtles to the Virginia Aquarium’s Stranding Response Team.
- Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities that have the potential to impact marine resources.

Coastal Zone Protection

- Review Installation plans and proposed actions to ensure consistency with the enforceable policies of the Virginia Coastal Zone Management Program.
- Obtain a CCD when required.

Wetlands and Water Quality Protection

- Assist action proponents in applying for, reviewing, and obtaining required federal and state wetlands protection permits.
- Review all Installation development plans and actions to ensure conservation issues are identified and considered early in the planning process for NEPA consistency.
- Re-evaluate wetland inventories every five years for accuracy and obtain Preliminary Jurisdictional Determination from USACE.

Urban Forestry

- Conduct an urban tree inventory and develop an Installation urban forest management plan.

Fish and Wildlife Management

- Conduct a baseline bat survey to establish data on bat species richness and habitat use on Installation. Funding programmed for 2018 and in 2023.
- Evaluate impact to wildlife and bats during Environmental Checklist Process for construction/disturbance activities, maintaining snags and wildlife habitat when safe.
- Conduct a bird survey to update species richness data since the 2013 Installation bird survey.
- Acquisition and maintenance of an all-terrain vehicle for wildlife monitoring, habitat restoration projects, and dune projects.

Outdoor Recreation and Environmental Awareness

- Integration of an electronic permit system for the purchase of outdoor recreation permits online, including user data collection interface and maintenance of system.

Habitat Conservation and Restoration

- Conduct a Dune Assessment of shoreline areas to identify dune protection needs and recommendations for restoration measures since the 2012 Dune Study.

Cultural Resources

- Consult with the RHPO and SHPO during the planning process for any activity that has the potential to impact cultural resources.

Training and Professional Development

- Update the INRMP at the end of the five-year plan period by December 2022.

9.1.2 Environmental Readiness Level 3: Navy Pro-Active Involvement

Marine Resources Protection

- Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings
- Assist Installation personnel with the identification of marine mammals as needed.

Wetlands and Water Quality Protection

- Continue to participate in Chesapeake Bay Agreements to improve water quality within the Chesapeake Bay watershed.

Urban Forestry

- Participate in the identification and marking of damaged or hazardous trees for removal.
- Review development plans and actions where tree removal is proposed. Provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.
- Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators.
- Monitor forest conditions in the Natural Areas Management Unit and coordinate any required tree maintenance or removal with the First Lieutenants Division or Seabees.

Fish and Wildlife Management

- Evaluate recommendations from the 2015 sea turtle lighting survey and apply recommendations to reducing unnecessary lighting.
- Encourage the growth of vegetation by reducing mowing along forest edges, lake shorelines, and in other areas to improve food and cover for wildlife, and to reduce the attractiveness of shore areas to ducks and geese.
- Coordinate with VDGIF to conduct fish and water quality surveys approximately every four years on Lake Bradford and Chubb Lake.
- Monitor the beach area for shorebird nesting activity from April through July.
- Implement recommendations in the Raptor Management Plan, including an Owl Nesting Program.

Outdoor Recreation and Environmental Awareness

- Inspect the Heros Circle Nature Trail and picnic area and other park areas and coordinate with the Seabees and the First Lieutenants Division for needed repairs and maintenance to prevent erosion. Maintain and clean signs.

Habitat Conservation and Restoration

- Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of the dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures including

identifying and maintaining only a few critical beach access routes, installing rope and sand fencing, posting informational signs, and planting native beach grasses.

- Implement the dune restoration projects identified in the 2012 Dune Ecological Assessment and Restoration Report.
- Coordinate with the Naval Amphibious Construction Commands to install sand fencing and Christmas trees at the Installation of eroding primary sand dunes.

Invasive Species and Pest Management

- Implement an invasive species survey and management plan for JEB Little Creek.
- Monitor the maritime grassland communities for invasive species, including Japanese sedge; remove and restore areas where invasive species are identified, and monitor for success.

9.1.3 Environmental Readiness Level 2: Navy or Department of Defense Policy Requirement

Wetlands and Water Quality Protection

- Implement BMPs on all construction projects to reduce detrimental effects of nonpoint source pollution.
- Monitor and maintain designated “No Mowing” areas at riparian buffer sites.

Oil and Hazardous Substances

- Provide maps and other information pertaining to sensitive natural resources that are required for oil spill response planning as requested.

Urban Forestry

- Periodically monitor planted small trees and shrubs to identify major health problems, and trim or prune only when required to address health problems.

Outdoor Recreation and Environmental Awareness

- Post notices in appropriate media outlets (newsletter, the Installation newspaper, website, or public service announcements) as needed to provide outdoor recreation and environmental awareness information to Installation personnel and residents.

Invasive Species and Pest Management

- Identify and mark targeted invasive species in the Heros Circle Nature Trail Area and wildlife viewing platform to be treated and coordinate with trained, certified pesticide applicators to conduct treatments.
- Assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas, and monitoring nuisance wildlife, including geese and implement educational measures as necessary.

9.1.4 Environmental Readiness Level 1: Navy Environmental Stewardship

Fish and Wildlife Management

- Assess potential site locations and install nesting baskets in locations appropriate for mallard or black duck; inspect and repair wood duck boxes, as necessary, and clean and replace old bedding each fall.
- Conduct annual inspections and maintenance of bluebird nest boxes during the fall and monitor nesting activity throughout the nesting season.
- Evaluate the need for, and possible locations for retrofitting light poles and installing osprey nesting platforms to reduce risk of fire and electrocution in coordination with USFWS and VDGIF.
- Inspect osprey nest platforms during the fall, and monitor nesting activity at osprey nesting platforms and nest boxes throughout the nesting season.
- Provide for protection of native wildlife inhabiting dune habitats by controlling introduced predators (e.g., domestic free-ranging and feral cats), and removing sources of garbage and food that may attract native predators (e.g., raccoons and skunks).
- Conduct a frog and toad call survey at a minimum of every five years with three surveys conducted within the survey year: once in the early spring, once in mid-spring, and once in early summer following the route shown in **Figure 3-3**.

Habitat Conservation and Restoration

- Monitor oyster recruitment in Little Creek Cove oyster reef.

Invasive Species and Pest Management

- Monitor the installation for invasive nutria (*Myocaster coypus*) on a quarterly basis. If detected, coordinate with Virginia Tech Conservation Management Institute and Regional Game Warden for removal.

Training and Professional Development

- Attend basic ArcView and product update training.
- Attend wetlands delineation and regulatory training.
- Attend marine mammal stranding workshop.

9.2 Joint Expeditionary Base Fort Story Management Recommendations

Each of the following recommendation or guideline falls within one of four ERLs, as listed below in descending order of priority:

- ERL 4: Environmental Compliance
- ERL 3: Navy Proactive Involvement
- ERL 2: Navy or DoD Policy Requirement
- ERL 1: Navy Environmental Stewardship

Refer to **Section 8.5.1** for the specific descriptions that are associated with each of the ERLs.

9.2.1 Environmental Readiness Level 4: Environmental Compliance

Marine Resources Protection

- Report all marine mammals or sea turtles to the Virginia Aquarium’s Stranding Response Team.
- Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities that have the potential to impact marine resources.

Shoreline Management

- Conduct a Dune Assessment of shoreline areas to identify dune protection needs and recommendations for restoration measures since the 2012 Dune Study.

Wetlands and Water Quality Protection

- Maintain and manage the 1.7 ac (0.7 ha) wetland mitigation site in perpetuity as required by permits received following fill of 0.85 ac (0.34 ha) of wetlands for the Small Arms Test and Evaluation Compound. No alterations can be made to the 1.7 ac wetland mitigation system without coordination and approval from VDEQ.
- Re-evaluate wetland inventories every five years for accuracy and obtain Preliminary Jurisdictional Determination for USACE.

Wildlife Management

- Evaluate impact to wildlife and bats during Environmental Checklist Process for construction/disturbance activities, maintaining snags and wildlife habitat when safe.
- Acquisition and maintenance of an all-terrain vehicle for wildlife monitoring, habitat restoration projects, and dune projects
- Conduct planning level surveys for the existence of reptile and amphibian species, specifically federal candidate and state-listed species.

Fisheries Management

- Integration of an electronic permit system for the purchase of outdoor recreation permits online, including user data collection interface and maintenance of system.

Rare, Threatened, and Endangered Species Management

- Maintain the Sea Turtle Patrol MOU with USFWS Back Bay National Wildlife Refuge for detection and monitoring of nesting sea turtles.
- Manage for rare, threatened, and endangered species known or with the potential to occur at the Installation, including federal candidate species for listing and other species at risk identified in the Virginia SWAP.
- Conduct planning level surveys for reptiles and amphibians, including federal candidate species (found in the USFWS National Listing Workplan) and state-listed species.
- Conduct a bird survey to update species richness data since the 2013 Installation bird survey.

- Conduct a baseline bat survey to establish data on bat species richness and habitat use on Installation. Funding programmed for 2020.
- Monitor Rafinesque’s eastern big-eared bat roosting sites (including known artificial roosts, hibernacula, and maternity roost sites located within abandoned Buildings 219 and 221), other roost sites as they become identified, and natural roost sites. Provide information annually to VDGIF regarding Rafinesque’s eastern big-eared bat use of the Installation.

Training Area Management

- Conduct an urban tree inventory and develop an Installation urban forest management plan.

Cultural Resources

- Consult with the RHPO and SHPO during the planning process for any activity that has the potential to impact cultural resources.

Program Management

- Update the INRMP at the end of the five-year plan period by December 2022.

9.2.2 Environmental Readiness Level 3: Navy Pro-Active Involvement

Marine Resources Protection

- Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings
- Assist Installation personnel with the identification of marine mammals as needed.

Shoreline Management

- Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures identified in the 2012 JEBLCFS Dune Assessment report, including identifying and maintain only a few critical beach access routes, installing rope and sand fencing, posting informational signs, planting native beach grasses, and conducting additional flora and wildlife surveys.
- Implement stormwater management projects to support shoreline erosion control, including fertilization of dune vegetation and related vegetation management practices.
- Monitor and prioritize erosion control sites and implement soil erosion control projects as needed.
- Conduct a climate change assessment to determine potential effects from climate change related impacts such as sea level rise.

Wetlands and Water Quality Protection

- Conduct a baseline watershed assessment for JEB Fort Story lakes, including monitoring of water quality and wetlands, especially along the southern boundary where there is an elevation risk of impacts from runoff associated with Shore Drive. Assessment should include an evaluation of structures surrounding physical habitat that may influence water

quality, and condition of the resident aquatic community. Snake Lake, Hospital Road Lake, and East Entrance Lake should be included in the assessment to update data collected in a 1991 study (USFWS 1991).

Wildlife Management

- Coordinate with the regional game warden for nuisance control of furbearers.

Rare, Threatened, and Endangered Species Management

- Evaluate recommendations from the 2015 sea turtle lighting survey and apply recommendations to reducing unnecessary lighting.

Conservation Awareness

- Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing or destroying any wildlife species.

9.2.3 Environmental Readiness Level 2: Navy or Department of Defense Policy Requirement

Pest Management

- Implement pest management operations in accordance with the IPMP.
- Permanently remove feral cats and dogs (regional pest controller) from the Installation per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.

9.2.4 Environmental Readiness Level 1: Navy Environmental Stewardship

Wetlands and Water Quality Management

- Publish Wetland and Aquatic Sites Restrictions.
- Establish and maintain 100-foot (30-meter) buffers around lakes and wetlands to restrict incompatible activities.

Terrestrial Habitat Management

- Restore lands with plants that attract pollinators, and include pollinator-friendly plants in landscaping projects and grounds maintenance activities.

Wildlife Management

- Monitor furbearer populations to track trends in predation of ground-nesting birds.
- Establish permanent sample plots and annually monitor avian species populations.
- Assess potential site locations and install artificial bird boxes and bat roosts, and monitor use annually.
- Advise the Installation community against intentionally feeding wildlife, especially mammalian species such as fox and raccoon, and on measures to take to reduce negative interactions with wildlife.

Fisheries Management

- Partner with VDGIF to survey fish populations in Installation lakes to monitor size, structure, and biological integrity of fish communities.

Pest Management

- Monitor the installation for invasive nutria (*Myocaster coypus*) on a quarterly basis. If detected, coordinate with Virginia Tech Conservation Management Institute and Regional Game Warden for removal.

Conservation Awareness

- Participate annually in conservation awareness events including Clean the Bay Day activities.
- Disseminate educational outreach information related to natural resources activities and management at JEB Fort Story through *The Flagship* and other publications.
- Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.
- Provide natural resources conservation training at Officer/Non-Commissioned Officer Professional Development classes during special events and upon request.

Program Management

- Develop and maintain a GIS database for JEB Fort Story natural resources data.

This page intentionally left blank.

10.0 REFERENCES

- AH Environmental Consultants. 2009. Storm Water Pollution Prevention Plan, JEB Little Creek – Fort Story West. Prepared for CNRMA, Norfolk, VA.
- Alliance for the Chesapeake Bay. 2004. SAV Planting – Little Creek Naval Amphibious Base, VA.
- Armed Forces Pest Management Board. 2012. Armed Forces Pest Management Board Technical Guide No. 44, Bed Bugs-Importance, Biology, and Control Strategies. Silver Spring, MD: Armed Forces Pest Management Board Retrieved from <http://www.afpmb.org/sites/default/files/pubs/techguides/tg44.pdf>.
- Bailey, R.G. 1994. Ecoregions of the United States. Map, Revised Edition. Scale 1:7,500,000. U.S. Department of Agriculture, Forest Service, Washington, D.C.
- Bassi, J. 2017. Personal communication on 19 October 2017 between J Bassi (NAVFAC) and S. Kent (CH2M).
- Benton, N., J.D. Ripley, and F. Powledge. 2008. Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers. The Nature Conservancy, Arlington, Virginia.
- Boyce, C. 2016. Personal communication on 04 February 2016 between C Boyce (VDGIF) and S. Waligora (NAVFAC).
- Carpenter, E.S. 2008. Roosting Affinities of Rafinesque’s Big-eared Bat (*Corynorhinus rafinesquii*) in Southeastern Virginia. M.S. Thesis. Christopher Newport University. Newport News, Virginia.
- Centers for Disease Control and Prevention. 2011. Annual U.S. HPS Cases and Case-fatality, 1992-2011. <http://www.cdc.gov/hantavirus/surveillance/annual-cases.html>. Accessed 18 January 2013.
- Chesapeake Bay Local Assistance Department. 2002. Chesapeake Bay Preservation Area Designation and Management. <http://www.cblad.state.va.us/docs/Regs3-01-02.pdf>. Accessed 02 July 2004.
- CH2M HILL, Inc. (CH2M). 2016. *Site Management Plan Fiscal Years 2017 through 2021*. Joint Expeditionary (JEB) Little Creek – Fort Story. JEB Little Creek Virginia Beach, Virginia. August.
- City of Virginia Beach. 2009. Comprehensive Plan Policy Document. <http://www.vbgov.com/government/departments/planning/2009CompPlanProcess/Pages/default.aspx/planmaps/Pages/default.aspx>. Accessed 18 January 2013.
- City of Virginia Beach. 2012a. Annual Water Quality Report. Virginia Beach Department of Public Utilities. http://www.vbgov.com/government/departments/public-utilities/waterquality/Documents/2012%20CCR_web.pdf. Accessed 18 January 2013.
- City of Virginia Beach. 2012b. Code of Ordinances – City of Virginia Beach, Virginia. <http://library.municode.com/index.aspx?clientID=10122&stateID=46&statename=Virginia>. Accessed 18 January 2013.

References

- College of William and Mary, Department of Geology. n.d. Coastal Plain province, The Geology of Virginia.
http://web.wm.edu/geology/virginia/provinces/coastalplain/coastal_plain.html?svr=www. Accessed 18 January 2013.
- Commander, Navy Installations Command (CNIC). n.d. Joint Expeditionary Base Little Creek – Fort Story. Joint Expeditionary Base Security Precinct.
<http://www.cnic.navy.mil/JEBLCFS/OperationsAndManagement/Security/index.htm>. Accessed 21 January 2013.
- CNIC. 2012. INRMP Content and Format. Sikes Act Training: INRMP Content and Format. Final PowerPoint Presentation. December.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service, U.S. Department of Interior, Washington, D.C.
- Cowardin, L.M., V. Carter, F.C. Golet, and E. LaRoe. 1992. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service, Washington, D.C. Accessed 24 May 2004.
- U.S. Department of Defense (DoD). 1996. Urban Forestry Manual.
<https://www.denix.osd.mil/denix/Public/Library/Forestry/forestry.html>.
- DoD. 2011. Adaptation Planning for Climate Change in Integrated Natural Resources Management.
http://www.dodnaturalresources.net/files/DoD_CC_INRMP_Fact_Sheet_01-16-12.pdf. Accessed 18 February 2013.
- DoD. 2012a. Readiness and Environmental Protection Initiative (REPI) Fact Sheet.
<http://www.repi.mil/Documents.html#Info>. Accessed 21 February 2013.
- DoD. 2012b. Implementation of the DoD Coordinated Bird Monitoring Plan. DoD Legacy program, Project # 09-440. http://www.dodpif.org/legacy/09-440-CBM_Implementation_FS.pdf. Accessed 21 February 2013.
- DoD. 2017. About the Department of Defense (DOD). <http://www.defense.gov/about/>. Accessed 15 June 2017.
- DoD and United States Fish and Wildlife Service (DoD and USFWS). 2002. Integrated Natural Resources Management Plans. March 2002.
http://library.fws.gov/Pubs9/es_integrated_nrplans02.pdf. Accessed 18 January 2013.
- DoD Partners in Flight. n.d. Checklist of Birds: Naval Amphibious Base, Little Creek. http://www.dodpif.org/checklists/nab_lc.htm. Accessed 18 January 2013.
- DoD Sustainable Ranges Initiative. n.d. Readiness and Environmental Protection Initiative (REPI). <http://www.denix.osd.mil/sri/repi/>. Accessed 06 March 2013.
- Department of the Navy. 1987. Real Estate Operations and Natural Resources Management Procedural Manual. NAVFAC P-73, Volume II.
https://portal.navfac.navy.mil/portal/page/portal/docs/doc_store_pub/p-73%20vol%20ii.pdf. Accessed 18 January 2013.

References

- Department of the Navy. 1997. Integrated Natural Resources Management Plan, Naval Amphibious Base Little Creek, Virginia Beach, Virginia. Prepared for Atlantic Division, Naval Facilities Engineering Command by Geo-Marine, Inc., Newport News, Virginia.
- Department of the Navy. 1998. Final Environmental Impact Statement; Increased Flight and Related Operations in the Patuxent River Complex Patuxent River, Maryland. Prepared for the Department of Navy by TAMS Consultants, Inc.
- Department of the Navy. 1999. An Archeological Assessment of Naval Amphibious Base Little Creek, Virginia Beach, Virginia. Atlantic Division Naval Facilities Engineering Command, Norfolk, Virginia.
- Department of the Navy. 2000a. Ecological Assessment of the Beaches and Dunes Management Unit at Naval Amphibious Base Little Creek, Virginia Beach, Virginia. Prepared for Atlantic Division Naval Facilities Engineering Command, by Geo-Marine, Inc., Newport News, Virginia.
- Department of the Navy. 2000b. Chesapeake Bay Riparian Forest Buffer Site Assessments. Prepared for Atlantic Division Naval Facilities Engineering Command, by Geo-Marine, Inc., Newport News, Virginia.
- Department of the Navy. 2000c. Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan, Naval Amphibious Base Little Creek, Norfolk, Virginia. Navy Public Works Center, Norfolk, Virginia.
- Department of the Navy. 2002. Mid-Atlantic Region Overview Regional Shore Infrastructure Plan. Prepared for Commander, Navy Region Mid-Atlantic Division, Naval Facilities Engineering Command, by EDAW, Inc.
- Department of the Navy. 2004. Prevention, Reporting, Response, and Cleanup of Oil and Hazardous Substance
Spills for Hampton Roads Installations.
https://portal.navfac.navy.mil/portal/page/portal/docs/doc_store_pub/5090.3_0.pdf.
Accessed 18 January 2013.
- Department of the Navy. 2006. Integrated Natural Resources Management Plan Guidance for Navy Installations. How to Prepare, Implement, and Revise Integrated Natural Resource Management Plans (INRMP). April 2006.
- Department of the Navy. 2010. Integrated Natural Resources Management Plan for Joint Expeditionary Base Fort Story. Prepared by NAVFAC MIDLANT Environmental Division, Joint Expeditionary Base Little Creek – Fort Story, Virginia Beach, Virginia.
- Department of the Navy. 2011. Raptor Management Plan Joint Expeditionary Base Little Creek, Virginia.
Atlantic Division Naval Facilities Engineering Command, Norfolk, Virginia.
- Department of the Navy. 2012a. Ecological Assessment and Restoration Report, Dune Ecological Assessment Project, Joint Expeditionary Base Little Creek – Fort Story. Prepared for Atlantic Division, Naval Facilities Engineering Command by Tetra Tech, Inc., Arlington, Virginia.

References

- Department of the Navy. 2012b. Vegetation Survey Report, Dune Ecological Assessment Project, Joint Expeditionary Base Little Creek – Fort Story. Prepared for Atlantic Division, Naval Facilities Engineering Command by Tetra Tech, Inc., Arlington, Virginia.
- Department of the Navy. 2012c. Mammal Survey Report. Dune Ecological Assessment Project, Joint Expeditionary Base Little Creek – Fort Story. Prepared for Atlantic Division, Naval Facilities Engineering Command by Tetra Tech, Inc., Arlington, Virginia.
- Department of the Navy. 2012d. *Amphibian and Reptile Survey Report Dune Ecological Assessment Project Joint Expeditionary Base Little Creek – Fort Story, Virginia*. NAVFAC Atlantic Biological Resource Services. Contract: N62470-08-D-1008; Task Order: WE26. DRAFT – July.
- Department of the Navy. 2016a. Joint Expeditionary Base Little Creek – Fort Story Commander's Environmental Policy. 15 September 2016.
http://www.cnrc.navy.mil/content/dam/cnrc/cnrma/pdfs/JEBLCFS/Environmental/Commander%27s%20Environmental%20Policy%209_16.pdf. Accessed 05 January 2017.
- Department of the Navy. 2016b. *Lighting surveys for sea turtle nest management, Joint Expeditionary Base Fort Story, Virginia Beach, Virginia*. Draft report. Prepared for Naval Facilities Engineering Command, Mid-Atlantic Region by GMI-AECOM Joint Venture; Versar, Inc.; Azura Consulting LLC; and Virginia Aquarium & Marine Science Center Foundation.
- Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Ewing, A.M. 2010. Personal communication on 17 November 2010 between A. M. Ewing (Virginia Department of Game and Inland Wildlife) and L. Rivard (Tetra Tech, Inc.).
- Fleming, Gary P. and Karen D. Patterson. 2017. Natural Communities of Virginia: Ecological Groups and Community Types: a listing with conservation status ranks. Natural Heritage Technical Report 17-07. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 36 pages.
- Fort Eustis. 2008. Fort Story Army Defense Environmental Restoration Program Installation Action Plan Fiscal Year 2008. U.S. Army Transportation Center, Fort Eustis, Virginia.
- Galvez, J.I. and G.L Swihart. 2000. Assessment of Fishery Resources and Water Quality Parameters on Little Creek Naval Amphibious Base, Virginia. US Fish and Wildlife Service Office of Fishery Assistance, Gloucester, Virginia.
- Guilfoyle, M.P., and R.A. Fischer. 1999. Breeding Bird Survey Results on U.S. Army Garrisons Fort Eustis and Fort Story, VA.
- Guilfoyle, M.P., and R.A. Fischer. 2000. Spring Migration Bird Survey Results on U.S. Army Garrisons Fort Eustis and Fort Story, VA.
- Gulf South Research Corporation, 2013. *Field Summary Report Species Survey at Joint Expeditionary Base, Fort Story, Virginia Beach, Virginia*. Final. November.
- Hager, C. 2017. Final Report Operation of the Navy's Telemetry Array in the Lower Chesapeake Bay: 2016 Annual Report. Submitted by HDR. May.

References

- Hager, C., J. Kahn, J. C. Watterson, J. Russo, and K. Hartman. 2014. Evidence of Atlantic Sturgeon Spawning in the York River System. *Transactions of the American Fisheries Society* 143: 1217-1219.
- Hardaway, C.S., Jr., D. A. Milligan, J.P.Y. Maa, and G R. Thomas. 1997. Naval Amphibious Base Little Creek Shoreline Management Plan and Officers Beach Shore Protection Evaluation. Virginia Institute of Marine Science, Gloucester Point, Virginia.
- Hardaway, C.S., Jr., D.A. Milligan, G.R. Thomas, L.M. Meneghini. 2005. Little Creek Naval Amphibious Base Chesapeake Bay Shoreline: Part 1 Shoreline Management Plan Update.
- Joint Venture, GMI, AECOM and Versar. 2015. *Dune Stabilization Methodology Joint Expeditionary Base Fort Story, Virginia Beach, Virginia*. Draft. September.
- Kahn, J. E., C. Hager, J. C. Watterson, J. Russo, K. Moore, and K. Hartman. 2014. Atlantic Sturgeon Annual Spawning Run Estimate in the Pamunkey River, Virginia. *Society* 143: 1508-1514.
- Lutcavage, M. and J.A. Musick. 1985. Aspects of the Biology of Sea Turtles in Virginia. *Copeia* 1985: 449-456.
- The Mammals of Texas – Online edition. n.d. <http://www.nsr.ttu.edu/tmot1/myotaust.htm>. *Southeastern myotis*. Accessed 17 October 2016.
- Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds. 2014: *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.
- National Audubon Society. 2012. Christmas Bird Count data for circles in / around Hampton Roads. 2005–2011. Accessed at <http://birds.audubon.org/christmas-bird-count>. Retrieved 26 October 2012.
- National Oceanic and Atmospheric Administration (NOAA). 2003. Environmental Sensitivity Index (ESI) Maps. <http://response.restoration.noaa.gov/maps-and-spatialdata/download-esi-maps-and-gis-data.html>. Accessed 18 January 2013.
- NOAA. 2016a. NOWData – NOAA Online Weather Data. Monthly Mean Max Temperature for Norfolk Intl. AP, VA (1946-2016). <http://w2.weather.gov/climate/xmacis.php?wfo=akq>. Accessed 31 August 2016.
- NOAA. 2016b. NOWData – NOAA Online Weather Data. Monthly Mean Min Temperature for Norfolk Intl. AP, VA (1946-2016). <http://w2.weather.gov/climate/xmacis.php?wfo=akq>. Accessed 31 August 2016.
- NOAA. 2016c. NOWData – NOAA Online Weather Data. Monthly Mean Avg Temperature for Norfolk Intl. AP, VA (1946-2016). <http://w2.weather.gov/climate/xmacis.php?wfo=akq>. Accessed 31 August 2016.
- NOAA. 2016d. NOWData – NOAA Online Weather Data. Monthly Total Precipitation for Norfolk Intl. AP, VA (1946-2016). <http://w2.weather.gov/climate/xmacis.php?wfo=akq>. Accessed 31 August 2016.

References

- NOAA. 2016e. Leatherback Turtle (*Dermochelys coriacea*).
<http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.html>. Accessed November 6, 2017.
- NOAA. 2017a. Atlantic Sturgeon Recovery Program.
<https://www.greateratlantic.fisheries.noaa.gov/protected/atlsturgeon/>.
Accessed November 6, 2017.
- NOAA. 2017b. Kemp's Ridley Turtle (*Lepidochelys kempii*).
<http://www.nmfs.noaa.gov/pr/species/turtles/kempstridley.html>. Accessed November 6, 2017
- Naval Amphibious Base Little Creek (NAVPHIBASE). No date. Naval Amphibious Base Little Creek History. http://cnic.navy.mil/JEBLCFS/About/History/CNICP_A149770.
- NAVPHIBASE. 1992. Water Quality and Living Resources Assessments of Five Sites in Little Creek Harbor, U.S. Naval Amphibious Base Little Creek. Technical Report No. 878. Applied Marine Research Laboratory, Old Dominion University, Norfolk, Virginia.
- NAVPHIBASE. 2003. Naval Amphibious Base Little Creek. Public Affairs Office notice on baseloading.
- Naval Facilities Engineering Command (NAVFAC). 2014. *Telemetry Tracking of Atlantic Sturgeon in the Lower Chesapeake Bay*. Final Report
- NAVFAC. 2016. *Integrated Pest Management Plan*. Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, VA.
- NAVFAC MIDLANT. 2013. NAVFAC Mid-Atlantic Herpetofauna Database.
- NAVFAC MIDLANT. 2016. *Biological Assessment Sea Turtle Management at Joint Expeditionary Base Fort Story Virginia Beach, Virginia*. May.
- North American Bluebird Society. 2012. North American Bluebird Society Factsheet: Getting Started with Bluebirds.
<http://www.nabluebirdsociety.org/PDF/FAQ/NABS%20factsheet%20-%20Getting%20Started%20-%2024May12%20DRAFT.pdf>. Accessed 18 January 2013.
- Palermo, M.R., P.A. Zappi, T.M. Dillon, V.A. McFarland, F.J. Reilly, Jr., D.W. Moore, T.E. Myers, N.W. Scheffner, L.Z. Hales, and E.L. Thackston. 1993. Long-Term Management Strategy for Dredged Material Disposal for Naval Weapons Station, Yorktown, Yorktown, Virginia; Naval Supply Center, Cheatham Annex, Williamsburg, Virginia; and Naval Amphibious Base, Little Creek, Norfolk, Virginia. Phase II: Formulation of Alternatives, Miscellaneous Paper EL-93-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
<http://el.erdc.usace.army.mil/elpubs/pdf/mpel93-1.pdf>. Accessed 18 January 2013.
- Roble, S.M. 2010. Natural Heritage Resources of Virginia: Rare Animal Species. Natural Heritage Technical Report 10-12. Virginia Department of Conservation and Recreation, Richmond, Virginia. 45 pp.
http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml#lists. Accessed 24 May 2013.

References

- Schaeffer, Brad. 2013. Personal Communication (Email): Piping Plover Sighting at JEB Fort Story and NASO DNA. Received 09 April 2013.
- Secretary of Veteran Affairs and Homeland Security. n.d. Installation Update/Issues. Briefing Order. PowerPoint presentation.
<http://www.vahs.virginia.gov/Agencies/VMAC/docs/042412-meeting/All-Installation-Briefings.ppt>. Accessed 18 January 2013.
- Strategic Environmental Research and Development Program (SERDP). n.d. Climate Change and Impacts of Sea Level Rise. <http://www.serdp.org/Featured-Initiatives/Climate-Change-and-Impacts-of-Sea-Level-Rise>. Accessed 20 February 2013.
- SERDP. 2013. Assessing Impacts of Climate Change on Coastal Military Installations: Policy Implications. <http://www.serdp.org/Featured-Initiatives/Climate-Change-and-Impacts-of-Sea-Level-Rise>. Accessed 21 February 2013.
- Smith, B.S. and G.E. Harlow, Jr. 2002. Conceptual Hydrogeologic Framework of the Shallow Aquifer System at Virginia Beach, Virginia. Water-Resources Investigations Report 01-4262. U.S. Department of the Interior, Geological Survey, and City of Virginia Beach, Department of Public Utilities. Richmond, Virginia.
- Society for Ecological Restoration International. 2009. Ecological Restoration and Rare Species Management in Response to Climate Change. Policy Position Statement. August 2009.
- Somma, L.A., A. Foster, and P. Fuller. 2012. *Trachemys scripta elegans*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.
<http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=1261>. Accessed 18 January 2013.
- Stein, B.A., Ph.D. 2008. "Biodiversity and the Military Mission." *Conserving Biodiversity on Military Lands. A Guide for Natural Resource Managers*. NatureServe.
<http://www.dodbiodiversity.org/introduction/index.html>. Accessed 18 January 2013.
- Stevenson, D.J. 1996. A Natural Heritage Resource Inventory of Fort Story, Virginia. Natural Heritage Technical Report 96-12. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to the U.S. Department of the Army.
- Strickland, J. 2010. Welcome to the South Atlantic Landscape Conservation Cooperative. Available online at:
http://www.southatlanticlcc.org/notes/Welcome_to_the_South_Atlantic_Landscape_Conservation_Cooperative. Accessed 03 January 2013.
- Swihart, G.L. and J.I. Galvez. 1996. Assessment of Fishery Resources and Water Quality Parameters on Little Creek Naval Amphibious Base, Virginia. U.S. Fish and Wildlife Service, Office of Fishery Assistance, Gloucester, Virginia.
- Tazewell, C. W. (ed.). 1993. The Tazewell Quandary. Newsletter of the Tazewell Family, No. 16 W.S. Dawson Co.
- Tetra Tech, Inc. (Tetra Tech). 1999. Integrated Natural Resources Management Plan 2000 through 2004. U.S. Army Transportation Center, Fort Story, Virginia.

References

- Tetra Tech. 2010. Base-wide Wetland Delineation Naval Amphibious Base Little Creek. Prepared for NAVFAC Atlantic, Norfolk, VA.
- Tetra Tech. 2012c. *Amphibian and Reptile Survey Report Dune Ecological Assessment Project Joint Expeditionary Base Little Creek – Fort Story, Virginia*. NAVFAC Atlantic Biological Resource Services. Contract: N62470-08-D-1008; Task Order: WE26. DRAFT – July.
- Tetra Tech. 2013. *Invasive Species Inventory and Control Plan for Joint Expeditionary Base Fort Story Virginia Beach, Virginia*. NAVFAC Atlantic Biological Resource Services. Contract: N62470-08-D-1008; Task Order: WE54. FINAL – December.
- Tetra Tech. 2014. Department of Defense Coordinated Bird Monitoring Avian Species List Study *Joint Expeditionary Base Little Creek – Fort Story, Virginia*. FINAL – October 2014.
- Tetra Tech. 2016a. *Nearshore Survey at Joint Expeditionary Base (JEB) Fort Story and Little Creek*. NAVFAC Atlantic Biological Resource Services. Contract: N62470-13-D-8016; Task Order: WE08. 08 April.
- Tetra Tech. 2016b. *Bat Baseline Survey Report*. Joint Expeditionary Base Fort Story Virginia Beach, Virginia. May.
- Tetra Tech. 2017. *Invasive Plant Species Control Monitoring Report on the Efficacy of 2016 Growing Season Treatments*. Joint Expeditionary Base Fort Story Virginia Beach, Virginia. September.
- Townsend, J.F. 2012. Natural Heritage Resources of Virginia: Rare Plants. Natural Heritage Technical Report 12-12. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. Unpublished report. December 2012. http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml#lists. Accessed 21 February 2013.
- United States Army Corps of Engineers (USACE) Norfolk District. 1993. Final Environmental Assessment, Beach Lodging Facility and Beach Recreation Center, Fort Story, Virginia.
- USACE. 1996. Environmental Assessment for Implementation of the Master Plan, U.S. Army Transportation Center and Fort Story, Fort Story, Virginia. Prepared for U.S. Army Transportation Center and Fort Eustis by U.S. Army Corps of Engineers, Norfolk District, Norfolk, Virginia
- USACE. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0, ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- USACE. 2015. Preliminary Jurisdictional Determination. Southern Virginia Regulatory Section NAO-2009-02459. Department of the Army. 27 August.
- USACE. 2016. Preliminary Jurisdictional Determination. Southern Virginia Regulatory Section NAO-2004-02323. Department of the Army.

References

- United States Army Waterways Experiment Station. 1997. Shoreline Erosion Study for Fort Story, Virginia. Final Report. Prepared for U.S. Army Transportation Center, Directorate of Public Works, Environmental Division, Fort Eustis, Virginia. Prepared by U.S. Army Engineer Waterways Experiment Station, Coastal and Hydraulics Laboratory, Vicksburg, Mississippi.
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2009. USDA Soils Data Received by Tetra Tech, Inc. from U.S. Department of the Navy, April 2009.
- USDA NRCS. 2016. Soil Map—City of Virginia Beach, Virginia (VA810). Web Soil Survey, National Cooperative Soil Survey. 07 September.
- U.S. Department of Agriculture, Soil Conservation Service (USDA, SCS). 1988. Soil Survey Report for Naval Amphibious Base Little Creek. Virginia Beach, Virginia.
- U.S. Department of the Army and the Navy. 1976. Planting Design. June 1976.
https://portal.navfac.navy.mil/portal/page/portal/docs/doc_store_pub/p904.pdf. Accessed 18 January 2013.
- United States Environmental Protection Agency (USEPA). 1993. Fish and Fisheries Management in Lakes and Reservoirs: Technical Supplement to the Lake and Restoration Guidance Manual. Prepared for USEPA, Office of Water, by Terrene Institute, Alexandria, Virginia.
- USEPA. 2008. Strengthening the Management, Coordination, and Accountability of the Chesapeake Bay Program. Report to Congress. July 2008. USEPA, Region 3, Chesapeake Bay Program Office, Annapolis, Maryland. Prepared in cooperation with the Chesapeake Bay Program Partners.
http://cap.chesapeakebay.net/docs/EPA_Chesapeake_Bay_CAP.pdf. Accessed 18 January 2013.
- United States Fish and Wildlife Service (USFWS). 1991. Fish Survey and Water Quality Monitoring, Fort Story, VA. 01–02 October 1991. United States Fish and Wildlife Service, Office of Fishery Assistance, Gloucester, Virginia.
- USFWS. 2003. National Wetlands Inventory, Virginia Beach Quadrangle.
- USFWS. 2007. Status of the Red Knot (*Calidris canutus rufa*) in the Western Hemisphere. May 2007. Prepared by New Jersey Department of Environmental Protection.
<http://www.fws.gov/northeast/PDF/RedKnotAssessmentMay2007.pdf>. Accessed 21 February 2013.
- USFWS. 2011a. Abundance and productivity estimates – 2010 update: Atlantic Coast piping plover population. Sudbury, Massachusetts.
- USFWS. 2011b. Roseate Tern: North American Subspecies.
www.fws.gov/northeast/pdf/Roseatetern0511.pdf. Accessed 21 February 2013.
- USFWS. 2012a. Piping Plover, Atlantic Coast Population Species Profile.
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B079>. Accessed 21 February 2013.

References

- USFWS. 2012b. Roseate tern Species Profile.
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B07O>. Accessed 21 February 2013.
- USFWS. 2012c. Red Knot Species Profile.
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B0DM>. Accessed 21 February 2013.
- USFWS. 2012d. Chesapeake Bay Nutria Eradication Project: Strategic Plan. February.
- USFWS. 2012e. Personal communication on 15 October 2012 between M. Drummond (USFWS) and E. Carawan (NAVFAC Mid-Atlantic).
- USFWS. 2015a. Fact Sheet. Northern Long-Eared Bat (*Myotis septentrionalis*). April.
<https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html>. Accessed October 19, 2017.
- USFWS. 2015b. Fact Sheet. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). April.
<https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/kemps-ridley-sea-turtle.htm>. Accessed October 19, 2017.
- USFWS. 2015c. Fact Sheet. Loggerhead Sea Turtle (*Caretta caretta*). April.
<https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/loggerhead-sea-turtle.htm>. Accessed October 19, 2017.
- USFWS. 2015d. Fact Sheet. Leatherback Sea Turtle (*Dermochelys coriacea*). April.
<https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/leatherback-sea-turtle.htm>. Accessed October 19, 2017.
- USFWS. 2015e. Fact Sheet. Hawksbill Sea Turtle (*Eretmochelys imbricate*). April.
<https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/hawksbill-sea-turtle.htm>. Accessed October 19, 2017.
- USFWS. 2016a. Species of Concern. Status Review for two Midwestern Species March 16, 2016 – Positive 90-Day Findings. Yellow-banded Bumble Bee.
<https://www.fws.gov/midwest/es/soc/Batch90DayMarch2016.html>. Accessed 26 October 2016.
- USFWS. 2016b. Chesapeake Bay Nutria Eradication Project. Nutria (*Myocastor coypus*).
<https://www.fws.gov/chesapeakeanutriaproject/>. Accessed November 6, 2017.
- USFWS. 2016c. *IPaC Trust Report*. August 29.
- USFWS. 2017a. Atlantic Sturgeon – Chesapeake Bay Field Office
<https://www.fws.gov/chesapeakebay/sturgeon.html> Accessed 25 July 2017
- USFWS. 2017b. Fact Sheet. Green Sea Turtle (*Chelonia mydas*). February.
<https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/green-sea-turtle.htm>. Accessed October 19, 2017.
- USFWS. 2017c. Fact Sheet. Rusty Patched Bumble Bee (*Bombus affinis*). January.
<https://www.fws.gov/midwest/endangered/insects/rpbb/factsheetrpbb.html>. Accessed October 19, 2017.
- USFWS. 2017d. Rusty Patched Bumble Bee – Guidance on Endangered Species Act Implementation, Interactive Map.

References

- <https://www.fws.gov/midwest/endangered/insects/rpbb/guidance.html#map> Accessed 24 July 2017
- USFWS. 2017e. Environmental Conservation Online System – Yellow banded Bumble bee (*Bombus terricola*) <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=I0YN> Accessed 24 July 2017
- United States Geological Survey (USGS). 1986. Cape Henry, Virginia, 7.5-minute topographic map. Revised. Original publication 1964. Scale: 1: 24,000. U.S. Geological Survey, Reston, Virginia.
- USGS. 1989. Geologic Map and Generalized Cross Sections of the Coastal Plain and Adjacent Parts of the Piedmont, Virginia. Scale: 1:250,000. U.S. Geological Survey, Reston, Virginia.
- USGS. 2013. Earthquake Hazards Program. Magnitude 5.8 Virginia. <http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/se082311a/>. Accessed 13 June 2013.
- United States Global Change Research Program. 2009. Second National Climate Assessment – Regional Climate Impacts: Southeast. Washington, D.C. <http://www.globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009>. Accessed 20 February 2013.
- Virginia Aquarium & Marine Science Center Foundation (VAQF). 2014. Virginia Sea Turtle and Marine Mammal Stranding Network 2014 Grant Report, Virginia Coastal Zone Management Program Department of Environmental Quality Commonwealth of Virginia, Virginia Beach, Virginia.
- Virginia Department of Conservation and Recreation (VDCR). 1992. Virginia Erosion and Sediment Control Handbook. Third Edition. Richmond, Virginia.
- Virginia Department of Conservation and Recreation – Division of Natural Heritage (VDCR-DNH). 1990. An Inventory of the Rare, Threatened, and Endangered Species of the Little Creek Naval Amphibious Base, Virginia Beach, Virginia. Natural Heritage Technical Report 90-3. Richmond, Virginia.
- VDCR-DNH. 2009. Invasive Alien Plant Species of Virginia. Virginia Native Plant Society, Blandy Experimental Farm, Boyce, Virginia. http://www.dcr.virginia.gov/natural_heritage/invspdflist.shtml. Accessed 19 June 2013.
- VDCR-DNH. 2013. Information Services Overview. http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml. Accessed 3 May 2013.
- VDCR-DNH. n.d. Invasive Alien Plant Species of Virginia: Japanese sedge (*Carex kobomugi*). http://www.dcr.virginia.gov/natural_heritage/documents/fscako.pdf. Accessed 18 January 2013.
- Virginia Department of Environmental Quality (VDEQ). 2002. Virginia’s Coastal Environment.
- VDEQ. 2012. Status of Virginia’s Water Resources: A Report on Virginia’s Water Resources Management Activities. <http://www.deq.state.va.us/Portals/0/DEQ/Water/WaterSupplyPlanning/2012WaterResourcesReport.pdf>. Accessed 18 January 2013.

References

- VDEQ. 2014. *Virginia Erosion and Sediment Control Law. Virginia Erosion and Sediment Control regulations and Certification Regulations*. FY2014. Commonwealth of Virginia.
- Virginia Department of Game and Inland Fisheries (VDGIF). 2005. Virginia's Comprehensive Wildlife Conservation Strategy. Virginia Department of Game and Inland Fisheries, Richmond, Virginia. <http://bewildvirginia.org/wildlifeplan/plan.asp>. Accessed 18 January 2013
- VDGIF. 2010. Removal or relocation of osprey nests in Virginia: A guideline of landowners. Virginia Department of Game and Inland Fisheries, Bureau of Wildlife Resources, Wildlife Diversity Division, Nongame and Endangered Wildlife Program. Richmond, VA 8 pp.
- VDGIF. 2012. Piping Plovers in Virginia. <http://www.dgif.virginia.gov/wildlife/birds/piping-plovers>. Accessed 3 May 2013.
- VDGIF. 2013a. Fish Population Sampling on Lake Braford. 19 September.
- VDGIF. 2013b. Bald Eagle Facts. <http://www.dgif.virginia.gov/wildlife/birds/bald-eagles.asp> Accessed 21 February 2013.
- VDGIF. 2017. Special Status Faunal Species in Virginia. <https://www.dgif.virginia.gov/wp-content/uploads/virginia-threatened-endangered-species.pdf>. Accessed November 6, 2017.
- Versar, Inc. 2006. Planning Level Surveys for Amphibians and Reptiles, Mammals, Birds, and Fish, As Well As Pest Insects and Invasive Plant Species at Fort Story, Virginia in 2004 and 2005. August 2006.
- Virginia Institute of Marine Science (VIMS). 2003. Little Creek Naval Amphibious Base Chesapeake Bay Shoreline, Shoreline Management Plan Update. Shoreline Studies Program, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, Virginia.
- VIMS. 2013. Research: Nearshore Ecology. http://www.ccrm.vims.edu/research/nearshore_ecology/index.html#nearshore. Accessed 21 February 2013.
- VIMS. n.d. Research: Nearshore Ecology. http://www.ccrm.vims.edu/research/nearshore_ecology/index.html#nearshore. Accessed 22 April 2013.
- Wikipedia Commons. 2013a. Roseate Tern. http://commons.wikimedia.org/wiki/File:Roseate_terns_Palometas.jpg. Accessed 7 June 2013.
- Wikipedia Commons. 2013b. Piping Plover. http://en.wikipedia.org/wiki/File:Charadrius-melodus-004_edit.jpg. Accessed 7 June 2013.
- Wikipedia Commons. 2013c. Red Knot. http://commons.wikimedia.org/wiki/File:Red_knot_Delaware.jpg. Accessed 7 June 2013.
- Wikipedia Commons. 2017a. Loggerhead Sea Turtle. [https://en.wikipedia.org/wiki/Loggerhead_sea_turtle#/media/File:Loggerhead_Sea_Turtle_\(Caretta_caretta\)_2.jpg](https://en.wikipedia.org/wiki/Loggerhead_sea_turtle#/media/File:Loggerhead_Sea_Turtle_(Caretta_caretta)_2.jpg). Accessed 6 November 2017.

References

Wikipedia Commons. 2017b. Green Sea Turtle.

https://en.wikipedia.org/wiki/Green_sea_turtle#/media/File:Green_turtle_in_Kona_2008.jpg. Accessed November 6, 2017.

Wikipedia Commons. 2017c. Hawksbill Sea Turtle.

https://en.wikipedia.org/wiki/Hawksbill_sea_turtle#/media/File:Eretmochelys_imbricata_01.jpg . Accessed November 6, 2017.

This page intentionally left blank.

**APPENDIX A: JEB LITTLE CREEK AND JEB FORT
STORY NATURAL RESOURCES PROJECT
IMPLEMENTATION SCHEDULES**

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule¹ (FY)	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Marine Resources Protection									
1	Report marine animal strandings to the Virginia Aquarium's Stranding Response Team.	3.5.3 and 4.3.1	As needed	F, H, T	I	4	NA	O&MN	NA
2	Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.	3.5.3 and 4.3.1	As needed	F, H, T	II	3	NA	NA	NA
3	Assist Installation personnel with the identification of marine mammals as needed.	3.5.3 and 4.3.1	As needed	F, H, T	III	3	NA	NA	NA
4	Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities that have the potential to impact marine resources.	1.9, 3.5.3, 3.2.3, and 4.3.1	As needed	F, H, T	I	4	NA	O&MN	NA
Coastal Zone Protection									
5	Review Installation plans and proposed actions to ensure coastal zone consistency.	1.9, 3.2.3, 4.1.1, 4.2.1, and 4.3.2	As needed	G, H, I, K, L, Q	I	4	NA	O&MN	NA
6	Obtain a coastal consistency determination when required.	1.9, 3.2.3, 4.1.1, 4.2.1, and 4.3.2	As needed	G, H, I, K, L, Q	I	4	NA	O&MN	NA

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule¹ (FY)	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Wetlands/Water Quality Protection									
7	Assist action proponents in applying for, reviewing, and obtaining required federal and state wetlands protection permits.	1.9, 3.2.3, 3.2.4, 3.2.6, 3.8.4, 4.1.2, 4.2.2, 4.3.3, and 4.3.6	As needed	G, K, L, Q	I	4	NA	O&MN	NA
8	Implement BMPs on all construction projects to reduce detrimental effects of nonpoint source pollution.	4.1.2	As needed	G, I	II	2	NA	NA	NA
9	Monitor and maintain designated “No Mowing” areas at riparian buffer sites.	3.2.6 and 4.1.2	Ongoing	K, L, Q	0	2	NA	FOR	NA
10	Review all Installation development plans and actions to ensure conservation issues are identified and considered early in the planning process for NEPA consistency.	2.2, 1.6, 1.9, 3.1, 3.5.3, 3.8.4, 4.1.8, 4.2.7, and 4.3	As needed	B, I, J	I	4	NA	O&MN	NA
11	Continue to participate in Chesapeake Bay Agreements to improve water quality within the Chesapeake Bay watershed.	3.2.6	Ongoing	A, B, C, E, G, L, Q	III	3	NA	SAIA	NA
12	Re-evaluate wetland inventories every five years for accuracy and obtain Preliminary Jurisdictional Determination for USACE.	3.2.4	Planned	A, G, K	I	4	\$6,008	O&MN	2020
Oil and Hazardous Substances									
13	Provide maps and other information pertaining to sensitive natural resources that are required for oil spill response planning as requested.	3.3.1, 3.3.2, and 4.1.3	As needed	G, K, L, Q	III	2	NA	NA	NA

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Urban Forestry									
14	Conduct an urban tree inventory and develop an Installation urban forest management plan.	3.4.1, 4.1.4, and 4.2.3	Planned	E, A, P, S	III	4	\$67,709	FOR	2020
15	Participate in the identification and marking of damaged or hazardous trees for removal.	4.1.4 and 4.2.3	Ongoing	P, S	II	3	NA	FOR	
16	Review development plans and actions where tree removal is proposed. Provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.	4.1.4 and 4.2.3	Ongoing	P, S	I	3	NA	O&MN	
17	Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators.	3.4.1, 3.7.1, and 4.1.4	Ongoing	P, S	II	3	NA	FOR	
18	Monitor forest conditions in the Natural Areas Management Unit and coordinate any required tree maintenance or removal with the First Lieutenants Division or Seabees.	4.1.4 and 4.2.3	Annual	P, S	II	3	NA	FOR	
19	Periodically monitor planted small trees and shrubs to identify major health problems; trim or prune only when required to address health problems.	4.2.3 and 4.2.4	Annual	P, S	II	2	NA	FOR	
Fish and Wildlife Management									
20	Conduct a baseline bat survey to establish data on bat species richness and habitat use on Installation. Funding programmed for 2018 and in 2023.	2.11.4 and 3.6.2	2018	A, E, F	II	4	\$79,334	O&MN	2023

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Fish and Wildlife Management (cont'd)									
21	Evaluate impact to wildlife and bats during Environmental Checklist Process for construction/disturbance activities, maintaining snags and wildlife habitat when safe.	2.11.4, 3.6.2, 4.1.5 and 4.2.4	Ongoing	A, E, F	II	4	NA	NA	Ongoing
22	Evaluate recommendations from the 2015 sea turtle lighting survey and apply recommendations to reducing unnecessary lighting.	2.11.6, 3.6.2, and 4.2.4	As needed	A, E, F	II	3	NA	O&MN	NA
23	Assess potential site locations and install nesting baskets for mallards or black ducks; inspect and repair wood duck boxes, as necessary, and clean and replace old bedding each fall.	3.5.1, 3.5.2, 4.1.5, and 4.2.4	As needed	A, B, C, D, E	III	1	\$100	SAIA, LP	
24	Conduct annual inspections and maintenance of bluebird nest boxes during the fall and monitor nesting activity throughout the nesting season.	3.5.1, 3.5.2, 4.1.5, and 4.2.4	As needed	A, B, C, D	III	1	NA	LP	NA
25	Evaluate the need for, and possible locations for retrofitting light poles and installing osprey nesting platforms to reduce risk of fire and electrocution in coordination with USFWS and VDGIF.	3.5.1, 3.5.2, and 4.1.5, 4.2.4	As needed	D	III	1	\$10,000	O&MN	
26	Inspect osprey nest platforms during the fall, and monitor nesting activity at osprey nesting platforms and nest boxes throughout the nesting season.	3.5.2, 4.1.5 and 4.2.4	Annual	A, B, C, E	III	1	NA	LP	NA
27	Encourage the growth of vegetation by reducing mowing along forest edges, lake shorelines, and in other areas to improve food and cover for wildlife, including pollinators, and to reduce the attractiveness of shore areas to ducks and geese.	4.1.6 and 4.2.5	Ongoing	A, B, C, E	III	3	NA	FOR	NA

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Fish and Wildlife Management (cont'd)									
28	Provide for protection of native wildlife inhabiting dune habitats by controlling introduced predators (e.g., domestic free-ranging and feral cats), and removing sources of garbage and food that may attract native predators (e.g., raccoons and skunks).	3.7.2, 3.7.3, 4.1.6, 4.1.9, 4.2.5, 4.2.8	Ongoing	A, B, C, E, R	III	1	\$	SAIA	NA
29	Coordinate with VDGIF to conduct fish and water quality surveys approximately every 4 years on Lake Bradford and Chubb Lake.	2.10.4 and 3.5.4	Ongoing	A, B, C, E, N	III	3	NA	SAIA, LP	
30	Monitor the beach area for shorebird nesting activity from April through July.	4.3.4	Annual	D, F	III	3	NA	LP	NA
31	Conduct a frog and toad call as needed and as funding is available with three surveys conducted within the survey year: once in the early spring, once in mid-spring, and once in early summer following the route shown in Figure 3-3.	2.10.5 and 4.2.4	Ongoing as needed	A, B, C	III	1	\$5,000	SAIA, FOR	NA
32	Conduct a bird survey to update species richness data since the 2013 Installation bird survey.	2.11.1, 2.11.2, 2.11.3, 3.6.2	Planned	A, D, E	II	4	\$68,808	O&MN	2023
33	Implement recommendations in the Raptor Management Plan, including an Owl Nesting Program.	2.10.3, 3.5.2, 4.1.5, and 4.2.4	Ongoing	A, B, C, D	III	3	NA	SAIA, FOR	NA
34	Acquisition and maintenance of an All-Terrain vehicle for wildlife monitoring, habitat restoration projects, and dune projects.	3.5.2, 3.5.3, 4.3.4 and 4.3.5	Planned	D, E, F, T	II	4	\$11,406	O&M N	2024

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Outdoor Recreation and Environmental Awareness									
35	Post notices in appropriate media outlets (newsletter, the Installation newspaper, website, or public service announcements) as needed to provide outdoor recreation and environmental awareness information to Installation personnel and residents.	3.9 and 4.1.7	Ongoing	A, B, C	III	2	NA	NA	NA
36	Inspect the Heroes Circle Nature Trail and picnic area and other park areas and coordinate with the Seabees and the First Lieutenants Division for needed repairs and maintenance to prevent erosion. Maintain and clean signs.	3.9, 4.2.2 and 4.2.5	Annual	A, B, C	II	3	NA	NA	NA
37	Integration of an electronic permit system for the purchase of outdoor recreation permits online, including user data collection interface and maintenance of system.	3.8.1	Planned	A, E, N	III	4	\$11,110	O&MN, SAIA, Non-DoD	2024
Habitat Conservation and Restoration									
38	Conduct a Dune Assessment of shoreline areas to identify dune protection needs and recommendations for restoration measures since the 2012 Dune Study.	2.12, 3.8.1, and 4.3.6	Planned	E, F, G	I	4	\$36,474	O&MN, Non- DoD	2022
39	Implement the dune restoration projects identified in the 2012 Dune Ecological Assessment and Restoration Report.	2.12, 3.8.1, and 4.3.6	Planned	A, B, C, E, I, L	III	3	\$	O&MN, Non-DoD	

Table A-1. JEB Little Creek Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Habitat Conservation and Restoration (cont'd)									
40	Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of the dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures including identifying and maintaining only a few critical beach access routes, installing rope and sand fencing, posting informational signs, and planting native beach grasses.	2.12, 3.8.1, and 4.3.6	Annually	A, B, C, I, O	II	3		O&MN, Non-DoD	NA
41	Coordinate with Naval Amphibious Construction Commands to install sand fencing and Christmas trees at the base of eroding primary sand dunes.	1.10, 3.8.1, 3.8.2, and 4.3.6	Annually as needed	H, I, L	III	3	\$	O&MN, Non-DoD	
42	Monitor oyster recruitment in Little Creek Cove oyster reef.	3.5.5 and 4.2.4	Annually during August	Q	III	1	NA	NA	NA
Invasive Species and Pest Management									
43	Implement an invasive species survey and management plan for JEB Little Creek.	3.7.1, 4.1.9, 4.2.8, 4.3.7	Planned	A, B, C, E, M	III	3	\$40,501	O&MN LP, FOR	2020

Table A-1. JEB Little Creek Natural Resources Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule¹ (FY)	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Invasive Species and Pest Management (cont'd)									
44	Identify and mark targeted invasive species in the Heroes Circle Nature Trail Area and wildlife viewing platform to be treated and coordinate with trained, certified pesticide applicators to conduct treatments.	3.7, 4.2.7, and 4.3.7	Ongoing	M	II	2		LP	NA
45	Monitor the maritime grassland communities for invasive species, including Japanese sedge; remove and restore areas where invasive species are identified, and monitor for success.	3.7.1 and 4.3.7	Ongoing	M	II	3	NA	LP	NA
46	Assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas, monitor for nuisance wildlife, including geese and feral cats; implementing educational measures as necessary.	3.7, 4.1.6, and 4.2.5	As needed	A, B, C ,R	II	2	NA	LP	NA
47	Monitor the installation for invasive nutria (<i>Myocaster coypus</i>) on a quarterly basis. If detected, coordinate with Virginia Tech Conservation Management Institute and Regional Game Warden for removal.	3.7.1, 3.7.4, and 4.1.6 4.2.5	As needed	M	II	1	NA	NA	Ongoing
Cultural Resources Protection									
48	Consult with the RHPO and SHPO during the planning process for any activity that has the potential to impact cultural resources.	3.11, 4.1.10 and 4.2.9	As needed	A, B, C, U	I	4	NA	O&MN	

Table A-1. JEB Little Creek Natural Resources Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule ¹ (FY)	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Training/Professional Development									
49	Attend basic ArcView and product update training.	1.7	As needed	A, B, C	II	1	NA	NA	NA
50	Attend wetlands delineation and regulatory training.	1.7 and 3.3	As needed	A, B, C	III	1	NA	NA	NA
51	Attend marine mammal stranding training.	1.7 and 3.5.2	As needed	A, B, C	III	1	NA	NA	NA
52	Update the INRMP at the end of the five-year plan period.	Plan Updates	Planned	A, B, C, E	II	4		SAIA, O&MN	

¹ Implementation/Completion Project Frequency: Annual = 1-10 days/year during a specific season; Ongoing = multi-day, multi-season activity

² Legal Drivers and Initiatives:

A OPNAVINST 5090.1C Ch-1

B DoDI 4715.03, Natural Resources Conservation Program

C 32 CFR 190, Natural Resources Management Program

D Migratory Bird Treaty Act

E Sikes Act Amendment Act

F Endangered Species Act

G Clean Water Act

H Coastal Zone Management Act

I Soil and Water Conservation Act

J National Environmental Policy Act

K EO 11990, Protection of Wetlands

L EO 11988, Floodplain Management

M EO 13112, Invasive Species

N EO 12962, Recreational Fisheries

O EO 11989, Use of Off-Road Vehicles on Public Lands

P EO 13148, Greening the Government through Leadership in Environmental Management

Q Chesapeake Bay agreements

R Chief of Naval Operations Guidance on Feral Cats and Dogs

S Regional Tree Preservation and Replacement Instruction

T Marine Mammal Protection Act

U National Historic Preservation Act

V Magnuson-Stevens Fishery Conservation and Management Act

³ DoD Funding Level Classification: Class 0: recurring administrative and management; Class I: current compliance; Class II: maintenance requirements; Class III: enhancement actions beyond compliance

⁴ Navy Environmental Readiness Level: Level 4=compliance requirement, Level 3=Navy proactive involvement, Level 2=Navy or DoD policy requirement, and Level 1=Navy environmental stewardship

⁵ Funding Sources: O&MN = Operations and Maintenance, Navy; SAIA = Sikes Act Revenues; LP = Legacy Program; FOR = Navy Forestry; AO = Agricultural Outleasings; RF = Recycling Funds; SERDP = Strategic Environmental Research and Development Funds; and Non-DoD Funds
NA = Not Applicable FY = Fiscal Year

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Marine Resources Protection									
1	Report marine animal strandings to the Virginia Aquarium's Stranding Response Team.	6.5.3 and 7.3.1	As needed	F, H, T	I	4	NA	O&MN	NA
2	Serve as a liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.	6.5.3 and 7.3.1	As needed	F, H, T	II	3	NA	NA	NA
3	Assist Installation personnel with the identification of marine mammals as needed.	6.5.3 and 4.3.1	As needed	F, H, T	III	3	NA	NA	NA
4	Coordinate with and obtain the required permits from the appropriate federal and state agencies for any Installation activities that have the potential to impact marine resources.	1.9, 6.2.3, 6.5.3, and 7.3.1	As needed	F, H, T	I	4	NA	O&MN	NA
Shoreline Management									
5	Conduct annual maintenance and monitoring of dune stabilization and restoration efforts to ensure successful establishment of vegetation, stabilization of dunes, and reduced sand migration. Provide for dune protection by limiting pedestrian and motorized traffic within dune habitats. Implement dune protection and restoration measures identified in the 2012 JEB Little Creek – Fort Story Dune Assessment report, including identifying and maintain only a few critical beach access routes, installing rope and sand fencing, posting informational signs, planting native beach grasses, and conducting additional flora and wildlife surveys.	6.7.1, 7.3.2 and 7.3.5	Annual	A, B, C, G, H, I, O	II	3		O&MN, Non-DoD	NA

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
6	Conduct a Dune Assessment of shoreline areas to identify dune protection needs and recommendations for restoration measures since the 2012 Dune Study	6.7.1, 7.3.2, and 7.3.5	Planned	E, F, G	I	4	\$36,474	O&MN, Non- DoD	2022
7	Implement stormwater management projects to support shoreline erosion control, including fertilization of dune vegetation and related vegetation management practices.	6.2.2 and 7.3.2	As needed	A, B, C, G, H, I	II	3		O&MN, Non- DoD	NA
8	Monitor and prioritize erosion control sites and implement soil erosion control projects as needed.	6.2.1 and 7.3.5	As needed	A, B, C, G, H, I	II	3		O&MN, Non- DoD	NA
9	Conduct a climate change assessment to determine potential effects from climate change related impacts such as sea level rise.	5.3.2, 5.3.3,5.5.1 , and 6.2.3		A, B, C	III	3		SERDP, Non- DoD	
Wetlands and Water Quality Management									
10	Conduct a baseline watershed assessment for JEB Fort Story lakes, including monitoring of water quality and wetlands, especially along the southern boundary where there is an elevation risk of impacts from runoff associated with Shore Drive. Assessment should include an evaluation of structures surrounding physical habitat that may influence water quality, and condition of the resident aquatic community. Snake Lake, Hospital Road Lake, and East Entrance Lake should be included in the assessment to update data collected in a 1991 study (USFWS 1991).	5.3.3, 6.2.4, 7.2.1, and 7.3.2	As Needed	A, B, C, K	III	3		O&MN	

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
11	Publish Wetland and Aquatic Sites Restrictions.	5.7.5, 6.2.4, 7.1.1, 7.2.1, and 7.3.2	Ongoing	G, K, L, Q	III	1		O&MN	
12	Establish and maintain 100-foot (30-meter) buffers around lakes and wetlands to restrict incompatible activities.	5.7.5, 6.2.4, 7.1.1, and 7.2.1	Ongoing	G, I, K, L, Q	III	1		FOR	NA
13	Maintain and manage the 1.7 ac (0.7 ha) wetland mitigation site in perpetuity as required by permits received following fill of 0.85 ac (0.34 ha) of wetlands for the Small Arms Test and Evaluation Compound. No alterations can be made to the 1.7 ac wetland mitigation system without coordination and approval from Virginia DEQ.	5.7.5, 6.2.4, and 7.1.1	Ongoing	G, K, L, Q	I	4		O&MN	NA
14	Re-evaluate wetland inventories for accuracy and obtain Preliminary Jurisdictional Determination for USACE as needed	6.2.4 and 7.1.1	Planned	A, G, K	I	4	\$6,008	O&MN	2020
Terrestrial Habitat Management									
15	Restore lands with plants that attract pollinators, and include pollinator-friendly plants in landscaping projects and grounds maintenance activities.	6.4, 7.1.2, and 7.1.3	Ongoing	A, B, C	III	1		O&MN	
Wildlife Management									
16	Monitor furbearer populations to track trends in predation of ground-nesting birds.	6.5.1 and 7.2.2	Ongoing	A, D	II	1		O&MN	

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
17	Coordinate with the regional game warden for nuisance control of furbearers.	6.5.1 and 7.2.4	As needed	A, B, C	II	3		O&MN	
18	Acquisition and maintenance of an All-Terrain vehicle for wildlife monitoring, habitat restoration projects, and dune projects	6.5.3, 6.5.4, 7.1.5, and 7.2.4	Planned	D, E, F, T	II	4	\$11,406	O&M N	2024
19	Establish permanent sample plots and annually monitor avian species populations.	6.6.2 and 7.2.2	Annual	A, D	III	1		O&MN	
20	Assess potential site locations and install artificial bird boxes and bat roosts, and monitor use annually.	6.5.2 and 7.2.2	Annual	A, D	II	1		AO	
21	Conduct planning level surveys for the existence of reptile and amphibian species, specifically federal candidate and state listed species.	6.6, 7.2.3, and 7.3.4	Planned	A, B, C, F	I	4	\$44,082	O&MN	2021
22	Advise the Installation community against intentionally feeding wildlife, especially mammalian species such as fox and raccoon, and on measures to take to reduce negative interactions with wildlife.	6.5.1 and 7.2.2	As needed	A, B, C, R	III	1		AO	
Fisheries Management									
23	Partner with VDGIF to survey fish populations in Installation lakes to monitor size, structure, and biological	6.5 and 7.2.2	As needed	N	III	1		AO	
24	Integration of an electronic permit system for the purchase of outdoor recreation permits online, including user data collection interface and maintenance of system.	6.9	Planned	A, E, N	III	4	\$11,110	O&MN, SAIA, Non-DoD	2024

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY) ¹	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Rare, Threatened, and Endangered Species Management									
25	Manage for rare, threatened, and endangered species known or with the potential to occur at the Installation, including federal candidate species for listing and other species at risk identified in the Virginia SWAP.	6.6, 7.2.3, and 7.3.4	Ongoing	A, B, C, D, F, T	I	4		O&MN	
26	Conduct planning level surveys for reptiles and amphibians, including federal candidate species (found in the USFWS National Listing Workplan) and state listed species	6.6, 7.2.3, and 7.3.4	Planned	A, B, F	I	4		O&MN	2021
27	Conduct a bird survey to update species richness data since the 2013 Installation bird survey	5.10.3 and 6.5.2	Planned	A, D, E	II	4	\$68,808	O&MN	2023
28	Conduct a baseline bat survey to establish data on bat species richness and habitat use on Installation. Funding programmed for 2020.	5.11.4, 6.5.1, and 6.6	Planned	A, E, F	II	4	\$74,758	O&MN	2020
29	Monitor Rafinesque's eastern big-eared bat roosting sites (including known artificial roosts, hibernacula, and maternity roost sites located within abandoned Buildings 219 and 221), other roost sites as they become identified, and natural roost sites. Provide information annually to VDGIF regarding Rafinesque's eastern big-eared bat use of the Installation.	6.6, 7.2.3, and 7.3.4	Ongoing	A, B, C, F	I	4		O&MN	

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Training Area Management									
30	Conduct an urban tree inventory and develop an Installation urban forest management plan.	6.4, 7.1.2, and 7.2.1	Planned	E, A, P, S	III	4	\$67,709	FOR	2020
Pest Management									
31	Implement pest management operations in accordance with the Integrated Pest Management Plan.	6.7.2, 7.1.5, 7.2.7, and 7.3.7	As needed	A, B, C, M	II	2		OM&N, FOR	NA
32	Permanently remove feral cats and dogs (regional pest controller) from the Installation per DoD guidelines, and educate the Installation community to avoid feeding feral cats, dogs, and any other wildlife.	6.7.3, 7.1.5 7.2.6, and 7.3.7	As needed	A, B, C, R	II	2		OM&N	NA
Cultural Resources Protection									
33	Consult with the RHPO and SHPO during the planning process for any activity that has the potential to impact cultural resources.	6.11 and 7.1.4	As needed	A, B, C, U	I	4	NA	O&MN	

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY)¹	Legal Driver/ Initiative²	Class³	Navy ERL⁴	Cost Estimate	Funding Sources⁵	Date Project Completed
Conservation Awareness									
34	Participate annually in conservation awareness events including Clean the Bay Day activities.	6.9 and 7.3.6	Annual	A, B, C, H, Q	III	1		AO, Non- DoD	
35	Disseminate educational outreach information related to natural resources activities and management at JEB Fort Story through <i>The Flagship</i> and other publications.	6.9 and 7.3.6	Ongoing	A, B, C, E, P	III	1		AO, Non- DoD	
36	Target certain groups, such as grounds maintenance and housing, for dissemination of information on natural resources management actions.	6.9.2, 6.10 and 7.3.6	As needed	A, B, C, E	III	1		OM&N, AO	
37	Provide natural resources conservation training at Officer/NCO Professional Development classes during special events and upon request.	6.12 and 7.3.6	As needed	A, B	III	1		OM&N, AO	
38	Educate and inform the Installation community to respect wildlife and associated habitats to include avoiding handling, feeding, capturing, collecting, disturbing or destroying any wildlife species.	6.10 and 6.12	Ongoing	A, B, C, D, F, R	III	3		OM&N, AO	

Table A-2. JEB Fort Story Natural Resources Project Implementation Schedule

Project #	Project Description	INRMP Section Ref.	Implementation Schedule (FY) ¹	Legal Driver/ Initiative ²	Class ³	Navy ERL ⁴	Cost Estimate	Funding Sources ⁵	Date Project Completed
Program Management									
40	Update the INRMP at the end of the five-year plan period.	Plan Updates	As Needed	A, B, C, E	II	4		O&MN, SAIA	
41	Develop and maintain a GIS database for JEB Fort Story natural resources data.	1.14	Ongoing	A, B, C	II	1		O&MN	

¹ Implementation/Completion Project Frequency: Annual = 1-10 days/year during a specific season; Ongoing = multi-day, multi-season activity

² Legal Drivers and Initiatives:

A OPNAVINST 5090.1C Ch-1

B DoDI 4715.03, Natural Resources Conservation Program

C 32 CFR 190, Natural Resources Management Program

D Migratory Bird Treaty Act

E Sikes Act Amendment Act

F Endangered Species Act

G Clean Water Act

H Coastal Zone Management Act

I Soil and Water Conservation Act

J National Environmental Policy Act

K EO 11990, *Protection of Wetlands*

L EO 11988, *Floodplain Management*

M EO 13112, *Invasive Species*

N EO 12962, *Recreational Fisheries*

O EO 11989, *Use of Off-Road Vehicles on Public Lands*

P EO 13148, *Greening the Government through Leadership in Environmental Management*

Q Chesapeake Bay agreements

R Chief of Naval Operations Guidance on Feral Cats and Dogs

S Regional Tree Preservation and Replacement Instruction

T Marine Mammal Protection Act

U National Historic Preservation Act

V Magnuson-Stevens Fishery Conservation and Management Act

³ DoD Funding Level Classification: Class 0: recurring administrative and management; Class I: current compliance; Class II: maintenance requirements; Class III: enhancement actions beyond compliance

⁴ Navy Environmental Readiness Level: Level 4=compliance requirement, Level 3=Navy proactive involvement, Level 2=Navy or DoD policy requirement, and Level 1=Navy environmental stewardship

⁵ Funding Sources: O&MN = Operations and Maintenance, Navy; SAIA = Sikes Act Revenues; LP = Legacy Program; FOR = Navy Forestry; AO = Agricultural Outleas; RF = Recycling Funds; SERDP = Strategic Environmental Research and Development Funds; and Non-DoD Funds

NA = Not Applicable

FY = Fiscal Year

APPENDIX B: CROSS-REFERENCE OF INRMP TO
DOD INRMP TEMPLATE

Cross-Reference of *Integrated Natural Resources Management Plan* Guidance for Navy Installations to DoD INRMP Template

DOD <i>Integrated Natural Resources Management Plan</i> Template	Cross-Reference to Joint Expeditionary Base Little Creek (LC)-Fort Story (FS) 2017 INRMP Update Table of Contents
Title Page	Title Page (see front matter)
Signature Page	Signature Page (see front matter)
Executive Summary	Executive Summary (see front matter)
Table of Contents	Table of Contents (see front matter)
1. Overview	Sections 2.3 (LC) and 5.3 (FS) Overview of Natural Resources Management Program
a. Purpose	Section 1.1 Purpose and Authority
b. Scope	Section 1.2 Scope
c. Goals and Objectives	Section 1.3 Objectives
d. Responsibilities	Section 1.4 Responsibilities
(1) Installation stakeholders	Section 1.4.1 Installation Stakeholders
(2) External stakeholders	Section 1.4.2 External Stakeholders
e. Authority	Section 1.1 Purpose and Authority
f. Stewardship and Compliance	Section 1.5 Compliance and Stewardship
g. Review and Revision Process	Plan Updates (see front matter)
h. Management Strategy	Sections 2.3 and 5.3 Overview of Natural Resources Management Program
2. Current Conditions and Use	Sections 2.0 (LC) and 5.0 (FS) Existing
a. Installation Information	Sections 2.1 (LC) and 5.1 (FS) Location and Regional Setting, Sections 2.2.1 (LC) and 5.2.1 (FS) Historical Overview and Military Mission
(1) General Description	Sections 2.1 (LC) and 5.1 (FS) Location and Regional Setting, Sections 2.2.1 (LC) and 5.2.1 (FS) Historical Overview and Military Mission
(2) Regional Land Uses	Sections 2.1 (LC) and 5.1 (FS) and Section 1.6 Encroachment and Adjacent Land Use
(3) Abbreviated History and Pre-Military Land Use	Sections 2.2.1 (LC) and 5.2.1 (FS) Historical Overview and Military Mission
(4) Military Mission	Sections 2.2.1 (LC) and 5.2.1 (FS) Historical Overview and Military Mission
(5) Operations and Activities	Sections 2.2.1 (LC) and 5.2.1 (FS) Historical Overview and Military Mission, Sections 2.2.2 (LC) and 5.2.2 (FS) Mission Impacts on the Environment, and Sections 2.4 (LC) and 5.4 (FS) Constraints and Opportunities

(6) Constraints Map	No map but constraints and opportunities are discussed in Sections 2.2.2 (LC) and 5.2.2 (FS) Mission Impacts on the Environment, Sections 2.4 (LC) and 5.4 (FS) Constraints and Opportunities, and Sections 2.3 (LC) and 5.3 (FS) Overview of Natural Resources Management Program
(7) Opportunities	Constraints and opportunities are discussed in Sections 2.2.2 (LC) and 5.2.2 (FS) Mission Impacts on the Environment, Sections 2.4 (LC) and 5.4 (FS) Constraints and Opportunities, and Sections 2.3 (LC) and 5.3 (FS) Overview of Natural Resources Management Program
b. General Physical Environment	Sections 2.0 (LC) and 5.0 (FS) Existing
(1) Climate	Sections 2.5 (LC) and 5.5 (FS) Climate
(2) Physiography and Soils	Sections 2.6 (LC) and 5.6 (FS) Physiography and Soils
(3) Hydrology	Sections 2.7 (LC) and 5.7 (FS) Hydrology
c. General Biotic Environment	Sections 2.0 (LC) and 5.0 (FS) Existing
(4) T & E Species and Species of Concern	Sections 2.11 (LC) and 5.11 (FS) Rare, Threatened and Endangered Species and Significant Ecological Communities
(5) Wetlands and Deep Water Habitats	Sections 2.7.5 (LC) and 5.7.5 (FS) Wetlands, Sections 2.7.6 (LC) and 5.7.6 (FS) Nearshore Environment
(6) Fauna	Sections 2.10 (LC) and 5.10 (FS) Fauna
(7) Flora	Sections 2.9 (LC) and 5.9 (FS) Flora
3. Environmental Management Strategy and Mission Sustainability	Section 8.1.1 Integration of Military Mission and Sustainable Use
a. Supporting Sustainability of the Military Mission and the Natural Environment	Section 8.1.1 Integration of Military Mission and Sustainable Use
(1) Integrate Military Mission and Sustainable Land Use	Section 8.1.1 Integration of Military Mission and Sustainable Use
(2) Define Impact to the Military Mission	Sections 2.4 (LC) and 5.4 (FS) Constraints and Opportunities
(3) Describe Relationship to Range Complex Management Plan or other operation area plan	Section 8.1.3 Relationship with Other Operational Management Plans
b. Natural Resources Consultation Requirements	Section 8.2 Natural Resources Consultation Requirements
c. NEPA Compliance	Section 8.4 NEPA Compliance

d. Beneficial Partnerships and Collaborative Resource Planning	Section 1.10 Beneficial Partnerships and Collaborative Resource Planning
e. Public Access and Outreach	Sections 3.9 (LC) and 6.9 (FS) Outdoor Recreation and Environmental Awareness
(1) Public Access and Outdoor Recreation	Sections 3.9 (LC) and 6.9 (FS) Outdoor Recreation and Environmental Awareness, Sections 3.9.1 (LC) and 5.3.9 (FS) Outdoor Recreation
2) Public Outreach	Sections 3.10 (LC) and 6.10 (FS) Community Awareness, Sections 3.9.1 (LC) and 5.3.9 (FS) Outdoor Recreation
f. Encroachment Partnering	Section 1.6 Encroachment and Adjacent Land Use
g. State Comprehensive Wildlife Plans	Section 1.11 State Wildlife Action Plan
4. Program Elements	Sections 3.0 (LC) and 6.0 (FS) Program Components
a. T & E Species Management and Species benefit, Critical Habitat, and Species of Concern Management	Sections 3.6 (LC) and 6.6 (FS) Rare, Threatened and Endangered Species Management
b. Wetlands and Deep Water Habitats Management	Sections 3.2.4 (LC) and 6.2.4 (FS) Wetlands and Water Quality Protection
c. Law Enforcement of Natural Resources Laws and Regulations	Sections 3.12 (LC) and 6.12 (FS) Conservation Law Enforcement
d. Fish and Wildlife Management	Sections 3.5 (LC) and 6.5 (FS) Wildlife and Marine Resources Management
e. Forestry Management	Sections 3.4 (LC) and 6.4 (FS) Urban Forestry Management
f. Vegetation Management	Sections 3.8 (LC) and 6.8 (FS) Habitat Conservation and Restoration
g. Migratory Birds Management	Sections 3.5.2 (LC) and 6.5.2 (FS) Migratory Birds
h. Invasive Species Management	Sections 3.7 (LC) and 6.7 (FS) Invasive Species and Pest Management
i. Pest Management	Sections 3.7 (LC) and 6.7 (FS) Invasive Species and Pest Management
j. Land Management	Sections 3.2 (LC) and 6.2 (FS) Land Management, Section 6.3 (FS) Training Area Management, and Sections 3.8 (LC) and 6.8 (FS) Habitat Conservation and Restoration
k. Agricultural Outleasing	N/A

l. Geographical Information Systems (GIS) Management, Data Integration, Access, and Reporting	Section 1.8 Geographical Information Systems (GIS) Management, Data Integration, Access, and Reporting
m. Outdoor Recreation	Sections 3.9 (LC) and 6.9 (FS) Outdoor Recreation and Environmental Awareness
n. Bird Aircraft Strike Hazard	N/A
o. Wildland Fire Management	N/A
p. Training of Natural Resource Personnel	Section 1.7 Training of Natural Resources Personnel
q. Coastal/Marine Management	Sections 3.5.3 (LC) and 6.5.3 (FS) Marine Resources Protection, Sections 3.2.3 (LC) and 6.2.3 (FS) Coastal Zone Protection
r. Floodplains Management	Sections 3.2.5 (LC) and 6.2.5 (FS) Floodplains Management
s. Other Leases	N/A
5. Implementation	Section 5.0 INRMP Implementation
a. Summarize Process of Preparing Prescriptions that Drive the Projects	Section 8.5 Project Development and Classification
b. Achieving No-Net-Loss	Section 8.3 Achieving No Net Loss
c. Use of Cooperative Agreements	Section 8.8 Use of Cooperative Agreements
d. Funding	Section 8.6 Funding Sources

N/A = Not Applicable

APPENDIX C: NATIONAL ENVIRONMENT POLICY
ACT DOCUMENTATION

NAVFAC ENVIRONMENTAL CHECKLIST – ALL INSTALLATIONS

This Environmental Checklist (EC) is utilized to determine the environmental requirements associated with a proposed project. Complete this form and attach a site map. Then forward it to the NAVFAC Environmental Planning Program. The Environmental Department will respond within 2 weeks. Type responses in the **GRAY** boxes (as seen in Microsoft Word).

GENERAL PROJECT INFORMATION

1	Activity Requesting:	
2	Activity POC / Phone / email:	
3	Name of Project:	
4	Project Number (if any):	
5	Project Location:	Select from pulldown menu - click here
6	Project Type:	Select from pulldown menu - click here
7	Brief Description of the Project:	
8	Why is this project needed?	
9	When project scheduled to begin?	

PLANNING QUESTIONS

10a	Total Project Area (sq. ft.) - (Include clear zones, laydown areas, etc)	Square Feet or	Acres
10b	Percentage of Project Area - that is currently Impervious (asphalt, bldgs, etc.)	% of Project Area	
10c	Percentage of Project Area - that will be Impervious once project completed	% of Project Area	
10d	Percentage of Project Area - that will be disturbed (excavated, graded, etc)	% of Project Area	
11	How will StormWater be managed in the long-term (post-construction)?	Select from pulldown menu - click here	
12	How will Sanitary Sewage (wastewater) be managed in the long-term?	Select from pulldown menu - click here	
13	Will there be actions conducted in the water (dredging, new pilings, etc.)?	Select from pulldown menu - click here	
14	Will there be actions conducted in an area under an Agriculture outlease?	Select from pulldown menu - click here	

DESIGN RELATED QUESTIONS

		YES	NO	UNSURE
15	Will trees be removed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Will emission-generating equipment be utilized during construction (bulldozer, backhoe, etc)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Will the project remove, install or utilize a petroleum storage tank, that is >=55-gallons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Will the project remove or install an Oil Water Separator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Will the project relocate excavated material at the Installation?; if yes – Where:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Will the construction / repair actions generate by-products (powerwashing water; haz. waste)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Will the construction / repair actions require de-watering?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OPERATIONAL RELATED QUESTIONS

		YES	NO	UNSURE
22	Will emission-generating equipment be installed (ex. paint booth, emergency generators)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Will there be any new processes or maintenance activates conducted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADDITIONAL COMMENTS

Type here:

Checklist Preparer, phone number and e-mail (if Same as Question #2 – Type “SAME”)	Date

The NAVFAC Environmental Department will respond within 2 weeks with the completed form (shown below) detailing the environmental requirements associated with your project

NAVFAC ENVIRONMENTAL CHECKLIST – ALL INSTALLATIONS

SUMMARY OF ENVIRONMENTAL REQUIREMENTS

PLEASE NOTE: The Environmental review provided is only valid for 1 year. If the project scope has been modified or checklist has expired, please contact the NAVFAC Environmental Planning Program to re-evaluate the project.

Name of Project:

Project Number:

PLANNING REQUIREMENTS (Issues That Can Effect the Project's Timeline, Cost or Site Location)

Environmental Aspect	YES	NO	Environmental Requirement	Project Impacts
National Env Policy Act (NEPA)	TBD		CATEX = 1 week; EA = 12 months; EIS = 24 months.	Can't award till NEPA complete
Threatened, Endangered Species	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with Regulators required.	Process may take 6 months.
Wetland Impacts	<input type="checkbox"/>	<input type="checkbox"/>	Permits and possibly mitigation required.	May take 7 months -after NEPA
Navigable Water Impacts	<input type="checkbox"/>	<input type="checkbox"/>	Permits required.	Takes 2-7 months – after NEPA
Agriculture Outlease	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with NAVFAC Real Estate required.	Process may take 1 to 3 months.
Tree Mitigation	<input type="checkbox"/>	<input type="checkbox"/>	Compensation for tree loss or mitigation is required.	This may add costs to project.
Coastal Zone Mgmt Act	<input type="checkbox"/>	<input type="checkbox"/>	Coastal Consistent Determination (CCD) is required.	Process takes 90 days.
Cultural Resources	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with SHPO required	Process may take 1 to 6 months.
Major Air Emission Source	<input type="checkbox"/>	<input type="checkbox"/>	Permit is required.	Process takes 6 months.
Construction Emissions	<input type="checkbox"/>	<input type="checkbox"/>	Air Conformity Record of Non-Applicability is required.	This process takes a week.
Installation Restoration	<input type="checkbox"/>	<input type="checkbox"/>	Land-use controls exist or Consultation w/ EPA required	Process may take 4 months.
Petroleum Contamination	<input type="checkbox"/>	<input type="checkbox"/>	Follow guidance in NAVFAC POL SOP.	This may add costs to project.

DESIGN REQUIREMENTS (Issues To Be Addressed In Design Phase)

StormWater Best Mgmt Practice	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 1 acre of land.	Incorporate into the design.
Erosion & Sediment Control	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 10,000 sq ft.	Incorporate into the design.
State StormWater Mgmt Permit	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 1 acre of land.	Obtain before construction.
De-watering, Wastewater Mgmt	<input type="checkbox"/>	<input type="checkbox"/>	Protective Measures required for managing excess waters.	Incorporate into the design.
Beach & Dune Management	<input type="checkbox"/>	<input type="checkbox"/>	Protective Measures required for impact beaches & dunes	Incorporate into the design.
Spill Preventative Measures	<input type="checkbox"/>	<input type="checkbox"/>	Secondary containment required for tanks >= 55-gal	Incorporate into the design.

OPERATIONAL REQUIREMENTS (Issues To Be Addressed Prior To Use)

New Industrial Process	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Department Site Inspection required.	Required before operation.
New Waste Generating Activity	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Department Site Inspection required.	Required before operation.

ADDITIONAL REQUIREMENTS or COMMENTS

Cmmt 1	
Cmmt 2	
Cmmt 3	
Cmmt 4	
Cmmt 5	

Environmental POC: phone number and email	Signature	Date
--	------------------	-------------

**Final Environmental Assessment for Development and Implementation of the Fort Story Integrated
Natural Resources Management Plan (Plan Years 2004-2008)**

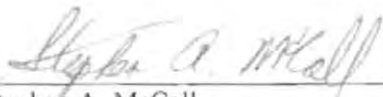
March 2005

FINAL ENVIRONMENTAL ASSESSMENT
FOR DEVELOPMENT AND IMPLEMENTATION OF THE FORT STORY
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
(PLAN YEARS 2004-2008)

March 2005

Prepared by:
Geo-Marine, Inc.
Newport News, VA

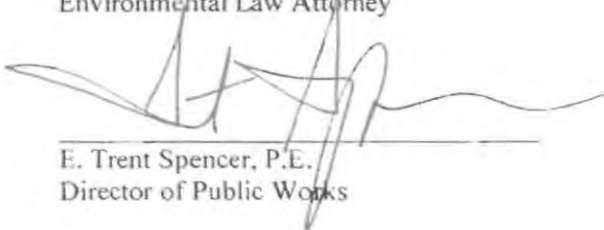
Reviewed by:



Stephen A. McCall
Chief, Environmental and Natural Resources Division
Directorate of Public Works



Susan A. Bivins
Environmental Law Attorney



E. Trent Spencer, P.E.
Director of Public Works



W.L. Rehorn
Lieutenant Colonel, US Army
Commanding Officer
Fort Story

Approved by:



Ronnie T. Ellis
Colonel, US Army
Garrison Commander

Cover Letter

LEAD AGENCY: Fort Eustis, Virginia.

TITLE OF PROPOSED ACTION: Environmental Assessment for Development and Implementation of the Fort Story Integrated Natural Resources Management Plan.

AFFECTED JURISDICTION: The City of Virginia Beach, Virginia.

PREPARED BY: Directorate of Public Works, Environmental and Natural Resources Division, Fort Eustis, Virginia.

REVIEWED BY: Susan A. Bivins, Office of the Staff Judge Advocate; Stephen A. McCall, Chief Environmental and Natural Resources Division; and, David J. Bender, Colonel, US Army, Director of Public Works.

APPROVED BY: Ronnie T. Ellis, Colonel, TC, Garrison Commander, Fort Eustis, Virginia; Diane M. Deven, Director, Installation Management Agency, Northeast Regional Office.

ABSTRACT: The Environmental Assessment (EA) analyzes the potential impacts associated with development and implementation of an Integrated Natural Resources Management Plan (INRMP) at Fort Story, Virginia. The proposed action would implement a conservation program that integrates coastal resources protection; fish and wildlife management; land management; and management of rare, threatened, and endangered species as practicable and consistent with the military mission and planned mission activities. Implementation of the proposed action is not expected to result in significant environmental impacts. Therefore, preparation of an Environmental Impact Statement is not required and a Finding of No Significant Impact (FONSI) will be published in accordance with the Army's NEPA regulation.

REVIEW COMMENT DEADLINE: The Draft EA and FONSI were available for public and agency review for 30 days. Copies were provided to the Virginia Beach Library, Virginia Beach, Virginia. Comments should be addressed to Commander, US Army Transportation Center, ATZF-PWE (Tim Christensen), 1407 Washington Blvd., Fort Eustis, VA 23604-5306.

This page intentionally left blank

EXECUTIVE SUMMARY

This Environmental Assessment (EA) analyzes the potential environmental consequences resulting from implementation of the proposed Integrated Natural Resources Management Plan (INRMP) at Fort Story, Virginia. The environmental analysis process is designed to ensure the public is involved in the process and informed about the potential environmental effects of the proposed action; and to help decision makers take environmental factors into consideration when making decisions related to the proposed action.

Purpose and Need

The purpose of this action is to implement a conservation program that integrates coastal resources protection; fish and wildlife management; wetlands management; land management; and management of rare, threatened, and endangered species as practicable and consistent with the military mission and planned mission activities. The need for this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA). In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the United States, unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

Description of the Proposed Action and Alternatives

The proposed action is to update the 1999 INRMP at Fort Story. The INRMP would maintain ecosystem viability and ensure the sustainability of desired military training area conditions; maintain, protect, and improve ecological integrity; protect and enhance biological communities, particularly sensitive, rare, threatened, and endangered species; protect the ecosystems and their components from unacceptable damage or degradation; identify and restore degraded habitats; provide recreational opportunities; and accommodate multiple uses of the land. Three alternatives were considered: Ecosystem Management Approach (Alternative 1/Preferred Alternative), Limited Action Alternative (Alternative 2), and the No Action Alternative (Alternative 3).

The preferred alternative would develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA.

Implementation of an INRMP under the limited action alternative would focus on activities necessary to achieve legal compliance with environmental laws and regulations. Stewardship projects would be given a low priority for implementation. The no action alternative would be the continued implementation of natural resources management practices conducted at Fort Story.

Summary of Environmental Consequences

There would be positive effects and temporary minor impacts associated with implementation of the action alternatives. A summary of the potential impacts is presented in Table ES-1.

Table ES-1. Comparison of Alternatives.

Resource/Issue	Preferred Alternative	Limited Action Alternative	No Action Alternative
Land Use	Positive effects to the installation's capability to support the military mission by implementing projects to maintain ecosystem integrity	No change to the installation's capability to support the military mission	Negative effects on management of land use since the existing INRMP does not involve wetland delineations and subsequent updates
Soil	Positive effects from review of military construction projects for erosion and sediment control and by integrating management activities for erosion and sediment control	Positive effects, but less benefit than the preferred alternative because of low priority for implementation of stewardship actions	No change to existing conditions
Water	Positive effects from review of permitting requirements; compliance with wetlands regulations; and project implementation for protection of water quality and wetlands	Positive effects from review of permitting requirements and compliance with wetlands regulations	No change to existing conditions
Vegetation	Positive effects from integration of forest, wildlife, terrestrial and aquatic habitat, invasive species control, pest control, and conservation awareness management activities	Positive effects from invasive species control, negative effects due to low priority for wildlife habitat enhancement, and environmental education management actions	Negative effects due to lack of projects to prevent the loss of habitat

Table ES-1. Comparison of Alternatives (cont'd).

Resource/Issue	Preferred Alternative	Limited Action Alternative	No Action Alternative
Wildlife	Positive effects from integration of forest, wildlife, terrestrial and aquatic habitat, pest control, and conservation awareness management activities	Negative effects due to low priority for wildlife habitat enhancement, pest control, and environmental education management activities	Negative effects due to lack of projects to prevent loss of habitat, conduct predator control, and conduct non-game species management programs
Threatened and Endangered Species	Positive effects from rare species surveys and protection and enhancement of rare species habitat	Positive effects from rare species surveys and protection and enhancement of rare species habitat	Non-compliance with state endangered species guideline
Cultural Resources	Positive effects from integration with the cultural resources management plans	Positive effects from integration with the cultural resources management plans	No change to existing conditions
Air Quality	<i>De minimis</i> emissions from grading activities	No change to existing conditions	No change to existing conditions
Socioeconomics and Environmental Justice	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations

This page intentionally left blank

TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND NEED FOR THE ACTION	1-1
1.1 Introduction	1-1
1.2 Purpose and Need	1-1
1.3 Regulatory Compliance	1-3
1.4 Scope of this EA	1-4
2.0 DESCRIPTION OF THE PROPOSED ACTION	2-1
3.0 ALTERNATIVES CONSIDERED	3-1
3.1 Alternatives Development	3-1
3.2 Alternatives to the Proposed Action	3-1
3.2.1 Alternative 1 – Ecosystem Management (Preferred Alternative)	3-2
3.2.2 Alternative 2 – Limited Action	3-5
3.3 Alternative 3 - No Action Alternative	3-6
4.0 AFFECTED ENVIRONMENT	4-1
4.1 Land Use	4-1
4.2 Soil Resources.....	4-1
4.3 Water Resources	4-1
4.4 Vegetation	4-2
4.5 Wildlife	4-2
4.6 Rare, Threatened, and Endangered Species	4-4
4.7 Cultural Resources	4-4
4.8 Air Quality	4-5
4.9 Socioeconomics and Environmental Justice.....	4-6
5.0 ENVIRONMENTAL CONSEQUENCES	5-1
5.1 Land Use	5-1
5.1.1 Preferred Action Alternative.....	5-1
5.1.2 Limited Action Alternative.....	5-2
5.1.3 No Action Alternative.....	5-2
5.2 Soil Resources.....	5-2
5.2.1 Preferred Alternative.....	5-2
5.2.2 Limited Action Alternative	5-2
5.2.3 No Action Alternative.....	5-3
5.3 Water Resources	5-3
5.3.1 Preferred Alternative.....	5-3
5.3.2 Limited Action Alternative.....	5-3
5.3.3 No Action Alternative.....	5-3
5.4 Vegetation Resources.....	5-4
5.4.1 Preferred Alternative.....	5-4
5.4.2 Limited Action Alternative.....	5-4

TABLE OF CONTENTS (cont'd)

	<u>Page</u>
5.4.3 No Action Alternative.....	5-4
5.5 Wildlife Resources.....	5-4
5.5.1 Preferred Alternative.....	5-5
5.5.2 Limited Action Alternative.....	5-5
5.5.3 No Action Alternative.....	5-5
5.6 Threatened and Endangered Species.....	5-5
5.6.1 Preferred Action Alternative.....	5-5
5.6.2 Limited Action Alternative.....	5-6
5.6.3 No Action Alternative.....	5-6
5.7 Cultural Resources.....	5-6
5.7.1 Preferred Action Alternative.....	5-6
5.7.2 Limited Action Alternative.....	5-7
5.7.3 No Action Alternative.....	5-7
5.8 Air Quality.....	5-7
5.8.1 Preferred Alternative.....	5-7
5.8.2 Limited Action Alternative.....	5-7
5.8.3 No Action Alternative.....	5-8
5.9 Socioeconomics and Environmental Justice.....	5-8
5.9.1 Preferred Action Alternative.....	5-8
5.9.2 Limited Action Alternative.....	5-8
5.9.3 No Action Alternative.....	5-9
5.10 Potential Conflicts between the Proposed Action and Federal, State, and Local Land Use Plans.....	5-9
5.11 Irreversible and Irretrievable Commitment of Resources.....	5-9
5.12 Cumulative Impacts.....	5-10
6.0 COMPARISON OF ALTERNATIVES AND CONCLUSION.....	6-1
7.0 AGENCIES AND PERSONS CONSULTED.....	7-1
8.0 LIST OF PREPARERS.....	8-1
9.0 REFERENCES.....	9-1

APPENDICES

- Appendix A Regulatory Coordination
- Appendix B Record of Non-Applicability

LIST OF FIGURES

<u>No.</u>	<u>Page</u>
Figure 1-1. Vicinity Map of Fort Story.....	1-2

LIST OF TABLES

<u>No.</u>	<u>Page</u>
Table 3-1. Project Implementation Schedule (2004-2008).....	3-3
Table 4-1. <i>De Minimis</i> Exemption Levels in Maintenance Areas.....	4-6
Table 6-1. Comparison of Alternatives.....	6-1

ACRONYMS AND ABBREVIATIONS

AR	Army Regulation
BMP	best management practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CB	Conservation Branch
CCD	Coastal Consistency Determination
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
<i>de minimis</i>	below a minimum threshold level
DoD	Department of Defense
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
ESMP	endangered species management plan
GIS	geographic information system
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
LCTA	land condition trend analysis
LRAM	land rehabilitation and maintenance
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
O ₃	ozone
Pb	lead
PM ₁₀	particulate matter less than 10 micrometers
ROI	Region of Influence
SO ₂	sulfur dioxide
SAIA	Sikes Act Improvement Act
SAV	submerged aquatic vegetation
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USFWS	U.S. Fish and Wildlife Service
VDCR	Virginia Department of Conservation and Recreation
VDGIF	Virginia Department of Game and Inland Fisheries
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VOC	volatile organic compounds

1.0 PURPOSE AND NEED FOR THE ACTION

1.1 Introduction

The US Army proposes to update the 1999 Integrated Natural Resources Management Plan (INRMP) for Fort Story, Virginia (Tetra Tech, Inc. 1999) to guide natural resources management from 2004 through 2008. This Environmental Assessment (EA) has been prepared in accordance with the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508, Section [§] 1502.13) implementing the provisions of the National Environmental Policy Act (NEPA) of 1969, 42 U.S. Code (USC) § 4231 et seq. as amended, and 32 CFR Part 651 (US Army regulations pertaining to compliance with NEPA).

Fort Story is a 1,460-acre installation at Cape Henry adjacent to the city of Virginia Beach, Virginia (Figure 1-1). It is bordered on the northeast by the Atlantic Ocean, on the northwest by the Chesapeake Bay, and on the south by the 2,770-acre First Landing/Seashore State Park and Natural Area. Fort Story is the satellite installation of Fort Eustis, located approximately 45 miles northwest. The first land acquisition for Fort Story was made in 1914 and completed in 1963.

1.2 Purpose and Need

The purpose of this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997 (16 USC § 670a et seq.). In November 1997, the SAIA was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. The need for this action arises from the SAIA requirements that the Secretaries of the military departments prepare and implement an INRMP for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate. In order to maintain consistency with the SAIA and Army guidelines, Fort Story must conduct a 5-year revision to update the 1999 INRMP.

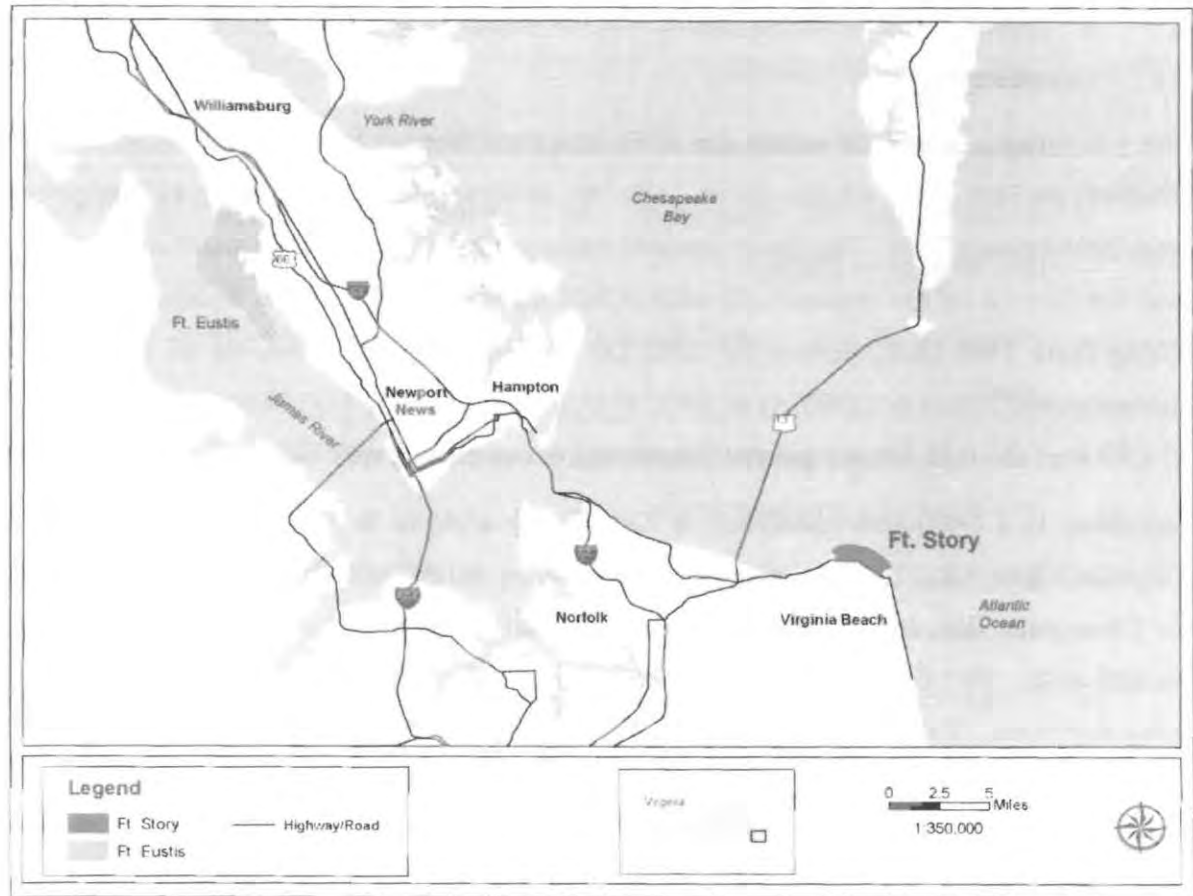


Figure 1-1. Vicinity Map of Fort Story.

The SAIA requires each installation to prepare an INRMP that provides for the following management activities, to the extent that such activities are consistent with use of the installation for military preparedness:

- The conservation and rehabilitation of natural resources on military installations;
- The sustainable multipurpose use of the resources, to include hunting, fishing, trapping, and nonconsumptive uses; and
- Public access to the installation, subject to safety requirements and military security.

As required by the SAIA, the INRMP must, to the extent appropriate and applicable, provide for:

- Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- Fish and wildlife habitat enhancement or modifications;
- Wetland protection, enhancement, and restoration, where necessary, for support of fish, wildlife, or plants;
- Integration of, and consistency among, the various activities conducted under the plan;
- Establishment of specific natural resources management goals and objectives and time frames for proposed action;
- Sustainable use of natural resources by the public to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- Public access to the military installation that is necessary or appropriate, subject to any requirements necessary to ensure safety and military security;
- Enforcement of applicable natural resource laws (including regulations);
- No net loss in the capability of the installation lands to support the military mission of the installation; and
- Such other activities as the Army determines appropriate to implement natural resources management.

1.3 Regulatory Compliance

In preparing the INRMP, Fort Story has worked in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF) so that the plan will reflect the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on the installation. These comments will be provided in Appendix A. Also as required by the SAIA, the INRMP has been provided for public comments in preparing the plan.

In accordance with NEPA and 32 CFR Part 651, a notice of availability for this EA was published in The Virginian-Pilot to obtain public reviews and comments (Appendix A).

1.4 Scope of this EA

This EA has been prepared to evaluate the potential environmental impacts of implementing the proposed INRMP and two alternatives. The analysis compares and summarizes the environmental consequences of the proposed action and alternatives rather than individual projects or practices and is therefore a programmatic assessment. Site-specific environmental analyses that are required for future projects may be tiered to this EA provided the anticipated impacts of a specific project, project components, the affected resources, or circumstances do not differ substantially from those evaluated in this EA.

Relevant resources evaluated in this EA include, land use, ecological resources (soil, water, vegetation, wildlife, and protected species), cultural resources, air quality, and socioeconomics and environmental justice. In compliance with NEPA and 32 CFR Part 651 requirements, the scope of this EA focuses on those resources potentially subject to impacts.

Resources eliminated from further evaluation include noise, facilities, and hazardous materials and waste. No changes to ambient sound levels, acceptable land use compatibility guidelines regarding noise, or noise complaints would occur since the proposed action would not involve activities that would change noise conditions. All facilities (buildings, transportation assets, and utilities) would continue to be maintained and operated in accordance with established policies to include the INRMP as appropriate. Implementation of the INRMP (under all three alternatives) would not increase the use of hazardous materials and, subsequently, not increase the volume of waste stream of hazardous wastes.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to update the 1999 INRMP for Fort Story to ensure that natural resources conservation measures and Army activities are integrated and consistent with federal stewardship requirements. The updated INRMP would maintain ecosystem viability and ensure the sustainability of desired military training area conditions; maintain, protect, and improve ecological integrity; protect and enhance biological communities, particularly sensitive, rare, threatened, and endangered species; protect the ecosystems and their components from unacceptable damage or degradation; identify and restore degraded habitats; provide recreational opportunities; and accommodate multiple uses of the land.

The updated INRMP would be developed in accordance with the memorandum issued by the Deputy Under Secretary of Defense for Environmental Security (8 August 1994) regarding Implementation of Ecosystem Management in the Department of Defense (DoD), which states that ecosystem management will become the basis for future management of DoD lands and waters. Implementing ecosystem management principles would protect and enhance the diversity of wildlife and habitats, as well as continue to provide an aesthetically pleasing environment. The updated INRMP takes into account changes in natural resources or activities likely to affect natural resources in the future. It includes projects and management techniques that respond to such changes. Best management practices (BMPs) would be used for implementation of natural resources management activities.

In accordance with AR 200-3 (Natural Resources-Land, Forest, and Wildlife Management), management recommendations would be developed with consideration for the interrelationships between the individual components of the ecosystem, the requirements of the military mission, and other land use activities. The focus would be on maintaining the structure, diversity, and integrity of the biological communities, while recognizing that the military mission is a vital component of the ecosystem. Management actions would be monitored to ensure they are effective in achieving their intended goals and objectives. This management approach would preserve and enhance natural resources while providing the optimum environmental conditions required to sustain the military mission and realistic training conditions.

This page intentionally left blank

3.0 ALTERNATIVES CONSIDERED

3.1 Alternatives Development

Each alternative must integrate natural resources management with the military mission in a manner that ensures military preparedness and meets the requirements of the SAIA and other conservation laws that regulate natural resources on federal lands. The proposed alternatives are based on SAIA guidance that installations shall develop and implement an INRMP using an ecosystem management approach. AR 200-3 provides program requirements and standards for managing natural resources on Army installations. The Environmental Conservation Program (DoD Instruction 4715.3) provides guidelines for classifying conservation actions as compliance activities (projects associated with a legal requirement for protection and management of natural resources) or stewardship activities (projects that enhance natural resources but are not required under regulation or Executive Order [EO] and are not of an immediate nature). Compliance activities are assigned Funding Class 0, I, or II and are high priority for funding. Stewardship activities are assigned Funding Class III and are the lowest priority for funding. These funding classes are used to develop implementation priorities for management actions in each alternative.

Alternatives to the proposed action that would disproportionately administer one portion of the natural resources program, such as forest or wildlife management stewardship activities, over compliance management activities were considered and eliminated from further consideration. These alternatives would not constitute an integrated conservation program and would therefore not be compliant with SAIA, DoD Instruction 4715.3, or AR 200-3, and would not adequately address other conservation laws and regulations.

3.2 Alternatives to the Proposed Action

The alternatives analyzed in this EA are modifications in the level of effort required to implement natural resources management goals and objectives. The preferred alternative (Alternative 1) would provide greater environmental benefits than the limited action alternative (Alternative 2) because the fullest range of management projects would be implemented to ensure that an ecosystem approach to natural resources management is achieved. The No Action Alternative (Alternative 3) has the least benefits since this alternative encompasses not updating the INRMP.

3.2.1 Alternative 1 – Ecosystem Management (Preferred Alternative)

The preferred alternative would develop and fully implement an updated INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. Implementation of the INRMP using an ecosystem management approach would include compliance and stewardship activities to achieve long-term use of natural resources and resource protection.

There would be 12 interrelated program components included in the INRMP: urban forestry; wildlife, fisheries, and habitat management; threatened and endangered species management; Chesapeake Bay Program; integrated training area management; land management; outdoor recreation; community awareness; natural resources law enforcement; cultural resources protection; ecosystem management; and pest management.

The projects proposed for implementation are presented in Table 3-1 and further explained in the INRMP. A total of 43 project management objectives would be implemented to address needs for 11 management issues outlined in the updated INRMP for Fort Story. Proposed projects include shoreline stabilization, land rehabilitation and maintenance (LRAM), land condition trend analysis (LCTA), water quality monitoring to prevent and control algal blooms, wetland buffer establishment, wetland delineation, urban forest inventory, non-game wildlife habitat development, recreational fishing enhancement, planning level inventories, conservation area protection, pest management, invasive species control, conservation awareness activities, and updating the INRMP in 2008. The updated INRMP would include 23 compliance projects (Class 0, I, and II) and 20 stewardship projects (Class III).

As part of the ITAM Program, LRAM and LCTA provide a basis for sustainable use of training lands on Fort Story. LRAM reduces the impacts that result from training activities by implementing projects for erosion control, drainage improvements, shoreline stabilization, beach replenishment, training area maintenance and repair, and similar projects to rehabilitate degraded areas. LCTA provides a methodology for inventorying and monitoring physical and biological resources on training lands in an effort to relate land conditions to training activities. Using GIS to document baseline conditions and conduct change analysis has been the primary objective for LCTA at Fort Story.

The primary goal of the INRMP would be to maintain ecosystem viability and ensure the sustainability of desired military training area conditions. Implementation of projects would require coordination with agencies and organizations within and outside Fort Story. The Conservation Branch (CB), Environmental and Natural Resources Division, Directorate of Public Works at Fort Eustis and Fort Story would oversee all management projects recommended in the INRMP. Command support would be essential for implementation of the INRMP. Professionally trained natural resources management personnel, in cooperation with other installation staff, would be necessary to implement the INRMP.

Table 3-1. Project Implementation Schedule (2004-2008).

Management Issue/Project	Class	Fund	2004	2005	2006	2007	2008	Total
7.2 Shoreline Management								
Stormwater Projects	II	EPR		X			X	X
LRAM Projects Dune Stabilization	II	ITAM	X		X		X	X
LCTA Monitoring Projects	II	ITAM		X		X		X
7.3 Soil Conservation Management								
LRAM Projects	II	ITAM		X		X		X
LCTA Monitoring Projects	II	ITAM		X		X		X
Prioritize Erosion Control Sites	II	EPR	X	X	X	X	X	X
7.4 Wetlands and Water Quality Management								
Monitor Water Quality in Lakes	II	EPR		X		X		X
Monitor Water Quality in Wetlands	II	EPR			X		X	X
LRAM Drainage Improvement Projects	II	ITAM		X	X		X	X
Baseline Watershed Assessment	III	EPR	X	X	X	X	X	X
Lake Habitat Assessment	III	EPR			X			X
Maintain Wetland Buffers	III	EPR	X	X				X
Publish Wetland and Aquatic Sites Restrictions	II	ITAM		X			X	X

Table 3-1. Project Implementation Schedule (2004-2008) (cont'd).

Management Issue/Project	Class	Fund	2004	2005	2006	2007	2008	Total
7.5 Terrestrial Habitat Management								
LRAM Projects	II	ITAM		X	X	X	X	X
Ecotones for Biodiversity	III	EPR	X	X	X	X	X	X
Bird and Bat Boxes	III	EPR		X	X	X	X	X
Planning Level Surveys	II	EPR		X	X			X
Plant Native Grasses	III	EPR	X	X	X	X	X	X
7.6 Wildlife Management								
Monitor Furbearer Populations	III	EPR		X			X	X
Nuisance Furbearer Control	III	EPR	X	X	X	X	X	X
Planning Level Surveys	II	EPR		X	X			X
Watchable Wildlife Areas	III	EPR		X	X			X
Monitor Avian Species	III	EPR	X	X	X	X	X	X
7.7 Fisheries Management								
Survey Fish Populations	III	EPR		X			X	X
Angler Reporting Form	III	EPR	X	X	X	X	X	X
7.8 Rare, Threatened, and Endangered Species Management								
Regulatory Compliance	I	EPR		X			X	X
GIS Database	I	EPR	X	X	X	X	X	X
Monitor Beach Strandings	II	EPR	X	X	X	X	X	X
Incorporate Conservation Boundaries	III	EPR		X			X	X
Update Natural Heritage Inventory	I	EPR			X			X
Install Gates	II	ITAM	X					X
7.9 Cantonment Area Management								
Urban Forest Inventory	III	EPR			X		X	X
Develop Natural Areas	III	EPR	X	X	X	X	X	X

Table 3-1. Project Implementation Schedule (2004-2008) (cont'd).

Management Issue/Project	Class	Fund	2004	2005	2006	2007	2008	Total
7.10 Pest Management								
Integrated Pest Management Plan	II	EPR	X	X	X	X	X	X
Conduct Invasive Species Survey	II	EPR		X			X	X
Invasive Species Control Plan	II	EPR		X				X
Remove Feral Cats and Dogs	III	EPR	X	X	X	X	X	X
Invasive Species Control	II	EPR	X	X	X	X	X	X
7.11 Conservation Awareness								
Publish Articles in <i>The Wheel</i>	III	EPR	X	X	X	X	X	X
Conduct <i>Historic Classrooms</i>	III	EPR	X	X	X	X	X	X
Sponsor Clean the Bay Day	III	EPR	X	X	X	X	X	X
Disseminate Information	III	EPR	X	X	X	X	X	X
8.1 Program Management								
Staff Salaries (0.5 FTE)	0	EPR	X	X	X	X	X	X
INRMP Update	I	EPR					X	X

¹ Class 0, Recurring Compliance, Class I, Current Compliance, Class II, Maintenance Compliance Requirements, Class III, Stewardship Enhancement Actions Beyond Compliance.

² EPR-environmental program requirements, ITAM-integrated training area management fund.

3.2.2 Alternative 2 – Limited Action

Implementation of the updated INRMP under the limited action alternative would focus on activities necessary to achieve legal compliance with environmental laws and regulations, such as Clean Air Act, Clean Water Act, Endangered Species Act, Migratory Bird Treaty Act, Chesapeake Bay Preservation Act, appropriate state laws, and EOs. Projects that support or provide participation in regional ecosystem initiatives and other stewardship activities (Funding Class III), representing the Army's commitment to conservation of natural resources, would be given a low priority for implementation.

The management programs and initiatives would be the same as presented for the preferred alternative; however, project implementation would be focused on maintaining compliance with legal requirements for protection and management of natural resources in order to avoid disruption of military mission activities. Although the project list under Alternative 2 would be the same as for the preferred alternative, the 20 stewardship projects proposed in Table 3-1

would probably not be implemented under the limited action alternative unless the availability of project funding exceeded requirements for the specified compliance projects. Although consistent with the SAIA and INRMP requirements, implementation of the limited action alternative would reduce the environmental benefits of ecological sustainability, ecosystem integrity and conservation of biodiversity that would be achieved by full implementation of compliance and stewardship projects specified in the preferred alternative.

3.3 Alternative 3 - No Action Alternative

The no action alternative would be the continued implementation of current natural resources management practices conducted at Fort Story. Under this alternative, there would be no change to the affected environment and management measures outlined in the 1999 INRMP would not be updated. Implementation of the management programs and initiatives that were planned through Fiscal Year 2004 would continue under this alternative; however, no new initiatives would be established to address emerging management issues through 2008. Adopting the no action alternative would result in the Fort Story INRMP being non-compliant with the SAIA and Army requirements regarding the 5-year revision requirement as well as being outdated by recent developments at the installation. The no action alternative has been carried forward in this EA as a baseline for comparison of potential environmental consequences from implementing the action alternatives.

4.0 AFFECTED ENVIRONMENT

This section describes the affected environment that would be impacted by implementation of the alternatives discussed in Section 3.0. In accordance with CEQ regulations (§ 1502.15), the descriptions presented below are no longer than necessary to understand the potential effects of implementation of the proposed action or alternatives. More detailed information on the affected environment is presented in the INRMP.

4.1 Land Use

Land uses at Fort Story are divided into the cantonment area, training areas, recreational sites, and woodlands. The cantonment area on Fort Story covers approximately 433 acres. Facilities in this area include housing, administrative offices, indoor training, and recreation. Training areas encompass 1,027 acres of inland and beach areas. There are 22 training areas and one helicopter landing pad on Fort Story.

4.2 Soil Resources

There are 11 soil map units on Fort Story. These soils are classified as sandy coastal soils, swamp marsh soils, or upland soils (USDA 1985). Hydric soils occur primarily in the south-central and southeastern portions of the installation. There is a slight to severe potential of soil erosion for more than half the installation.

4.3 Water Resources

Groundwater. The water table is at 0 to 10 feet using sea level as a reference and from 2.5 feet below the ground surface near the shore to greater than 40 feet in high ridge areas (USACE 1996). The water supply for Fort Story comes from surface reservoirs operated by the cities of Virginia Beach and Norfolk.

Surface Water. Fort Story has four man-made lakes and one pond that cover approximately 10 acres. There are no streams on the installation, and much of the stormwater infiltrates into the sandy soil or is lost through evaporation or evapotranspiration (USACE 1996).

Wetlands. The Norfolk District Corps of Engineers Regulatory Branch delineated wetlands at Fort Story on February 2005. There are approximately 349.5 acres of wetlands on Fort Story.

Coastal Resources. Fort Story is located entirely within the coastal zone of Virginia as established in Virginia's Coastal Resources Management Program. The installation is fronted on its northern and eastern boundaries by 19,000 feet of beach. The western reaches of the Fort Story shoreline front the Chesapeake Bay and the shoreline east of the Cape Henry apex front the Atlantic Ocean. In accordance with the Virginia Coastal Resources Management Plan, a Coastal Consistency Determination (CCD) is obtained for all actions on Fort Story that have the potential to affect Virginia's coastal uses and resources.

4.4 Vegetation

The undisturbed habitats at Fort Story are divided into three main groups: vegetated oceanfront dunes, interior vegetated dunes, and low lying forested wetlands. Coastal maritime forest covers approximately 507 acres in parallel vegetated sand dunes with interdunal wetlands. Forested wetlands cover approximately 260 acres and are predominately swamp blackgum-red maple-bald cypress (*Nyssa biflora-Acer rubrum-Taxodium distichum*) forested swamp. Beach/dune areas cover approximately 106 acres and include American beachgrass (*Ammophila breviligulata*) and broomsedge (*Andropogon virginicus*). Aquatic vegetation in the lakes include creeping rush (*Juncus repens*), water-thread pondweed (*Pontamogeton diversifolius*) and bladderwort (*Utricularia* spp.). There are 514 acres of developed area that have been planted with various landscape tree and shrub species (Stevenson 1996, USACE 1996).

4.5 Wildlife

Mammals. At least 30 species of mammals have been recorded in the Fort Story/Cape Henry area. These species include the least shrew (*Cryptotis parva*), short-tailed shrew (*Blarina brevicauda*), common mole (*Scalopus aquaticus*), eastern big-eared bat (*Corynorhinus rafinesquii macrotis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), river otter (*Lutra canadensis*), mink (*Mustela vison*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), golden mouse (*Peromyscus nuttalli*), cotton mouse (*Peromyscus gossypinus*), white-footed mouse (*Peromyscus leucopus*), rice rat (*Oryzomys palustris*), muskrat (*Ondatra zibethicus*), Virginia opossum (*Pidelphis marsupialis*), eastern cottontail rabbit (*Sylvilagus floridans*), and marsh rabbit (*Sylvilagus palustris*).

Birds. Approximately 140 bird species are known to occur in the vicinity of Fort Story. A partial listing of these species includes Acadian flycatcher (*Empidonax vireescens*), black and white warbler (*Mniotilta varia*), black-crowned night heron (*Nycticorax nycticorax hoactli*), brown-headed nuthatch (*Sitta pusilla*), cedar waxwing (*Bombycilla cedrorum*), golden-crowned kinglet (*Regulus satrapa satrapa*), great egret (*Casmerodius albus*), greater scaup (*Aythya marila*), green heron (*Dutorides vireescens vireescens*), osprey (*Pandion haliaetus carolinensis*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), spotted sandpiper (*Actitis macularia*), snowy egret (*Leucophoyx thula thula*), Wilson's snipe (*Capella gallinago delicata*), wood duck (*Aix sponsa*), and yellow-bellied sapsucker (*Sphyrapicus varius varius*).

Fish. The USFWS conducted a fish survey in 1991 of three lakes on the installation (Snake Lake, Hospital Road Lake, and East Gate Lake). The following fish species were collected: largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), gambusia (*Gambusia* spp.), pumpkinseed sunfish (*Lepomis gibbosus*), brown bullhead (*Ictalurus nebulosus*), golden shiner (*Notemigonus crysoleucas*), bluespotted sunfish (*Enneacanthus gloriosus*), black crappie (*Pomoxis nigromaculatus*), and white perch (*Morone americana*). Of all the fish collected, the largemouth bass and bluegill were the most common species (USFWS 1991).

Numerous species of marine fauna are found in the offshore waters of the installation and include Atlantic croaker (*Micropogon undulatus*), American eel (*Anguilla rostrata*), bay anchovy (*Achoa mitchilli*), black sea bass (*Centropristis striata*), common squid (*Loligo pealei*), cownose ray (*Phinoptera bonasus*), dusky shark (*Carcharhinus obscurus*), king mackerel (*Scomberomorus cavella*), oyster toadfish (*Opsanus tau*), sand tiger shark (*Odontaspis taurus*), silver perch (*Bairdiella chrysura*), spiny dogfish (*Squalus acanthias*), spotted sea trout (*Cynoscion nebulosus*), striped bass (*Morone saxatilis*), striped flounder (*Paralichthys dentatus*), and winter skate (*Raja ocellata*).

Reptiles and Amphibians. At least 30 reptiles and 16 amphibian species occur in the Fort Story/Cape Henry region (USAWES 2000). These species include bronze frog (*Rana clamitans clamitans*), southern cricket frog (*Acris gryllus gryllus*), eastern gray tree frog (*Hyla chrysoscelis*), green tree frog (*Hyla cinerea*), eastern mud salamander (*Pseudotriton montanus montanus*), marble salamander (*Ambystoma opacum*), eastern cottonmouth (*Agkistrodon piscivorus piscivorus*), eastern garter snake (*Thamnophis sirtalis sirtalis*), eastern king snake

(*Lampropeltis getulus getulus*), eastern mud snake (*Farancia abacura*), scarlet snake (*Cemophora coccinea*), southern copperhead (*Agkistrodon contortrix contortrix*), northern diamond-back terrapin (*Malaclemys terrapin terrapin*), common snapping turtle (*Chelydra serpentina*), eastern box turtle (*Terrapene carolina carolina*), eastern painted turtle (*Chrysemys picta picta*), red bellied turtle (*Chrysemys scripta rubriventris*), and yellow spotted turtle (*Clemmys guttata*).

4.6 Rare, Threatened, and Endangered Species

The USFWS and Virginia Department of Conservation and Recreation (VDCR) were sent letters to formally request a list of federal and state listed rare, threatened, endangered, and candidate species that are known to occur, or potentially occur on, or in the vicinity of Fort Story. The USFWS stated that suitable habitat exists for the bald eagle (*Haliaeetus leucocephalus*), which is federally threatened. The species has been observed on the installation; however, no known nest sites have been recorded. Loggerhead sea turtles (*Caretta caretta*), (federally threatened), occur in the Chesapeake Bay and could nest on Fort Story beaches, but the species has never been documented as nesting on the installation. The VDCR stated that the chicken turtle (*Deirochelys reticularia*) and eastern big-eared bat (*Corynorhinus rafinesquii macrotis*) are the only state endangered species within a 2-mile radius of Fort Story. Eastern big-eared bats are known to occur at Fort Story. No chicken turtles have been recorded on Fort Story. The VDCR stated that 13 state-ranked plant species and nine state-ranked invertebrate species are known to occur within a 2-mile radius of the installation.

4.7 Cultural Resources

Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural places (TCPs). Archaeological resources, like Arch. Resources, are locations and objects from past human activities. Architectural resources are those standing structures that are usually over 50 years of age and are of significant historic or aesthetic importance to be considered for inclusion in the National Register of Historic Places (NRHP). TCPs hold importance or significance to Native Americans or other ethnic groups in the persistence of traditional culture.

The 1792 Cape Henry Lighthouse is a registered National Historic Landmark. An 1881 lighthouse is listed in the Virginia Department of Historic Resources inventory and is potentially eligible for listing on the NRHP. Apart from a shoreline collection of artifacts, one prehistoric site has been identified on Fort Story. MAAR Associates, Inc. (1989) completed a limited inventory of the cultural resources at Fort Story. No in situ archaeological resources were identified. However, historical maps, illustrations, and recent discoveries of the area adjacent to the lighthouses indicated that remains of some structures may still be present. All built prior to 1978, some of the 344 buildings on the installation are identified as historic and are in the process of being nominated for the NRHP. An historic district, which is eligible for the National Register, exists around the built-up areas of the post. An Integrated Cultural Resources Management Plan (ICRMP) and Programmatic Agreement are being completed for Fort Story.

4.8 Air Quality

The National Ambient Air Quality Standards (NAAQS) have been established by the Environmental Protection Agency (EPA) for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter less than 10 micrometers (PM₁₀), ozone (O₃), nitrogen dioxide (NO₂), and lead (Pb). In addition, the Clean Air Act (CAA) of 1970 requires that states with designated ozone nonattainment areas regulate volatile organic compounds (VOCs) and nitrogen oxides (NO_x) because they are precursor pollutants to ozone formation.

Fort Story is in EPA Region 3, Hampton Roads Air Quality Control Region. The region was designated as being in nonattainment for ozone (marginal) between 1993 and 1997; however, in 1997 the area was redesignated as an attainment area for ozone and is currently designated as a maintenance area (outside an ozone transport region) for ozone (EPA 2003). Section 107(d)(3)(E) of the 1990 Clean Air Act Amendments (CAAA) designates criteria that must be met in order for an area to be redesignated from nonattainment to attainment.

The CAAA state that federal agencies cannot support any action that does not conform to an EPA-approved State Implementation Plan (SIP). A General Conformity Rule applicability analysis is required to demonstrate that the proposed federal action conforms to the SIP. Ongoing actions and actions that are identified in the SIP are exempt from demonstrating conformity. Other actions are assumed to be in conformity if total project emissions are below a

minimum threshold level (*de minimis* level) and less than 10 percent of the regional emission inventory. Projects below the *de minimis* level are not subject to the General Conformity Rule; those projects at or above the levels are required to perform a conformity analysis. *De minimis* emissions levels for areas of ozone maintenance areas are presented in Table 4-1.

An inventory of air pollution sources on Fort Story was completed in 1993 (Tetra Tech, Inc. 1999). All sources were found to produce low levels of emissions.

Table 4-1. *De Minimis* Exemption Levels in Maintenance Areas.

Pollutant/Maintenance Classification	Emissions (tons/year)
Ozone (NO _x)	
All maintenance areas	100
Ozone (VOCs)	
Maintenance areas inside an ozone transport region	50
Maintenance areas outside an ozone transport region	100
CO	
All maintenance areas	100
SO ₂ or NO ₂	100
All maintenance areas	
PM ₁₀	
All maintenance areas	100

Source: 40 CFR § 93.153(b)(2)

4.9 Socioeconomics and Environmental Justice

The Region of Influence (ROI) for the social and economic environment is defined as the independent City of Virginia Beach. The ROI covers 248 square miles. No personnel changes are proposed in this action; therefore, no impact to the population or demographics is expected and consequently is not covered in this EA. This analysis will focus on potential employment and income from implementation of the INRMP. In addition to employment and income, populations of special concern, as addressed by EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 1994), are identified and analyzed for environmental justice impacts.

According to the CEQ (1997), a minority population can be described as being composed of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander,

Black, not of Hispanic origin, or Hispanic, and exceeding 50 percent of the population in an area or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population. Race and ethnicity are two separate categories of minority populations. A minority population can be defined by race, by ethnicity, or by a combination of the two distinct classifications. The U.S. Census Bureau (USCB) defines ethnicity as either being of Hispanic origin or not being of Hispanic origin. Hispanic origin is defined as “a person of Cuban, Mexican, Puerto Rican, South or Central America, or other Spanish culture or origin regardless of race” (USCB 2001).

Each year the USCB defines the national poverty thresholds, which are measured in terms of household income dependent upon the number of persons within the household. Individuals falling below the poverty threshold (\$17,603 for a household of four in 2000) are considered low-income individuals. USCB census tracts where at least 20 percent of the residents are considered poor are known as poverty areas (USCB 1995). When the percentage of residents considered poor is greater than 40 percent, the census tract becomes an extreme poverty area.

Employment and Income. Unemployment in the ROI varied approximately 3.0 percent between the highest unemployment rates in 1992 and the lowest unemployment rates in 2000 (Bureau of Labor Statistics [BLS] 2004). The labor force increased in the state of Virginia and in Virginia Beach between 1990 and 2000 (BLS 2004). During this period the unemployment rate in Virginia Beach was 5.3 percent and in the state of Virginia it was 6.4 percent (BLS 2004). In 2000, the unemployment rates were 2.2 percent in both Virginia Beach and the state of Virginia, (BLS 2004). Total employment positions during this period in Virginia Beach increased by approximately 49,000 positions (BEA 2002a).

Total personal income within the ROI nominally increased 59.2 percent to \$13.2 billion between 1990 and 2001 (BEA 2002b). Total nonfarm personal income increased 59.3 percent to \$13.2 billion and total farm personal income declined by 64.8 percent to \$3.3 million during this period (BEA 2002b). Total nonfarm earnings increased 82.3 percent to \$7.0 billion (BEA 2002b). Total personal earnings from wage and salary employment increased 203.4 percent in the finance, insurance, and real estate industry, 123.0 percent in the federal, civilian sector, and 118.0 percent in services between 1990 and 2001 (BEA 2002b).

Environmental Justice. Only one block group adjacent to Fort Story would be considered a concentrated minority population area. Block group 1, census tract 432 had a population of 1,053 persons in 2000 (USCB 2003). The total minority population accounts for 633 persons or 60.111 percent. The combined demographic profile indicated that White, non-Hispanic account for 39.999 percent of the total population, Black or African-American 44.5 percent, Hispanic 13.0 percent, and all other races or combination of races accounted for 2.6 percent (USCB 2003). None of these block groups would be considered poverty areas (USCB 2003).

5.0 ENVIRONMENTAL CONSEQUENCES

The overall management approach and management practices are evaluated on a programmatic level, rather than a project-specific level. The intent is to evaluate the overall impacts of implementing the alternatives in a broad sense. Such a programmatic analysis provides opportunities for the installation to accommodate unforeseen projects, as well as changes to projects, as long as impacts are covered within the overall scope and analysis of this EA.

The activities proposed in the natural resources management program were designed to avoid negative environmental impacts and include planning measures for compliance with applicable laws and regulations. Therefore, none of the activities currently being conducted or any of the project actions recommended in the action alternatives would have the potential to cause significant environmental impacts.

5.1 Land Use

The significance of potential land use impact is based on the degree of sensitivity to land use changes in the area. Land use would be impacted if implementation of the INRMP were inconsistent with adopted land use plans or policies; decreased the viability of a preferred existing land use activity; created threats to public health, safety, and welfare of adjacent or nearby land users; or conflicted with the fundamental mission of the installation.

5.1.1 Preferred Action Alternative

Implementing the INRMP would have positive effects on the installation's ability to sustain military land use by following an ecosystem management approach. Ecosystem integrity would be enhanced by protecting soil and water resources, improving aesthetics, and providing information for future land use management decisions. Delineation of wetlands, urban forest inventory, and other natural resources management actions would provide basic information for planning purposes. Since the proposed INRMP was prepared through interagency coordination and stakeholder reviews of the major actions, the proposed action would be compatible with regional land use. No conflicts between implementation of the INRMP and land use plans are anticipated.

5.1.2 Limited Action Alternative

Implementation of the limited action alternative would not change the installation's capability to support the military mission or existing land uses in the vicinity of Fort Story. Since this alternative would be prepared through interagency coordination, the limited action alternative would also be compatible with regional land use.

5.1.3 No Action Alternative

Implementing the no action alternative would not change the installation's capability to support the military mission or existing land uses in the vicinity of Fort Story. Potential negative effects exist since the existing INRMP does not include wetland delineations. Having jurisdictional wetland ensures wetland protection during land use planning.

5.2 Soil Resources

The soils at Fort Story would be impacted if implementation of the INRMP resulted in severe soil loss such that the area could no longer maintain the existing land use. The primary consideration for protecting soil resources would be maintaining soil capability to support training activities.

5.2.1 Preferred Alternative

Implementation of the INRMP would not result in adverse impacts to soils on Fort Story, but would create positive effects by implementing land rehabilitation and maintenance projects for soil erosion control, and prioritizing erosion control sites for implementing corrective actions. Proposed grading activities for rehabilitation of degraded sites in the training areas would have the potential to disturb soils; however, these short-term impacts would be minimized by following BMPs such as quickly reseeding or replanting disturbed sites with appropriate native plant species and avoiding impacts to sites with erodible soils during wet conditions.

5.2.2 Limited Action Alternative

Similar to the preferred action, the limited action alternative would have positive effects on soil resources. However, stewardship projects that would be implemented under the preferred action such as vegetation development and wetland buffer plantings would not be implemented under the limited action to benefit soil resources.

5.2.3 No Action Alternative

There would be no change from existing conditions under the no action alternative. Review of soil erosion and sediment control plans would continue as part of natural resources management activities. In addition, BMPs would continue to be used to minimize potential impacts from soil disturbance.

5.3 Water Resources

Water resources at Fort Story would be impacted if implementation of natural resources management activities resulted in a change to the groundwater or surface water quantity or quality. Changes that exceed the maximum contaminant levels or state water quality standards for surface waters would be considered significant.

5.3.1 Preferred Alternative

Implementation of the INRMP would result in positive effects on water resources by monitoring water quality in surface waters, using the wetlands delineation for planning purposes, and conducting LRAM projects for water quality protection. Water resources would be protected in accordance with state and federal water quality and wetlands protection laws. Additional projects that would enhance water quality and wetlands include conducting aquatic habitat assessments, maintaining wetland buffers, and shoreline erosion control. There would be positive effects for coastal resources because all projects and actions affecting coastal areas would be consistent with the Virginia Coastal Resources Management Plan.

5.3.2 Limited Action Alternative

Potential benefits to water resources under the limited action alternative would be similar to those under full implementation of the INRMP. However, stewardship projects to benefit water resources that would be implemented under the preferred action such as aquatic habitat assessments would not be implemented under the limited action alternative.

5.3.3 No Action Alternative

There would be no change from existing conditions under the no action alternative. Natural resources management actions would continue to be conducted in accordance with state and federal regulations for water quality, wetlands, and coastal resources protection.

5.4 Vegetation Resources

Vegetation resources at Fort Story would be impacted if implementation of the INRMP resulted in changes to vegetation that reduced the viability of native vegetation in the area. The primary consideration for protecting vegetation resources would be sustainability.

5.4.1 Preferred Alternative

Implementation of the INRMP would result in positive effects to vegetation resources at Fort Story. Planting of ecotones for biodiversity, invasive/pest species control, and implementation of beneficial landscaping would provide benefits to vegetative communities. Initiating the development of an urban forest management plan would improve urban forest conditions in the cantonment area. Use of herbicides for pest management would be conducted in accordance with the Fort Eustis/Story Integrated Pest Management Plan.

5.4.2 Limited Action Alternative

Similar to the preferred alternative, implementation of the limited action alternative would result in positive effects to vegetation resources from invasive species control. However, urban forest improvements and habitat enhancement projects proposed as stewardship activities in the INRMP would receive a low priority for implementation under the limited action alternative.

5.4.3 No Action Alternative

There would be no change from existing conditions under the no action alternative. Basic management such as grounds maintenance would continue to maintain the existing vegetative communities; however, the lack of projects to prevent the loss of habitat would have negative effects.

5.5 Wildlife Resources

Wildlife resources at Fort Story would be impacted if implementation of the INRMP resulted in changes to species distributions. Changes that reduced the viability of wildlife populations would be considered significant.

5.5.1 Preferred Alternative

Implementation of the INRMP would result in positive effects to wildlife resources from integration of coastal resources protection; wildlife, terrestrial and aquatic habitat protection; pest control; prevention of habitat loss; predator control; other non-game species programs; and conservation awareness management activities. The objectives of the INRMP would be to conduct planning level surveys of wildlife populations, manage furbearers for nuisance animal control, and enhance fish and wildlife values on the installation. In addition, concurrence on development of the INRMP from the USFWS and VDGIF would further increase the benefits to wildlife resources under the proposed action.

5.5.2 Limited Action Alternative

Potential benefits to wildlife resources under the limited action alternative would be reduced due to low priority for wildlife, pest control, and environmental education management actions. Stewardship projects such as habitat improvement, nest box installation, nuisance furbearer control, and conservation awareness would not be conducted under the limited action alternative.

5.5.3 No Action Alternative

Negative effects may occur from continuing with the existing INRMP. The existing INRMP lacks projects that prevent loss of habitat that affect many wildlife species, incorporate predator control, and include non-game species management programs.

5.6 Threatened and Endangered Species

Threatened and endangered species would be impacted if implementation of the INRMP resulted in changes to the listed species on Fort Story. Any adverse changes to threatened or endangered species would be considered significant.

5.6.1 Preferred Action Alternative

Implementation of the INRMP would have positive effects from rare species surveys and protection and enhancement of rare species habitat. All state and federal threatened and endangered species protection laws would continue to be implemented under the INRMP. Additional benefits would be provided to state listed species by projects designed to enhance rare

species habitat and through the protection of designated conservation areas. Fort Story would coordinate with the USFWS and VDGIF to ensure compliance with listed species.

5.6.2 Limited Action Alternative

Similar to the preferred alternative, implementation of the limited action alternative would result in positive effects to rare, threatened and endangered species. State and federal threatened and endangered species protection laws would be implemented.

5.6.3 No Action Alternative

There would be no change from existing conditions under the no action alternative. The continued protection of rare, threatened, and endangered species habitats would serve to protect threatened and endangered species.

5.7 Cultural Resources

Cultural resources at Fort Story would be impacted if implementation of natural resources projects and activities resulted in adverse effects on historic properties through the disturbance of buried archaeological deposits or through disturbance of the integrity of historic resources.

5.7.1 Preferred Action Alternative

Implementation of the INRMP would not adversely affect archaeological resources, architectural resources, or traditional cultural properties. Careful planning and consultation with the Fort Story Cultural Resources Manager would be conducted before any potentially ground-disturbing activities are carried out at Fort Story. Even with careful planning, it is possible that currently buried and unknown archaeological resources may be uncovered during ground-disturbing activities. If any archaeological resources (historic and/or prehistoric) are encountered while conducting natural resources projects, the Fort Story Cultural Resources Manager and the Virginia Department of Historic Preservation would be notified to ensure compliance with 36 CFR Part 800.11. All site work would be suspended until a qualified archeologist could determine the significance of the encountered resource(s).

5.7.2 Limited Action Alternative

Similar to the preferred alternative, implementation of the limited action alternative would not adversely affect archaeological resources, architectural resources, or traditional cultural properties. The same conditions apply to the limited action alternative as to the preferred action alternative described above.

5.7.3 No Action Alternative

Implementing the no action alternative would result in no changes to cultural resources at Fort Story.

5.8 Air Quality

Air quality would be impacted if activities resulted in an exceedance of the NAAQS, exceedance of *de minimis* exemption levels, or the exposure of sensitive receptors to increased pollutant concentrations. Potential emissions for the ozone precursor pollutants, NO_x and VOC, were estimated for the General Conformity Rule applicability analysis.

5.8.1 Preferred Alternative

Implementation of the INRMP would result in short-term, minimal impacts to air quality from grading activities to rehabilitate degraded sites in the training areas. However, BMPs would be implemented to minimize impacts. An applicability analysis was conducted and determined that the *de minimis* value of 100 tons per year for NO_x and VOC would not be exceeded. Therefore, impacts to air quality would not be significant and the General Conformity Rule does not apply to the proposed action. The Record of Non-Applicability is presented in Appendix B.

5.8.2 Limited Action Alternative

Similar to the preferred alternative, there would be no change from existing conditions under the limited action alternative. Rehabilitation of degraded sites in the training areas would be conducted with BMPs.

5.8.3 No Action Alternative

Implementing the no action alternative would not change the local or regional air quality. There are no stationary pollution sources involved in the current natural resources management programs.

5.9 Socioeconomics and Environmental Justice

The socioeconomic conditions could be affected by changes in the rate of population growth, changes in the demographic characteristics, or changes in employment in the ROI caused by the implementation of the proposed action.

5.9.1 Preferred Action Alternative

Implementing the INRMP would not result in significant impacts to the social or economic resources nor create environmental justice impacts within the ROI. Potential increases in regional monetary flow could occur from implementation of the recommended projects. However, most of the projects would be undertaken by Fort Eustis/Story staff, which would limit the amount of additional monetary flow through the regional economy. Some activities, such as LRAM projects, could be contracted to specialists. The outside contracting would increase the amount of spending through the regional economy, if the contracting were to remain in the local region. However these expenditures would represent only a small fraction of the personal income generated in the ROI. No new employment opportunities would be anticipated under this alternative; therefore, there would be no change to employment or personal income profiles. Since there would be no adverse social or economic impacts associated with this alternative there would be no adverse impacts to minority or low-income populations in the ROI.

5.9.2 Limited Action Alternative

Implementation of this alternative would have less effect on the social or economic resources or environmental justice in the ROI than implementation of the preferred action. Consequently, there would be no measurable impact on the socioeconomic conditions under the limited action alternative.

5.9.3 No Action Alternative

Selecting the no action alternative would not change the socioeconomic resources or environmental justice in the ROI.

5.10 Potential Conflicts between the Proposed Action and Federal, State, and Local Land Use Plans

Implementation of the INRMP would be consistent with federal, state, and local land use plans. The management actions proposed in the INRMP would be conducted within the installation boundaries; however, the beneficial effects of taking an ecosystem management approach would extend beyond Fort Story's boundaries. For example, shoreline management conducted under the INRMP would be consistent with the Virginia Coastal Resources Management Plan. In accordance with the SAIA, the INRMP has been reviewed by the USFWS and VDGIF and provided for public review to obtain comments and concurrence on the fish and wildlife aspects of the plan.

5.11 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (such as energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (such as extinction of a threatened or endangered species or the disturbance of a cultural resources site).

Most resource commitments for the INRMP are neither irreversible nor irretrievable. However, implementation of the INRMP would require the use of energy in the form of fossil fuels and labor for natural resources management activities. This energy would be negligible over the 5-year plan period.

5.12 Cumulative Impacts

Cumulative impacts are the incremental impacts of an action when added to the impacts of other federal or nonfederal past, present, or reasonably foreseeable future actions. Implementation of natural resources management projects recommended in the action alternatives and no action alternative would not result in negative cumulative impacts to the environment at or in the vicinity of Fort Story.

In addition to the current management practices conducted at the installation, the INRMP would implement projects that directly support regional ecosystem management initiatives and would enhance and protect the human and natural environment, including state and federally listed threatened and endangered species. Monitoring programs, annual reviews, and five-year updates of the INRMP allow continuous assessment of management objectives (adaptive management) and would help to avoid undesirable cumulative impacts. Additionally, appropriate NEPA procedures and coordination with stakeholders such as the USFWS and VDGIF would be undertaken for any actions that could result in cumulative impacts.

6.0 COMPARISON OF ALTERNATIVES AND CONCLUSION

Each of the resources or issues was considered in assessing potential environmental impacts under each alternative and is the basis for providing choices to the decision maker. Continued implementation of the current management activities (no action alternative) would not satisfy the military mission requirements and it would be insufficient regarding SAIA guidelines for development of an INRMP. The preferred alternative would satisfy the requirements of the SAIA and the INRMP objectives to sustain healthy ecosystems, provide public access for outdoor recreational opportunities, and support the military mission at Fort Story. The limited action alternative would limit the ability to properly utilize natural resources on Army lands because no stewardship activities (or limited stewardship activities) would be implemented. However, the limited action alternative would be compliant with the SAIA. Table 6-1 presents a comparison of the potential impacts on resources for each alternative. Implementation of the preferred alternative would provide the greatest assurance of the sustainability of natural resources and the military mission.

Table 6-1. Comparison of Alternatives.

Resource/Issue	Preferred Alternative	Limited Action Alternative	No Action Alternative
Land Use	Positive effect to the installation's capability to support the military mission by implementing projects to maintain ecosystem integrity	No change to the installation's capability to support the military mission	Negative effects on management of land use since the existing INRMP does not involve wetland delineations and subsequent updates
Soil	Positive effects from review of military construction projects for erosion and sediment control and integrating erosion and sediment control management activities	Positive effects, but less benefit than the preferred alternative because of low priority for implementation of stewardship actions	No change to existing conditions

Table 6-1. Comparisons of Alternative (cont'd).

Resource/Issue	Preferred Alternative	Limited Action Alternative	No Action Alternative
Water	Positive effects from review of permitting requirements; compliance with wetlands regulations; and project implementation for protection of water quality and wetlands	Positive effects from review of permitting requirements and compliance with wetlands regulations	Negative effects on management of land use since the existing INRMP does not involve wetland delineations and subsequent updates
Vegetation	Positive effects from integration of wildlife, terrestrial and aquatic habitat, pest control, and conservation awareness management activities	Positive effects from invasive species control, negative effects due to low priority for wildlife habitat enhancement and environmental education management actions	Negative effects due to lack of projects to prevent loss of habitat
Wildlife	Positive effects from integration of urban forest, wildlife, terrestrial and aquatic habitat, pest control, and conservation awareness management activities	Negative effects due to low priority for wildlife habitat enhancement, pest control, and environmental education management actions	Negative effects due to lack of projects to prevent loss of habitat, conduct predator control, and conduct non-game species management programs
Threatened and Endangered Species	Positive effects from rare species surveys and protection and enhancement of rare species habitat	Positive effects from rare species surveys and protection and enhancement of rare species habitat	Non-compliance with state endangered species guidelines
Cultural Resources	Positive effects from integration with the cultural resources management plans	Positive effects from integration with the cultural resources management plans	No change to existing conditions
Air Quality	<i>De minimis</i> emissions from grading activities	No change to existing conditions	No change to existing conditions
Socioeconomics and Environmental Justice	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations	No change to population, income, or employment; no disproportionately high adverse impact on minority or low-income populations

7.0 AGENCIES AND PERSONS CONSULTED

In accordance with the SAIA, Fort Story has worked cooperatively with the USFWS and VDGIF to ensure that the INRMP reflects the mutual agreement of these parties concerning the conservation, protection, and management of fish and wildlife resources on the installation. Draft copies of the INRMP were provided to these agencies and the general public for review. All comments were considered in the preparation of the final INRMP. In addition, to identify issues of interest and concern, advice and information were sought from a number of other interested parties and stakeholders. The following persons and agencies were consulted in preparation of the INRMP:

Tim Christensen, CB, USATCFE
Eugene Crabtree, USDA, NRCS, Chesapeake, Virginia
Karen DelGrosso, USEPA Region 3, Philadelphia, Pennsylvania
Raymond T. Fernald, VDGIF, Richmond, Virginia
S. Rene' Hypes, VDCR, Richmond, Virginia
Ellie Irons, VDEQ, Richmond, Virginia
Steve Kokkinakis, NOAA, Silver Springs; Maryland
Karen Mayne, USFWS, Virginia Field Office, Gloucester, Virginia
David L. Perkins, USFWS, Region 5, Hadley, Massachusetts
Celso Puente, USDA Water Resources Division, Reston, Virginia
Terry Sanders, CB, USATCFE

This page intentionally left blank

8.0 LIST OF PREPARERS

Dana Banwart, Air Quality, Geo-Marine, Inc.

Elizabeth Pruitt, NEPA Editor, Geo-Marine, Inc.

Joseph Campo, Ph.D., Project Manager, Geo-Marine, Inc.

Paul Thrift, Conservation Branch, USATCFE

Rae Lynn Schneider, Socioeconomics, Geo-Marine, Inc.

Tim Christensen, Conservation Branch, USATCFE

Tim Sara, Cultural Resources Specialist, Geo-Marine, Inc.

This page intentionally left blank

9.0 REFERENCES

- Bureau of Economic Analysis (BEA). 2002a. CA25-Total Full-Time and Part-Time Employment by Industry. Regional Accounts Data. Local Area Personal Income. <http://www.bea.doc.gov/bea/regional/reis/action.cfm>. Accessed 08 March 2004.
- Bureau of Economic Analysis (BEA). 2002b. CA05-Personal Income by Major Source and Earnings by Industry. Regional Accounts Data. Local Area Personal Income. <http://www.bea.doc.gov/bea/regional/reis/action.cfm>. Accessed 08 March 2004.
- Bureau of Labor Statistics (BLS). 2004. Local Area Unemployment Statistics. <http://data.bls.gov>. Accessed 08 March.
- Council on Environmental Quality (CEQ). 1997. Environmental Justice. Guidance under the National Environmental Policy Act. U.S. Government Printing Office, Washington D.C.
- Environmental Protection Agency (EPA). 2003. Nonattainment Areas. <http://www.epa.gov/reg3airtd/airquality/nonattain.htm>
- MAAR Associates, Inc. 1989. Phase I Archeological Survey for Fort Eustis and Fort Story, Cities of Newport News and Virginia Beach, Virginia. Report on file, Fort Eustis, Virginia.
- Stevenson, D.J. 1996. A Natural Heritage Resource Inventory of Fort Story, Virginia. Natural Heritage Technical Report 96-12. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to the U.S. Department of the Army.
- Tetra Tech, Inc. 1999. Integrated Natural Resources Management Plan 2000 through 2004. US Army Transportation Center Fort Story, Virginia.
- U.S. Census Bureau (USCB). 2001. Overview of Race and Hispanic Origin. Census 2000 Brief. C2KBR/01-1.
- U.S. Census Bureau (USCB). 2003. 2000 Census of Population and Housing. Demographic Profile. Tables P1, P5, P6, P7, P9, P14, P53, P77, P82, P87, H1, H4, H6, H18, H35, H54, H56, H63, H70, H76, H85. <http://www.factfinder.census.gov>. Accessed 14 July 2004.
- U.S. Census Bureau (USCB). 1995. Poverty Areas. Statistical Brief. <http://www.census.gov/population/socdemo/statbriefs/povarea.html>. June. Accessed 25 September 2001.
- U.S. Department of Agriculture (USDA), Soil Conservation Series. 1985. Soil Survey of City of Virginia Beach, Virginia. U.S. Department of Agriculture, Washington, D.C.
- U.S. Fish and Wildlife Service (USFWS). 1991. Fish Survey and Water Quality Monitoring, Fort Story, VA. October 1-2, 1991. U.S. Fish and Wildlife Service, Office of Fishery Assistance, Gloucester, Virginia.
- U.S. Fish and Wildlife Service (USFWS). 1999. National Wetlands Inventory Map of Cape Henry, Virginia. Scale: 1:24,000. Prepared by U.S. Fish and Wildlife Service, National Wetlands Inventory, Hadley, Massachusetts.

U.S. Army Corps of Engineers, Norfolk District (USACE). 1996. Environmental Assessment for Implementation of the Master Plan, US Army Transportation Center and Fort Story, Fort Story, Virginia. Prepared for US Army Transportation Center and Fort Eustis by US Army Corps of Engineers, Norfolk District, Norfolk, Virginia.

US Army Waterways Experiment Station (USAWES). 2000. Reptile and Amphibian Species Inventory and Survey recommendations for Fort Story, Virginia. Conservation Assistance Program, Vicksburg, Mississippi.

Appendix A
Regulatory Coordination



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Mr. Celso Puente

USGS
Water Resources Division MS 423
John W. Powell Building
12201 Sunrise Valley Drive
Reston, VA 20192

Dear Mr. Puente:

An Environmental Assessment (EA) for the revision of the Fort Story Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations. Request your organization review and provide comments as appropriate. The EA describes the project, the affected environment and evaluates the environmental consequences of this plan.

Please provide comments within 30 days of receipt of this letter.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in cursive script, appearing to read "Stephen A. McCall".

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Mr. Eugene Crabtree
USDA, NRCS
310 Shea Drive, Building 3
Chesapeake, VA 23320

Dear Mr. Crabtree:

An Environmental Assessment (EA) for the revision of the Fort Story Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations. Request your organization review and provide comments as appropriate. The EA describes the project, the affected environment and evaluates the environmental consequences of this plan.

Please provide comments within 30 days of receipt of this letter.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. McCall".

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Steve Kokkinakis
NOAA
PPI/SP (NEPA Coordinator)
Room 15603
1315 East West Highway
Silver Spring, MD 20910

Dear Mr. Kokkinakis:

An Environmental Assessment (EA) for the revision of the Fort Story Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations. Request your organization review and provide comments as appropriate. The EA describes the project, the affected environment and evaluates the environmental consequences of this plan.

Please provide comments within 30 days of receipt of this letter.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Mr. Raymond T. Fernald
Nongame and Environmental Programs
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
P.O. Box 11104
Richmond, VA 23230-1104

Dear Mr. Fernald:

In accordance with the Sikes Act (16 USC 670 a-f), we request your review of the attached draft revised Integrated Natural Resources Management Plan (INRMP) for Fort Story, Virginia. Please note that the INRMP is also being forwarded to the US Fish and Wildlife Service for review as part of facilitating inter-agency coordination. Additionally, an Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations to evaluate potential impacts of this revision. Request your organization review and provide comments on the EA.

Please provide comments within 30 days of receipt of this letter. Upon completion of the review process, the final INRMP will be forwarded for your signature.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in cursive script, appearing to read "Stephen A. McCall".

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Ms. Karen Mayne
U.S. Fish and Wildlife Service
VA Field Office
Division of Ecological Services
6669 Short Lane
Gloucester, VA 23061

Dear Ms. Mayne:

In accordance with the Sikes Act (16 USC 670 a-f), we request your review of the attached draft revised Integrated Natural Resources Management Plan (INRMP) for Fort Story, Virginia. Please note that the INRMP is also being forwarded to the Virginia Department of Game and Inland Fisheries for review as part of facilitating inter-agency coordination. Additionally, an Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations to evaluate potential impacts of this revision. Request your organization review and provide comments on the EA.

Please provide comments within 30 days of receipt of this letter. Upon completion of the review process, the final INRMP will be forwarded for your signature.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. McCall", is written over a faint, larger signature.

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Ms. Karen DelGrosso
USEPA, Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Ms. DelGrosso:

An Environmental Assessment (EA) for the revision of the Fort Story Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations. Request your organization review and provide comments as appropriate. The EA describes the project, the affected environment and evaluates the environmental consequences of this plan. Please note that this EA is also coordinated with the US Fish and Wildlife Service, Virginia Department of Environmental Quality and the Virginia Department of Game and Inland Fisheries as well as several other federal and state agencies.

Please provide comments within 30 days of receipt of this letter.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. McCall".

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5000

JAN 19 2005

Environmental and Natural Resources Division

Ms. Ellie L. Irons
Virginia Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, VA 23219

Dear Ms. Irons:

An Environmental Assessment (EA) for the revision of the Fort Story Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its subsequent federal regulations. Request your organization review and provide comments as appropriate. Please find enclosed 22 copies of the EA as required for staffing with other Commonwealth and local government agencies.

Please submit comments within 30 days of receipt of this letter. Please note that this EA is prepared for a specific 5-year plan and does not contain a coastal consistency determination. Such determinations would be prepared separately for specific projects as applicable.

Please send your comments to Mr. Timothy P. Christensen, US Army Transportation Center, ATTN: IMNE-EU-PW-E, Directorate of Public Works, Fort Eustis, VA 23604-5306. Please contact Mr. Tim Christensen at (757)878-2375 ext 23 or via email at Tim.Christensen@eustis.army.mil if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. McCall".

Stephen A. McCall
Chief, Environmental and
Natural Resources Division



United States Department of the Interior

U. S. GEOLOGICAL SURVEY

WATER RESOURCES DISCIPLINE

February 16, 2005

Timothy P. Christensen
U.S. Army Transportation Center
IMNE EU-PW-E, Directorate of Public Works
Fort Eustis, VA 23604-5306

RE: Environmental Assessment for the revision of the Fort Story Integrated Natural Resources Management Plan

Dear Mr. Christensen,

The U.S. Geological Survey has reviewed the subject environmental assessment and has no comments.

Sincerely,

/Signed/

Lloyd H. Woosley, Jr., P.E.

Chief, Environmental Affairs Program

Cc: EAP Chron, MS 423

USGS:WRD:LWOOSLEY:bjjohnso:x6832:2/16/05



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 10009, Richmond, Virginia 23240

Fax (804) 698-4500 TDD (804) 698-4021

www.deq.state.va.us

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Robert G. Burnley
Director

(804) 698-4000
1-800-592-5482

February 23, 2005

Mr. Timothy P. Christensen
U. S. Army Transportation Center
Attn: IMNE-EU-PW-E
Directorate of Public Works
Fort Eustis, Virginia 23604

RE: Draft Environmental Assessment for Development and Implementation of
Fort Story Integrated Natural Resources Management Plan
DEQ-05-015F

Dear Mr. Christensen:

The Commonwealth of Virginia has completed its review of the above-referenced Environmental Assessment (Draft EA). The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. In addition, DEQ is the lead agency for Virginia's review of federal consistency determinations and certifications submitted pursuant to the Coastal Zone Management Act. The following agencies, regional planning district commission, and locality participated in this review:

- Department of Environmental Quality
- Department of Game and Inland Fisheries
- Department of Agriculture and Consumer Services
- Department of Conservation and Recreation
- Marine Resources Commission
- Department of Historic Resources
- Virginia Institute of Marine Science
- Department of Forestry
- Hampton Roads Planning District Commission
- City of Virginia Beach.

In addition, the Department of Health was invited to comment.

Project Description

The Army proposes to revise the Integrated Natural Resources Management Plan (INRMP) for Fort Story. The Plan would implement a conservation program integrating coastal resources protection, fish and wildlife management, land management, and management of rare, threatened, and endangered species, consistent with the military mission of the Fort. The INRMP is required by the Sykes Act Improvement Act of 1997 (SALA), which requires an INRMP, and periodic updates to same, for each military installation with significant natural resources (Draft EA, pages 1-1 and 1-2, section 1.2).

The Draft EA addresses the following alternatives:

Alternative 1, the Preferred Alternative (pages 3-2 through 3-4, section 3.2.1);

Alternative 2, the Limited Action Alternative, which would focus activities on basic legal compliance but no additional stewardship activities or ecosystem initiatives (pages 3-5 and 3-6, section 3.2.2); and

Alternative 3, the no-action alternative, which would mean not updating the 1999 INRMP or adding any new initiatives to those already planned for 1999-2004. This alternative would result in the INRMP being out of compliance with the SALA as well as outdated (page 3-6, section 3.3).

Federal Consistency under the Coastal Zone Management Act

We agree with the determination, indicated in Mr. McCall's January 19, 2005 cover letter for the Draft EA, that consistency determinations would be appropriate for specific projects affecting coastal uses or coastal resources, and that a consistency determination need not be submitted in connection with a review of the Draft EA for the revision of the INRMP, which is a planning document and not a project proposal.

Environmental Impacts and Mitigation

The Department of Conservation and Recreation expresses its preference for the Preferred Alternative as presented in the Draft EA.

1. Natural Heritage Resources.

(a) In General: Data Search Results. The Department of Conservation and Recreation has searched its Biotics Data System for occurrences of natural heritage resources in Fort Story. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered species of plants and animals, unique or exemplary natural

communities, significant geologic formations, and similar features of scientific interest. The Department has determined that the site is within the Fort Story Interior Dunes and Wetlands Conservation Site. See section I(b), next.

The Draft EA indicates that the Army intends to update the Natural Heritage Inventory in 2006 (page 3-4, Table 3.1, Management Issue/project 7.8). The Department of Conservation and Recreation's Division of Natural Heritage can assist in this endeavor; see "Regulatory and Coordination Needs," item 3, below.

Under a memorandum of agreement between the Department of Conservation and Recreation (DCR) and the Department of Agriculture and Consumer Services (VDACS), DCR represents VDACS in commenting on potential impacts to state-listed threatened and endangered plant and insect species. The implementation of the INRMP will not affect such species, according to DCR. VDACS confirms this statement.

(b) Conservation Sites. Conservation sites are tools for representing key areas of the landscape that warrant further review for conservation action. These sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its habitat and buffer areas considered necessary for its conservation. Conservation sites are given a bio-diversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The ranking is on a scale of 1 to 5, with 1 being the most significant. The Fort Story Interior Dunes and Wetlands Conservation Site has been given a bio-diversity significance ranking of B2, which is a site of very high significance. This ranking means it is the best example of any natural community type, or contains a good occurrence of a G1 (extremely rare on a global scale) species, or an excellent occurrence of a G2 (very rare) or G3 (rare to uncommon) species.

(c) Conservation Site Resources. According to the Department of Conservation and Recreation, the following natural heritage resources of concern can be found at Fort Story:

Communities:

Maritime swamp woodland

Animals:

Fine-lined emerald (*Somatochlora filosa*)

Eastern big-eared bat (*Corynorhinus rafinesquii macrotis*)

Plants:

Spanish moss (*Tilandsia usneoides*)

Lipocharpha (*Lipocharpha maculata*)

Viviparous spikerush (*Eleocharis vivipara*)
Wild olive (*Osmanthus americanus var. americanus*)
Pineland tick-trefoil (*Desmodium strictum*)
Blue jack oak (*Quercus incana*).

(d) *Recommendations.* The Department of Conservation and Recreation recommends the adoption of the Preferred Alternative, as stated above. In addition, DCR provided recommendations for protection and management of natural heritage resources in an earlier report, *A Natural Heritage Resource Inventory of Fort Story, Virginia* (Stevenson, 1996). The recommendations in that report should be followed, according to DCR.

Because the Fort may support populations of natural heritage resources, the Department of Conservation and Recreation recommends an updated inventory of suitable habitat. This will allow a determination by the Department's Division of Natural Heritage whether any activities will affect natural heritage resources and an opportunity to recommend ways to minimize the impacts. The plan to update the natural heritage inventory in 2006 (page 3-4, Table 3.1) may address this concern; see item 1(a), above and "Regulatory and Coordination Needs," item 3, below.

2. *Air Quality.* Fort Story is in a non-attainment area for ozone (O₃), according to DEQ's Division of Air Program Coordination. This means that the Army should take necessary precautions to restrict emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x), which are precursors of atmospheric ozone.

The projects which are to be undertaken pursuant to the INRMP, as listed in the Draft EA (Table 3-1, pages 3-3 through 3-5) may only cause insignificant effects on air quality. However, if any construction activity or open burning is to be carried out under the INRMP, the following requirements and precautions apply.

(a) *Open Burning.* If project activities include the burning of any material, this activity must meet the requirements of the Regulations for open burning (9 VAC 5-40-5600 et seq.), and it may require a permit (see "Regulatory and Coordination Needs," item 1, below). The Regulations provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Army should contact appropriate Virginia Beach officials to determine what local requirements, if any, exist. The model ordinance includes, but is not limited to, the following provisions:

- All reasonable effort shall be made to minimize the amount of material burned, with the number and size of the debris piles;
- The material to be burned shall consist of brush, stumps and similar debris waste and clean-burning demolition material;

- The burning shall be at least 500 feet from any occupied building unless the occupants have given prior permission, other than a building located on the property on which the burning is conducted;
- The burning shall be conducted at the greatest distance practicable from highways and air fields;
- The burning shall be attended at all times and conducted to ensure the best possible combustion with a minimum of smoke being produced;
- The burning shall not be allowed to smolder beyond the minimum period of time necessary for the destruction of the materials; and
- The burning shall be conducted only when the prevailing winds are away from any city, town or built-up area.

(b) *Fugitive Dust Control.* During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 et seq. of the Regulations for the Control and Abatement of Air Pollution. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

(c) *Fuel-burning Equipment.* If fuel-burning equipment is to be employed in constructing or operating projects pursuant to the INRMP, the Army must apply for appropriate air quality permits from DEQ. See "Regulatory and Coordination Needs," item 1, below.

3. *Water Quality and Wetlands.* According to the Draft EA, there are approximately 317 acres of wetlands on Fort Story, and the Army Corps of Engineers is delineating them (pages 4-1 and 4-2, section 4.3). Under the Preferred Alternative, the Army would use the wetlands delineation for planning purposes, maintain wetland buffers, monitor water quality in surface waters (four man-made lakes and one pond, but no streams; see Draft EA, page 4-1, section 4.3), control shoreline erosion, and conduct aquatic habitat assessments as well as following state and federal water quality protection laws (Draft EA, page 5-3, section 5.3.1). DEQ's Division of Water Quality and its Tidewater Regional Office had no comments pertaining to water quality impacts.

4. *Solid and Hazardous Waste Management.* According to DEQ's Waste Division, the Draft EA did not discuss hazardous or solid waste, or include a search of waste-related data bases, because the Army states that all facilities would continue to be

maintained and operated in accordance with established policies, and because implementation of the INRMP would not increase the use of hazardous materials or the volume of the hazardous waste stream (page 1-4, section 1.4).

(a) *Findings.* DEQ's Waste Division did a cursory review of its data files and determined the following:

- Building 6300 at Fort Story is a site under DEQ's Federal Facilities Installation Restoration Program (identification number VA6210020875); and
- Fort Story contains a Formerly Used Defense Site (FUDS) (identification number FUDS VA9799F7772).

(b) *Environmental Restoration Program Sites.* While the Draft EA includes a project implementation schedule (page 3-3, section 3.2.1), the schedule does not include specific locations for the projects. Accordingly, it is not possible to determine whether the proposed projects will affect any CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Environmental Restoration Program sites. DEQ's Federal Facilities Program staff (Waste Division) recommends that the Army advise DEQ when specific locations of land-disturbing projects are known; see "Regulatory and Coordination Needs," item 1, below.

5. *Historic Structures and Archaeological Resources.* The Department of Historic Resources states that in addition to the historic resources noted in the Draft EA (pages 4-4 and 4-5, section 4.7), there is an identified historic district at the Fort. The boundary of this district, which is eligible for the National Register of Historic Places, consists of the limits of the built-up areas of the post. The Draft EA text should reflect the existence of this historic district.

6. *Wildlife Resources.* The Department of Game and Inland Fisheries, as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects. The Department (hereinafter "DGIF") is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 *et seq.*), and provides environmental analysis of projects or permit applications coordinated through the Department of Environmental Quality and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce, or compensate for those impacts.

The Department of Game and Inland Fisheries commends the Army for using an ecosystem management approach in implementing the INRMP, and states that it will not

give rise to significant adverse effects upon wildlife resources under the Department's jurisdiction.

7. *Chesapeake Bay Preservation Areas.* Insofar as the Chesapeake Bay Preservation Act (*Virginia Code* sections 10.1-2100 *et seq.*) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 10-20-10 *et seq.*) are concerned, the Department of Conservation and Recreation's Division of Chesapeake Bay Local Assistance concurs with the Draft Finding of No Significant Impact (Draft EA, pages iii-iv).

8. *Land-Disturbing Activities.* In the event the INRMP results in any land-disturbing activities, the Army is reminded that the proponent of such activities must comply with the Virginia Erosion and Sediment Control Law (*Virginia Code* section 10.1-567), the Virginia Stormwater Management Law (*Virginia Code* section 10.1-603.15), and applicable federal non-point source pollution control mandates (Clean Water Act, section 313 and the federal consistency requirements under the Coastal Zone Management Act, section 307(c)). The Erosion and Sediment Control Plan requirements apply to any of the following activities, if they involve disturbance of 2,500 square feet or more (in designated Chesapeake Bay Preservation Areas; 10,000 square feet or more outside of those areas):

- clearing and grading
- installation of staging areas
- parking lots
- roads
- buildings
- utilities
- other structures
- dredged material spoil disposal areas
- related land conversion activities.

The Stormwater Management Plan requirement applies to projects involving land disturbance of one acre or more.

The Army must prepare and implement Erosion and Sediment Control Plans and Stormwater Management Plans to ensure compliance with the laws cited above. The Army is ultimately responsible for achieving project compliance through oversight of contractors, regular field inspections, prompt action against non-compliant sites, and/or other mechanisms consistent with Army policy. See "Regulatory and Coordination Needs," item 5, below.

9. Forest and Tree Protection. According to the Department of Forestry, the Plan would not significantly affect the forests of the Commonwealth.

10. Local and Regional Comments. The Hampton Roads Planning District Commission, after consultation with the City of Virginia Beach, indicates that the proposed INRMP is consistent with local and regional plans and policies. The Commission and the City recommend that the Army consult with the Department of Conservation and Recreation's Division of Natural Heritage and the Natural Resources Manager at First Landing State Park in preparing the Final EA (see "Regulatory and Coordination Needs," item 3, below).

Regulatory and Coordination Needs

1. Solid and Hazardous Waste Management. Any wastes that are generated during planned activities (e.g., potential ground-disturbing activities, Draft EA, page iv) must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. These include, but are not limited to, the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. sections 6901 *et seq.*), the Virginia Waste Management Act (*Virginia Code* sections 10.1-1400 *et seq.*), the Virginia Solid Waste Management Regulations (9 VAC 20-80), and the Virginia Hazardous Waste Management Regulations (9 VAC 20-60). (See attached DEQ memo, Brockman to Ellis, dated February 14, 2005 for additional citations.)

DEQ asks that the Army contact DEQ's Waste Division, Federal Facilities section (Durwood Willis, telephone (804) 698-4192) when the specific locations for proposed projects that would disturb groundwater, land, or sediments become known.

2. Subaqueous Bed Encroachments. If any part of any development projects contemplated under the revised Plan would result in encroachments in, on, or over any State-owned rivers, streams, or creeks, such projects would be subject to the jurisdiction of the Marine Resources Commission. In tidal waters, jurisdiction extends to encroachments channelward of mean low water; along natural streams, the jurisdiction covers encroachments channelward of ordinary high water. Questions on the permitting jurisdiction of the Marine Resources Commission may be addressed to the Commission (Justin Worrell, telephone (757) 247-2200).

3. Natural Resources Consultation. The Army may consult with the Department of Conservation and Recreation's Division of Natural Heritage and the Natural Resources Manager at First Landing State Park in preparing the Final EA for the INRMP, as the City of Virginia Beach and the Hampton Roads PDC recommend ("Environmental Impacts and Mitigation," item 10, above). Please contact the City (Clay Bernick,

Mr. Timothy P. Christensen
Page 9

Environmental Management Administrator, telephone (757) 427-4899 or e-mail cbernick@vb.gov) to discuss specifics of this recommendation.

As the Army prepares to update the Natural Heritage Inventory for Fort Story next year (Draft EA, page 3-4, Table 3-1), Army staff people are invited to contact the Department of Conservation and Recreation's Division of Natural Heritage (Christopher Ludwig, Natural Heritage Inventory Manager, telephone (804) 371-6206) to discuss arrangements for field work.

DCR also requests a copy of the Big-eared Bat study conducted by Karen Terwilliger and Mary Kay Clark. This may be sent to:

Department of Conservation and Recreation
Division of Natural Heritage
203 Governor Street
Richmond, Virginia 23219

4. Wildlife Data Base. To gain access to the wildlife locations data base maintained by the Department of Game and Inland Fisheries, the Army may contact that Department (Shirl Dresser, telephone (804) 367-6913) or use the web site:

- http://www.dgif.virginia.gov/wildlife/info_map/index.html.

5. Erosion and Sediment Control; Stormwater Management. The Army is encouraged to contact the Department of Conservation and Recreation's Chowan, Albemarle, and Coastal Watersheds Office (telephone (757) 925-2468) and/or local erosion and stormwater authorities to obtain Plan development and implementation assistance and to ensure project conformity with applicable requirements during and after active construction, for any activities involving construction. Similarly, for land disturbance exceeding one acre, the Army should contact the Department of Conservation and Recreation's Division of Soil and Water Conservation (Mr. Lee Hill, telephone (804) 786-3998) regarding applicability of the Virginia Pollutant Discharge Elimination System (VPDES) Stormwater General Permit for Construction Activities.

6. Integrated Cultural Resource Management Plan. The Department of Historic Resources states its understanding that the Army is developing an Integrated Cultural Resource Management Plan (ICRMP) to address the treatment of historic properties at the Fort. The Army is encouraged to work with the Department (Marc Holma, telephone (804) 367-2323, extension 114) on the development of this plan.

Mr. Timothy P. Christensen
Page 10

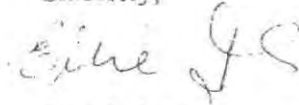
7. Wetlands and Waterways Impacts. In the event the Army proposes to undertake any activities affecting wetlands or surface waters on Fort Story, please contact DEQ's Tidewater Regional Office (Harold Winer, telephone (757) 518-2153) to inquire whether a Virginia Water Protection Permit would be required.

The Document

According to the Department of Conservation and Recreation, the animal species lists in the Draft EA, especially the list of reptiles and amphibians (pages 4-2 through 4-4), may have errors. To aid in correcting the list, the Department requests a copy of the 2000 reptile and amphibian survey mentioned in the Draft EA (page 9-2). The Army may use the address given above (see "Regulatory and Coordination Needs," item 3).

Thank you for the opportunity to comment on the Draft EA. If you have questions, please feel free to call me (telephone (804) 698-4325) or Charles Ellis of this Office (telephone (804) 698-4488).

Sincerely,



Ellie L. Irons
Program Manager
Office of Environmental Impact Review

Enclosures

cc: Andrew K. Zadnik, DGIF
Keith R. Tignor, VDACS
Robert S. Munson, DCR
Alan D. Weber, VDH
Allen R. Brockman, DEQ-Waste
Durwood H. Willis, DEQ-Waste-FFR
Kotur S. Narasimhan, DEQ-Air
Catherine M. Harold, DEQ-Water
Harold J. Winer, DEQ-TRO
Justin Worrell, MRC
Marc E. Holma, DHR
Thomas A. Barnard, Jr., VIMS
J. Michael Foreman, DOF
Alice R. T. Baird, DCR-DCBLA
John M. Carlock, Hampton Roads PDC
H. Clayton Bernick III, City of Virginia Beach

Ellis, Charles

From: ProjectReview ProjectReview [ProjectReview.ProjectReview@dgif.virginia.gov]
Sent: Tuesday, February 15, 2005 8:43 AM
To: Ellis, Charles
Subject: 05-105F_Implementation of Fort Story INRMP

We have reviewed the subject project and offer the following comments and recommendations. The proposed action is to update Fort Story's 1999 Integrated Natural Resources Management Plan (INRMP) to maintain the sustainability of desired military training area conditions and ecosystem integrity.

We do not anticipate a significant adverse impact upon wildlife resources under our jurisdiction to occur due to this project. We appreciate Ft. Story's proposal to use an ecosystem management approach in implementing this plan.

Thank you,
Andrew Zadnik
Andrew.Zadnik@dgif.virginia.gov

Virginia Department of Game and Inland Fisheries
Environmental Services Section
804-367-6913

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

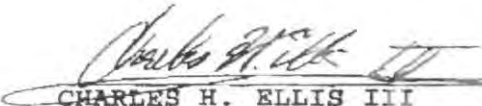
Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

RECEIVED

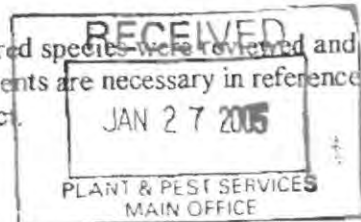
FEB 14 2005

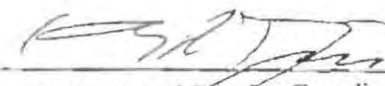
DEQ-Office of Environmental
Impact Review


CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Statements in the project document concerning endangered species were reviewed and compared to available information. No additional comments are necessary in reference to endangered plant and insect species regarding this project.



(signed)  (Keith R. Tignor) (date) February 10, 2005
(title) Endangered Species Coordinator
(agency) VDACS, Office of Plant and Pest Service

PROJECT # 05-015F

8/98

W. Tayloe Murphy, Jr.
Secretary of Natural
Resources



Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124
12 February 2005

RECEIVED

FEB 16 2005

DEQ-Office of Environmental
Impact Review

Mr. Charles H. Ellis, III
Environmental Review Coordinator
Virginia Department of Environmental Quality
629 East Main Street, 6th Floor
Richmond, Virginia 23219

Re: DEQ#05-015F: Development and Implementation of the Fort Story Integrated Natural Resources Management Plan (INRMP), Virginia Beach

Dear Mr. Ellis:

The Department of Conservation and Recreation (DCR) functions to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreation and natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, state unique or exemplary natural communities, significant geologic formations and similar features of scientific interest.

DCR has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined by the submitted map. According to the information currently in our files, this site is located within the Fort Story Interior Dunes and Wetlands Conservation Site. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain, on a scale of 1-5, 1 being most significant. Fort Story Interior Dunes and Wetlands Conservation Site has been given a biodiversity significance ranking of B2, which represents a site of very high significance (best example of any natural community type, a good occurrence of a G1 species, or an excellent occurrence of a G2 or G3 species).

*State Parks • Soil and Water Conservation • Natural Heritage • Outdoor Recreation Planning
Chesapeake Bay Local Assistance • Dam Safety and Floodplain Management • Land Conservation*

Natural heritage resources of concern at this site are as follows:

Communities

Maritime Swamp Woodland

Animals

Fine-lined Emerald (*Somatochlora filosa*, G5/S2/NL/NL)

Eastern Big-eared Bat (*Corynorhinus rafinesquii macrotis*, G3G4TNR/S2/NL/LE)

Plants

Spanish Moss (*Tillandsia usneoides*, G5/S2/NL/NL)

Lipocarpha (*Lipocarpha maculata*, G5/S1/NL/NL)

Viviparous Spikerush (*Eleocharis vivipara*, G5/S1/NL/NL)

Wild Olive (*Osmanthus americanus var. americanus*, G5T5/S1/NL/NL)

Pineland Tick-trefoil (*Desmodium strictum*, G4/S2/NL/NL)

Blue Jack Oak (*Quercus incana*, G5/S2/NL/NL)

Due to the potential for this site to support populations of natural heritage resources, DCR recommends an updated inventory of suitable habitat in the study area. If natural heritage resources are found, we can more accurately evaluate if there will be any impacts to natural heritage resources and if needed offer specific recommendations for minimizing impacts.

Table 3-1 on page 3-4 of the Environmental Assessment (EA) indicates that the Army plans to update the Natural Heritage Inventory in 2006. Please contact J. Christopher Ludwig, Natural Heritage Inventory Manager, at (804) 371-6206 to discuss arrangements for field work.

We recommend adopting the "Preferred Alternative" as outlined in the EA. Furthermore, it is recommended that the protection and management recommendations we provided within "A Natural Heritage Resource Inventory of Fort Story, Virginia" (Stevenson, 1996) be followed.

Additionally, we discovered potential errors in the animal species lists on pages 4-2 to 4-4, especially in the list of reptiles and amphibians. We would greatly appreciate a copy of the 2000 reptile and amphibian survey listed in the EA on page 9-2, so that we can follow up with suggested corrections. We also request that Fort Story send a copy of any reports that resulted from the Big-eared Bat study conducted by Karen Terwilliger and Mary Kay Clark.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in this letter. Their database may be accessed from http://www.dgif.virginia.gov/wildlife/info_map/index.html, or contact Shirli Dressler at (804) 367-6913.

As a reminder any ENRMP activities that involve regulated land disturbing activities on private and public lands in the state must comply with the Virginia Erosion and Sediment Control Law and Regulations (VESCL&R), Virginia Stormwater Management Law and Regulations (VSWML&R), and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, Federal Consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, or other structures, soil/dredge spoil areas, or related land conversion activities that disturb 2,500 square feet or more would be regulated by VESCL&R and by VSWML&R. Accordingly, the sponsoring federal agency should prepare and implement erosion and sediment control (ESC) and stormwater management (SWM) plans to ensure compliance with state law. Fort Story /Department of the Army is ultimately responsible for achieving project compliance through oversight of on site contractors, regular field inspection, prompt action against non-compliant sites, and/or other mechanisms consistent with agency policy. Fort Story is highly encouraged to contact DCR's Chowan, Albemarle & Coastal Watershed Office (757.925.2468) and/or the local ESC and SWM authorities to obtain plan development, implementation assistance and to ensure project conformance during and after active construction. [Reference: VESCL §10.1-567; VSWML §10.1-603.15]

Thank you for the opportunity to offer comments on this project.

Sincerely,



Robert S. Munson
Planning Bureau Manager

C: Eric Davis, USFWS
Andy Zadnik, VDGIF

Literature Cited

Stevenson, D.J. 1996. A Natural Heritage Resource Inventory of Fort Story, Virginia. Natural Heritage Technical Report 96-12. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to the U.S. Department of the Army.



CD

2005

Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 10009, Richmond, Virginia 23240

Fax (804) 698-4500 TDD (804) 698-4021

www.deq.state.va.us

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Robert G. Burnley
Director
(804) 698-4000
1-800-592-5482

MEMORANDUM

TO: Charles H. Ellis, III, Environmental Program Planner

FROM: *ARB* Allen Brockman, Waste Division Environmental Review Coordinator

DATE: February 14, 2005

COPIES: John Ely, Director Office of Waste Programs; Garwin Eng, file

SUBJECT: Environmental Assessment—Development and Implementation of the Ft. Story Integrated Natural Resources Management Plan, Ft. Story, Virginia; DEQ Project Code 05-015F

RECEIVED

FEB 14 2005

Office of Environmental Impact Review

The Waste Division has completed its review of the proposed development and implementation of the Ft. Story Integrated Natural Resources Management Plan at Ft. Story, Virginia. We have the following comments concerning the waste issues associated with this project:

Neither solid waste nor hazardous waste issues and sites were addressed in the report. In addition, the report did not include a search of waste-related data bases. Page 1-4 of the report stated that hazardous materials and waste were eliminated from further evaluation because Ft. Story does not anticipate they will be a problem. The Waste Division staff performed a cursory review of its data files and determined that Building 6300 at the facility is a site under DEQ's Federal Facilities Installation Restoration Program (VA6210020875). Also, Ft. Story contains a Formerly Used Defense Site (FUDS—VA9799F7772). Garwin Eng of DEQ's Federal Facilities Installation Restoration Program was contacted for his review of this consistency determination, and he will reply in a separate memo (if he identifies any additional issues). The following website may prove helpful in locating additional information for the Restoration Program's identification number: http://www.epa.gov/enviro/html/rcris/rcris_query_java.html.

Any wastes that are generated during proposed or planned activities (e.g. potential ground disturbing activities mentioned on p. iv) must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-80); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et*

seq., and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous materials, 49 CFR Part 107.

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Allen Brockman at (804) 698-4468.

RECEIVED

FEB 15 2005

DEQ-Office of Environmental
Impact Review

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WASTE DIVISION
Federal Facilities Restoration Program
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

Subject: Draft Environmental Assessment for Development and Implementation of the Fort Story Integrated Natural Resources Management Plan (Plan Years 2004-2008)

To: Charles B. Ellis, III
Office of Environmental Impact Review

From: Garwin W. Eng *B W E*
Federal Facilities Restoration Program

Date: February 14, 2005

Copies: Allen R. Brockman (DEQ)
Durwood H. Willis (DEQ)
Fort Story Correspondence File

The *Draft Environmental Assessment for Development and Implementation of the Fort Story Integrated Natural Resources Management Plan (Plan Years 2004-2008)* dated December 2004 has been reviewed as requested by Allen R. Brockman, Environmental Review Manager, Waste Division.

Although a project implementation schedule is provided in Table 3-1 of the *Draft EA*, the specific locations at which these projects will occur are not provided. Therefore, it is not possible to determine whether or not the proposed projects will impact any CERCLA Environmental Restoration Program (ERP) Sites.

The Federal Facilities Restoration (FFR) Program recommends that the DEQ be advised when the specific locations of any proposed project that would disturb land, sediment, or groundwater become known.

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR PROGRAM COORDINATION

ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY

TO: Charles H. Ellis III

DEQ - OEIA PROJECT NUMBER: 05 - 015F

PROJECT TYPE: STATE EA / EIR / FONSI FEDERAL EA / EIS SCC
 CONSISTENCY DETERMINATION/CERTIFICATION

RECEIVED

FEB 07 2005

PROJECT TITLE: DEVELOPMENT AND IMPLEMENTATION OF THE FORT STORY
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

DEQ-Office of Environmental
Impact Review

PROJECT SPONSOR: DOD / DEPT. OF THE ARMY / FORT STORY (FT. EUSTIS)

PROJECT LOCATION: X OZONE NON ATTAINMENT AREA

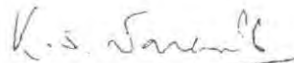
REGULATORY REQUIREMENTS MAY BE APPLICABLE TO: PLAN
 OPERATION

STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY:

1. 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E - STAGE I
2. 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 F - STAGE II Vapor Recovery
3. 9 VAC 5-40-5490 et seq. - Asphalt Paving operations
4. 9 VAC 5-40-5600 et seq. - Open Burning
5. 9 VAC 5-50-60 et seq. Fugitive Dust Emissions
6. 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to _____
7. 9 VAC 5-50-160 et seq. - Standards of Performance for Toxic Pollutants
8. 9 VAC 5-50-400 Subpart _____, Standards of Performance for New Stationary Sources, designates standards of performance for the _____
9. 9 VAC 5-80-10 et seq. of the regulations - Permits for Stationary Sources
10. 9 VAC 5-80-1700 et seq. Of the regulations - Major or Modified Sources located in PSD areas. This rule may be applicable to the _____
11. 9 VAC 5-80-2000 et seq. of the regulations - New and modified sources located in non-attainment areas
12. 9 VAC 5-80-800 et seq. Of the regulations - Operating Permits and exemptions. This rule may be applicable to _____

COMMENTS SPECIFIC TO THE PROJECT:

Being in an area of ozone non-attainment, all precautions are necessary to restrict the emissions of volatile organic compounds (VOC) and oxides of nitrogen (NOx) resulting from any activity.


(Kotur S. Narasimhan)
Office of Air Data Analysis

DATE: February 4, 2005

Fisher,John

From: Winer,Harold
Sent: Wednesday, January 26, 2005 9:47 AM
To: Fisher,John
Subject: EJR #05-015F, Development and Implementation of the Fort Story integrated Natural Resources Management Plan

As requested, the supplied information was reviewed and this office has no comments to make on this proposal other than we concur with an integrated plan implementing a natural resources conservation program.

Thanks for the opportunity to comment.

Harold J. Winer
Deputy Regional Director
DEQ, Tidewater Regional Office
Phone - 757-518-2153 Fax - 757-518-2003
email - hjwiner@deq.virginia.gov

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

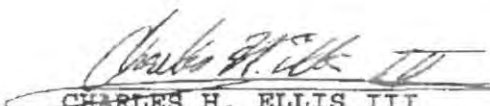
Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

RECEIVED

FEB 04 2005

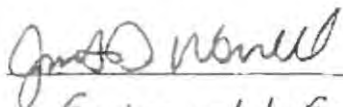
DEQ-Office of Environmental
Impact Review


CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

This will acknowledge receipt of your transmittal letter with enclosures requesting Commission review of the above-referenced project.

Please be advised that the Marine Resources Commission pursuant to Section 28.2-1204 of the Code of Virginia has jurisdiction over any encroachments in, on, or over any State-owned rivers, streams, or creeks in the Commonwealth. Accordingly, if any portion of the subject projects involves any encroachments channelward of ordinary high water along natural rivers and streams, or channelward of mean low water in tidal waters, a permit may be required from our agency.

(signed)  (date) 2-3-05
(title) Environmental Engineer
(agency) VMRC

PROJECT # 05-015F

8/98



RECEIVED

FEB 17 2005

DEQ-Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

Department of Historic Resources

2801 Kensington Avenue, Richmond, Virginia 23221

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.state.va.us

February 15, 2005

Mr. Charles H. Ellis, III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Virginia 23219

Re: Development and Implementation of the Fort Story
Integrated Natural Resources Management Plan
Fort Story, Virginia
DHR File No. 1998-0626

Dear Mr. Ellis:

We have received your request for our review and comment on the draft Fort Story Integrated Natural Resources Management Plan (INRMP). It is our understanding that the Army proposes to update the 1999 Fort Story INRMP in order to maintain the sustainability of desired military training area conditions and ecosystem integrity.

In addition to those historic architectural resources identified in the report (see page 4-4), it should also be noted that there is an identified historic district located at Fort Story. The boundary of this National Register of Historic Places-eligible historic district consists largely of the limits of the built-up areas of the post. The text should reflect the existence of the eligible district.

It is our understanding that Fort Story is in the process of developing an Integrated Cultural Resource Management Plan (ICRMP) to address the treatment of historic properties on post. We encourage Fort Story to work with DHR to develop such a plan.

If you have any questions about the Section 106 review process or our comments, please call me at (804) 367-2323, Ext. 114.

Sincerely,

Marc Holma, Architectural Historian
Office of Review and Compliance

Administrative Services
10 Courthouse Avenue
Petersburg, VA 23803
Tel: (804) 863-1624
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Ave.
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Portsmouth Region Office
612 Court Street, 3rd Floor
Portsmouth, VA 23704
Tel: (757) 396-6707
Fax: (757) 396-6712

Roanoke Region Office
1030 Penmar Ave., SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Winchester Region Office
107 N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**


Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

RECEIVED

FEB 03 2005

DEQ-Office of Environmental
Impact Review


CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

*No significant impact on the
forest land of the Commonwealth.*

(signed)

J. M. Foreman

(date)

2-1-05

(title)

Forest Mgt.

(agency)

DOF

PROJECT # 05-015F

8/98

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
 DEPARTMENT OF ENVIRONMENTAL QUALITY
 OFFICE OF ENVIRONMENTAL IMPACT REVIEW
 629 EAST MAIN STREET, SIXTH FLOOR
 RICHMOND, VA 23219
 FAX #804/698-4319

RECEIVED

FEB 04 2005

DEQ-Office of Environmental Impact Review


 CHARLES H. ELLIS III
 ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

We concur with the finding of "No Significant Impact" with respect to the Chesapeake Bay Preservation Act & Regulation.

(signed) Alise R.T. Baird (date) 1-20-05
 (title) Chesapeake Bay Special Projects Coordinator
 (agency) DCR-DCBLA

FSPR-ARMY-01-05

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
 DEPARTMENT OF ENVIRONMENTAL QUALITY
 OFFICE OF ENVIRONMENTAL IMPACT REVIEW
 629 EAST MAIN STREET, SIXTH FLOOR
 RICHMOND, VA 23219
 FAX #804/698-4319

Charles H. Ellis III
 CHARLES H. ELLIS III
 ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

We concur with the finding of "No Significant Impact" with respect to the Chesapeake Bay Preservation Act Regulation.

(signed) Alise R.T. Baird (date) 1-26-05
 (title) Chesapeake Bay Special Projects Coordinator
 (agency) DCR-DCBLA



RECEIVED

FEB 17 2005

DEQ-Office of Environmental
Impact Review

JEANNE ZEIDLER, CHAIR • PAUL D. FRAM, VICE CHAIRMAN • O. MCREYNOLDS, TREASURER

ARTHUR L. COLLINS, EXECUTIVE DIRECTOR/SECRETARY

February 16, 2005

CHESAPEAKE

Clarence V. Cuffee, *City Manager*
Dalton S. Edge, *Mayor*
Debbie Ritter, *Council Member*

FRANKLIN

Mark S. Fatheroll, *Council Member*
Rowland L. Taylor, *City Manager*

GLOUCESTER COUNTY

John J. Adams, Sr., *Board Member*
William H. Whitley, *County Administrator*

HAMPTON

Randall A. Gilliland, *Council Member*
Ross A. Kaarney II, *Mayor*
George E. Wallace, *City Manager*

ISLE OF WIGHT COUNTY

W. Douglas Caskey, *County Administrator*
Stan D. Clark, *Chairman*

JAMES CITY COUNTY

Bruce C. Goodson, *Chairman*
Sanford B. Wanner, *County Administrator*

NEWPORT NEWS

Charles C. Allen, *Vice-Mayor*
Joe S. Frank, *Mayor*
Edgar E. Maroney, *City Manager*

NORFOLK

Paul D. Fram, *Mayor*
Donald L. Williams, *Council Member*
Regina V. K. Williams, *City Manager*
Barday C. Winn, *Council Member*
W. Randy Wright, *Council Member*

POQUOSON

Charles W. Burgess, Jr., *City Manager*
Gordon C. Helsel, Jr., *Mayor*

PORTSMOUTH

Stephen E. Heretick, *Council Member*
James B. Oliver, Jr., *Interim City Manager*
Charles B. Whitehurst, Sr., *Council Member*

SOUTHAMPTON COUNTY

Anita T. Falta, *Board Member*
Michael W. Johnson, *County Administrator*

SUFFOLK

R. Steven Herbert, *City Manager*
Bobby L. Rabon, *Mayor*

SURRY COUNTY

Terry D. Lewis, *County Administrator*
Judy S. Lytle, *Board Member*

VIRGINIA BEACH

Harry E. Diezel, *Council Member*
Robert M. Dyer, *Council Member*
Louis R. Jones, *Vice Mayor*
Meydra E. Oberdorf, *Mayor*
Peter W. Schmidt, *Council Member*
James K. Spore, *City Manager*
James L. Wood, *Council Member*

WILLIAMSBURG

Jackson C. Tuttle, II, *City Manager*
Jeanne Zeidler, *Mayor*

YORK COUNTY

James O. McReynolds, *County Administrator*
Thomas G. Sheppard, Jr., *Chairman*

Mr. Charles H. Ellis, III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Virginia 23219

Re: Development and Implementation of
the Fort Story Integrated Natural
Resources Management Plan
DEQ #05-015F (ENV:GEN)

Dear Mr. Ellis:

Pursuant to your request of January 24, 2005, the staff of the Hampton Roads Planning District Commission has reviewed the Environmental Assessment for the development and implementation of the Fort Story Integrated Natural Resources Management Plan. We have contacted the City of Virginia Beach concerning the project.

Based on this review, it appears that the proposal is generally consistent with local and regional plans and policies. We concur with the City's suggestion that the Department of the Army consult with staff from the Department of Conservation and Recreation's Division of Natural Heritage and the First Landing State Park Natural Resources Manager in preparation of the final Environmental Assessment.

We appreciate the opportunity to review this project. If you have any questions, please do not hesitate to call.

Sincerely,

Arthur L. Collins
Executive Director/Secretary

MLJ:fh

Copy: Mr. H. Clayton Bernick III, VB

Ellis, Charles

From: Clay Bernick [emc@vbgov.com]
Sent: Thursday, February 17, 2005 11:29 AM
To: Ellis, Charles
Subject: Re: EA on Fort Story Integrated Natural Resources Management Plan (DEQ review log 05-015F)

Charlie-

In addition to the comments included in the HRPDC comment letters on the City's behalf, I offer the following comments:

Comments on Integrated Natural Resources Management Plan (05-015F):

The City of Virginia Beach recommends that consultation occur with staff from the Department of Conservation and Recreation's Division of Natural Heritage, and with First Landing State Park Natural Resources Manager, in preparation of the final EA. Please contact Clay Bernick at (757) 427-4621 or cbernick@vbgov.com to discuss specifics of this recommendation.

Comments on Fence (05-011F):

The City of Virginia Beach recommends that the project be undertaken in consultation with the City of Virginia Beach Department of Planning's Environmental Management Center, in order to determine the feasibility of transplanting vegetation material to be removed from the fence perimeter area for the City's maritime forest ecosystem restoration efforts in the Shore Drive corridor area. Identified vegetation would be removed in conformance with the contractor's schedule for transplanting to other public properties in the Shore Drive corridor where feasible by City staff or volunteers. Please contact Clay Bernick at (757) 427-4621 or cbernick@vbgov.com to discuss specifics of this recommendation.

Hope all is well with you.

Clay

Clay Bernick
Environmental Management Administrator
City of Virginia Beach
Department of Planning
Environmental Management Center
2405 Courthouse Drive
Building 2, Room 115
Municipal Center
Virginia Beach, VA 23456-9040
(757) 427-4621 Reception
(757) 426-5657 Fax
(757) 427-4899 Voice Mail
cbernick@vbgov.com Email

>>> "Ellis, Charles" <chellis@deq.virginia.gov> 02/17/05 08:56AM >>>
Everybody - I need your comments on this Draft EA when you get the chance. Thanks!

Charlie Ellis

DEQ-OEIR

2/17


If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
 DEPARTMENT OF ENVIRONMENTAL QUALITY
 OFFICE OF ENVIRONMENTAL IMPACT REVIEW
 629 EAST MAIN STREET, SIXTH FLOOR
 RICHMOND, VA 23219
 FAX #804/698-4319


 CHARLES H. ELLIS III
 ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

We have reviewed from a marine environmental perspective the Fort Story Integrated Natural Resources Management Plan and have no comments on the activities at the level of detail presented.

(signed) TAB Amond (date) 2/18/05
 (title) Marine Scientist
 (agency) VIMS - CCRM

THE VIRGINIAN-PILOT
NORFOLK, VIRGINIA
AFFIDAVIT OF PUBLICATION

The Virginian-Pilot

GEO-MARINE, INC.
STE. C
11846 ROCK LANDING DR
NEWPORT NEWS VA 23606

REFERENCE: 39060831
12618460 PUBLIC NOTICE

State of Virginia
City of Norfolk

This day, D. Johnson personally appeared before me
and after being duly sworn, made oath that:

1) She is affidavit clerk of The Virginian-Pilot,
a newspaper published by Landmark Communications
Inc., in the cities of Norfolk, Portsmouth,
Chesapeake, Suffolk, and Virginia Beach, Common-
wealth of Virginia and in the state of North
Carolina 2) That the advertisement hereto annexed
has been published in said newspaper on the date
stated.

PUBLISHED ON: 01/24 01/25 01/26

TOTAL COST: 502.26 AD SPACE: 44 LINE
FILED ON: 01/28/05

Legal Affiant: D. Johnson

Subscribed and sworn to before me in my city and state on the day and year
aforesaid this 28 day of February

Notary: [Signature] My commission expires January 31, 2008

Public Notices

PUBLIC NOTICE
US ARMY TRANSPORTATION CENTER FORT STORY
NOTICE OF AVAILABILITY

Notice is hereby given that the US Army Transportation Center and Fort Story has prepared a draft revision of its Integrated Natural Resources Management Plan (INRMP) and an Environmental Assessment (EA) evaluating the potential impacts of implementing the revised plan. Following completion of the draft INRMP and EA, the Army values determined that no significant environmental impacts would occur and a draft Finding of No Significant Impact (FONSI) has been prepared. However, the draft revised INRMP and draft EA with draft FONSI are presented for public review and comment as part of the analytical process. The documents are available for viewing at the following locations: Fort Story Library (Building 7330) and Virginia Beach Central Library (4100 Virginia Beach Boulevard, Virginia Beach, VA 23452). Please send comments within 30 days of this notice to: Mr. Timothy F. Christensen, US Army Transportation Center, ATTN: ANNE EU-PWE, 1407 Washington Blvd, Fort Eustis, VA 23604-5306, or by email to Tim.Christensen@eustis.army.mil or via (757) 818-4588 (fax).
VP Jan. 24, 25 & 26, 2005 12618460

Appendix B
Record of Non-Applicability Concerning the
General Conformity Rule (Code of Federal Regulations, Title 40 Part 51)

**Record of Non-Applicability Concerning the
General Conformity Rule
(Code of Federal Regulations, Title 40 Part 51)**

The US Army proposes to update the 1999 integrated natural resources management plan (INRMP) for US Army Transportation Center, Fort Story, Virginia to ensure that natural resources conservation measures and Army activities are integrated and consistent with federal stewardship requirements. The INRMP would guide natural resources management from 2004 through 2008.

Conformity under the Clean Air Act, Section 176, has been evaluated for the proposed action in accordance with Title 40 of the *Code of Federal Regulations* (CFR) Part 51. The requirements of this rule are not applicable to this action because the total direct and indirect emissions associated with the proposed action would be below the *de minimis* threshold.

To determine the applicability of the General Conformity Rule to the proposed action, potential emissions were estimated for the ozone precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC). The *de minimis* for maintenance ozone areas outside an ozone transport region is 100 tons per year (tpy) for each ozone precursor pollutant. The following assumptions and methodology were used to estimate potential emissions for a typical project to restore habitat conditions in degraded areas:

- Construction equipment for rehabilitation of degraded areas would include bulldozers, dump trucks, backhoe/loaders, water trucks, and flatbed trucks.
- Project duration would be 14 days, 8 hours per day, with 2 pieces for each type of construction equipment.
- Air pollutant factors are taken from U.S. Environmental Protection Agency (USEPA), 1985. Compilation of Air Pollutant Factors, Mobile Sources (AP 42), 4th Edition, U.S. Environmental Protection Agency, Ann Arbor, Michigan, September.

Total estimated emissions for VOC and NO_x would be 0.08 tpy and 1.16 tpy, respectively (see attached table). The *de minimis* values would not be exceeded. Therefore, impacts to air quality would not be significant and the General Conformity Rule does not apply to the proposed action.

Stephen A. McCall
Chief, Environmental and Natural Resources Division
US Army Transportation Center
Fort Eustis, Virginia

Date

Construction
Equipment

Equipment	Days	Hours/Day	Pieces	VOC emission factor	NOx emission factor
Bulldozer	14	8	2	0.20	2.14
Emissions (lbs)				44.80	479.36
Dump Trucks	14	8	2	0.19	4.17
Emissions (lbs)				42.56	934.08
Backhoe/loader	14	8	2	0.23	1.69
Emissions (lbs)				51.52	378.56
Water Truck	14	1	1	0.19	4.17
Emissions (lbs)				2.66	58.38
Flatbed Truck	14	8	1	0.19	4.17
Emissions (lbs)				21.28	467.04
Total Emissions (lbs)				162.82	2317.42
	tons/year			0.08	1.16

**Final Environmental Assessment for Implementation of the NAVPHIBASE Little Creek Integrated
Natural Resources Management Plan**

EXECUTIVE SUMMARY

This Environmental Assessment (EA) analyzes the potential environmental consequences resulting from the proposed implementation of the Integrated Natural Resources Management Plan (INRMP) at Naval Amphibious Base (NAVPHIBASE) Little Creek, Virginia Beach, Virginia. The environmental analysis process is designed to ensure that the public is involved in the process and informed about the potential environmental effects of the proposed action and to help decision makers take environmental factors into consideration when making decisions related to the proposed action.

Purpose and Need for the Proposed Action

The purpose of this action is to implement a conservation program that integrates fish and wildlife management, land management, and management of outdoor recreational opportunities, as practicable and consistent with the military mission and planned mission activities.

The need for this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA). In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the United States, unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

Proposed Action and Alternatives

The Navy proposes to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

The potential impacts of three alternatives: (1) a no action alternative, (2) the proposed action, and (3) an enhanced alternative are analyzed in this EA. The no action alternative would continue to implement the goals and objectives stated in the existing natural resources management plans for NAVPHIBASE. Under the proposed action alternative, only Navy Assessment Level 1 projects as described by the Navy Environmental Requirements Guidebook would be implemented. Navy Level 1 projects are compliance driven and have high funding priority. Under the third alternative, all Navy Assessment Level 1 requirements and, based on the availability of funding, Navy Level 2, 3, 4, and 5 would be implemented. Level 2 requirements are derived from DoD or Navy policy; Level 3 requirements are for pending regulations; Level 4 must meet future needs; and Level 5 requirements are leadership initiatives.

Summary of Environmental Consequences

It is expected that there would be positive long and short-term impacts associated with implementation of the proposed action or the alternative. A summary of the potential impacts is contained in Table ES-1.

Table ES-1. Comparison of Alternatives.

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed Action	Alternative 3 Enhanced Alternative
Land Use	No change	Positive effects on the base's ability to sustain military land use through protecting soil and water resources and providing information for future land planning.	Same as Alternative 2
Soil Resources	No change	Positive effects from review of soil erosion and control plans, implementation of dune protection and monitoring, installation of vehicle exclusion fencing, planting beach grasses, and implementing shoreline stabilization efforts.	Same as Alternative 2 with additional benefits to soil resources resulting from enhancing riparian buffers and no mow zones.
Water Resources	No change	Positive effects from review of permitting requirements, compliance with wetlands regulations, and implementation of projects including base wide jurisdictional wetlands delineation, dune restoration, and shoreline stabilization efforts.	Same as Alternative 2 with additional benefits from enhancing riparian buffers and no mow zones and conducting fisheries surveys on Lake Bradford
Marine Resources	No change	Positive impacts to marine resources could result from coordination with the NMFS and USFWS and the identification and reporting of marine animal strandings.	Same as Alternative 2
Coastal Zone Resources	No change	Positive effects from implementing dune protection and monitoring; installation of vehicle exclusion fencing; implementing successional shoreline management plan structures outlined in the VIMS shoreline management plan update of 2005; the review of projects to ensure consistency with the Virginia CZMP; and mapping and enhancing SAV ¹ beds in Little Creek Harbor.	Same as Alternative 2
Vegetation	No change	Positive effects from invasive species control and monitoring tree diseases and insect infestations, dune restoration, beach grass planting, and SAV establishment.	Same as Alternative 2 with additional benefits from developing an urban forest management plan and monitoring planted materials.

Table ES-1. Comparison of Alternatives (cont'd).

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed Action	Alternative 3 Enhanced Alternative
Fish and Wildlife	No change	Positive effects from retrofitting light poles with raptor electrocution guards and installing raised osprey platforms, nest box monitoring and maintenance, and habitat restoration activities.	Same as Alternative 2 with additional benefits from the distribution of additional duck boxes, conducting fisheries surveys, and monitoring the beach for shorebird nesting activity.
Rare, Threatened, and Endangered Species	No change	Positive effects from rare species surveys and tracking of and compliance with regulations.	Same as Alternative 2
Cultural Resources	No change	Positive impacts to undiscovered cultural resources from consultation with SHPO during project planning.	Same as Alternative 2
Air Quality	No Change	No Change from baseline conditions is expected since none of the proposed projects is expected to impact local or regional air quality	Same as Alternative 2
Socioeconomics	No change	No change to population, income, or employment.	Same as Alternative 2
Environmental Justice	No change	No disproportionately high adverse impact on minority or low-income populations.	Same as Alternative 2

¹ submerged aquatic vegetation

TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND NEED FOR ACTION.....	1-1
1.1 Introduction.....	1-1
1.2 Proposed Action.....	1-1
1.3 Purpose and Need	1-1
1.4 Regulatory Compliance	1-3
1.5 INRMP Implementation.....	1-4
1.5.1 Programming and Budgeting Priorities	1-4
1.5.2 Funding Sources.....	1-5
1.5.3 Project Implementation Schedule	1-6
1.6 Scope of the Environmental Assessment.....	1-6
2.0 PROPOSED ACTION AND ALTERNATIVES	2-1
2.1 Selection Criteria for Alternatives	2-1
2.2 Alternatives Eliminated from Consideration	2-2
2.3 Mission Constraints on Natural Resources Management	2-2
2.4 Alternatives Considered.....	2-2
2.4.1 Alternative 1 – No Action.....	2-2
2.4.2 Alternative 2 – Proposed Action.....	2-3
2.4.3 Alternative 3 – Enhanced Alternative.....	2-5
3.0 AFFECTED ENVIRONMENT	3-1
3.1 Land Use	3-1
3.1.1 Regional Land Use.....	3-1
3.1.2 Base Land Use	3-1
3.2 Soil Resources.....	3-1
3.3 Water Resources	3-2
3.3.1 Groundwater	3-2
3.3.2 Surface Water.....	3-2
3.3.3 Watersheds.....	3-2
3.3.4 Floodplains.....	3-3
3.3.5 Wetlands	3-3
3.4 Coastal Zone Resources.....	3-3
3.5 Vegetation	3-4
3.6 Fish and Wildlife.....	3-5
3.7 Rare, Threatened, and Endangered Species and Significant Ecological Communities	3-6
3.8 Cultural Resources	3-6
3.9 Air Quality	3-6
3.10 Socioeconomics and Environmental Justice.....	3-7
3.10.1 Demographics	3-8
3.10.2 Employment and Income	3-8
4.0 ENVIRONMENTAL CONSEQUENCES	4-1
4.1 Alternative 1 – No Action.....	4-4

TABLE OF CONTENTS (cont'd)

	<u>Page</u>
4.1.1 Land Use	4-4
4.1.2 Soil Resources.....	4-4
4.1.3 Water Resources	4-4
4.1.4 Marine Resources.....	4-4
4.1.5 Coastal Zone Resources	4-4
4.1.6 Vegetation	4-5
4.1.7 Fish and Wildlife.....	4-5
4.1.8 Rare, Threatened, and Endangered Species	4-5
4.1.9 Cultural Resources	4-5
4.1.10 Air Quality	4-5
4.1.11 Socioeconomics and Environmental Justice.....	4-5
4.2 Alternative 2 – Proposed Action.....	4-6
4.2.1 Land Use	4-6
4.2.2 Soil Resources.....	4-6
4.2.3 Water Resources	4-6
4.2.4 Marine Resources.....	4-6
4.2.5 Coastal Zone Resources	4-7
4.2.6 Vegetation	4-7
4.2.7 Fish and Wildlife.....	4-7
4.2.8 Rare, Threatened, and Endangered Species.....	4-7
4.2.9 Cultural Resources.....	4-8
4.2.10 Air Quality	4-8
4.2.11 Socioeconomics and Environmental Justice.....	4-8
4.3 Alternative 3 – Enhanced Alternative.....	4-8
4.3.1 Land Use	4-8
4.3.2 Soil Resources.....	4-8
4.3.3 Water Resources	4-9
4.3.4 Marine Resources.....	4-9
4.3.5 Coastal Zone Resources	4-9
4.3.6 Vegetation	4-9
4.3.7 Fish and Wildlife.....	4-9
4.3.8 Rare, Threatened, and Endangered Species.....	4-9
4.3.9 Cultural Resources	4-9
4.3.10 Air Quality	4-9
4.3.11 Socioeconomics and Environmental Justice.....	4-10
4.4 Cumulative Impacts	4-10
4.5 Irreversible and Irretrievable Commitment of Resources.....	4-11
5.0 COORDINATION AND PUBLIC INVOLVEMENT.....	5-1
6.0 LIST OF PREPARERS.....	6-1
7.0 REFERENCES	7-1

APPENDICES

- Appendix A Applicable Laws and Regulations
- Appendix B Project Summary Table
- Appendix C State and Federal Agency Coordination and Public Notification

LIST OF FIGURES

<u>No.</u>		<u>Page</u>
Figure 1-1.	Location and Regional Setting of NAVPHIBASE.....	1-2

LIST OF TABLES

<u>No.</u>		<u>Page</u>
Table 3-1.	<i>De Minimis</i> Exemption Levels in Nonattainment Areas.	3-7
Table 4-1.	Comparison of Alternatives.	4-2

LIST OF ACRONYMS AND ABBREVIATIONS

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	best management practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CO	carbon monoxide
CRMP	Coastal Resources Management Program
CNO	Chief of Naval Operations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
<i>de minimis</i> level	minimum threshold level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoN	Department of Navy
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
EPR	environmental program requirements
ESA	Endangered Species Act
FCTCLANT	Fleet Combat Training Center Atlantic
FEMA	Federal Emergency Management Agency
FONSI	finding of no significant impact
GMI	Geo-Marine, Inc.
INRMP	integrated natural resources management plan
LCAC	landing craft air cushions
LCU	landing craft utilities
MBTA	Migratory Bird Treaty Act
MILCON	Military Construction
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NAVPHIBASE	Naval Amphibious Base Little Creek
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O ₃	ozone

ACRONYMS AND ABBREVIATIONS (cont'd)

O&MN	Operations and Maintenance, Navy
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Operating Instruction
Pb	lead
PM ₁₀	particulate matter with a diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
RHPO	Regional Historic Preservation Officer
ROI	region of influence
RSIP	Regional Shore Infrastructure Plan
SAIA	Sikes Act Improvement Act
SAV	submerged aquatic vegetation
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO ₂	sulfur dioxide
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VDCR-DNH	Virginia Department of Conservation and Recreation-Division of Natural Heritage
VDGIF	Virginia Department of Game and Inland Fisheries
VOCs	volatile organic compounds

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

Naval Amphibious Base Little Creek (NAVPHIBASE) is located in the northeast corner of Virginia Beach at the mouth of the Chesapeake Bay in the Tidewater region of Virginia. The base encompasses approximately 2,380 acres, which include the 470-acre Little Creek Harbor and over two miles of Chesapeake Bay shoreline. The base is bounded by the Chesapeake Bay to the north, Shore Drive to the south, Lake Bradford and Chubb Lake to the east, and the city limits of Virginia Beach to the west (Figure 1-1). The surrounding land area is densely developed with residential, commercial, industrial developments, and recreational facilities.

NAVPHIBASE serves as the major operating base for Atlantic Fleet amphibious forces and supports 80 shore commands. The base provides on-base logistics, facilities, and other support services as required by local commands, organizations, other United States and allied units, home ported ships, and commands of the operating forces. As host command, NAVPHIBASE also supports 61 Navy piers where 28 Navy ships, 36 landing craft air cushions (LCACs), and 27 conventional waterborne landing craft utilities (LCUs) are currently home ported. The base employs approximately 9,200 military personnel and 3,000 civilians (NAVPHIBASE 2003).

1.2 Proposed Action

NAVPHIBASE proposes to develop and implement an integrated natural resources management plan (INRMP) consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP would be to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

1.3 Purpose and Need

The purpose of this action is to implement a conservation program that integrates fish and wildlife management, land management, and management of outdoor recreational opportunities, as practicable and consistent with the military mission and planned mission activities.

The need for this action is to meet statutory requirements under the SAIA. In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the United States, unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

The principal use of military installations is to ensure the preparedness of the armed forces. The SAIA requires each installation to prepare an INRMP that provides for the following program management activities, to the extent that such activities are consistent with use of the installation for military preparedness:



Figure 1-1. Location and Regional Setting of NAVPHIBASE.

- The conservation and rehabilitation of natural resources on the installation;
- The sustainable multipurpose use of the resources, including hunting, fishing, trapping, and non-consumptive uses; and
- Subject to safety requirements and military security, public access to the installation to facilitate such uses.

As required by the SAIA, the plan must, to the extent appropriate and applicable, provide for:

- Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- Fish and wildlife habitat enhancement or modification;
- Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;
- Integration of, and consistency among, the various activities conducted under the plan;
- Establishment of specific, natural resources management goals and objectives and time frames for proposed actions;
- Sustainable use by the public of natural resources, to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- Public access to the military installation that is necessary or appropriate for the sustainable use of natural resources, subject to requirements necessary to ensure safety and military security;
- Enforcement of applicable natural resource laws (including regulations);
- No net loss in the capability of the installation's lands to support the military mission of the installation; and
- Such other activities as the Navy has determined are appropriate.

Through the process of developing the INRMP, NAVPHIBASE has worked in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF) so that the plan reflects the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on NAVPHIBASE. Also, as required by the SAIA, the plan has been provided for public comment, and all comments received were taken into account in finalizing the INRMP.

1.4 Regulatory Compliance

This environmental assessment (EA) has been prepared pursuant to Section 102 of the National Environmental Policy Act (NEPA) of 1969, 42 USC § 4231 et seq., and in accordance with the regulations of the Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code of Federal Regulations [CFR] § 1500-1508), and the Navy Environmental and Natural Resources Program Manual (Chief of Naval Operations Operating Instruction [OPNAVINST] 5090.1B). NEPA requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect the environment through providing an assessment of alternative actions and providing the

opportunity for public comment on federal actions that have the potential to impact the environment. The information presented in this document will serve provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI) would be appropriate.

Individual actions identified in the plan may require state and federal review to ensure compliance with major environmental legislation, such as the Endangered Species Act (ESA), Clean Water Act (CWA), Clean Air Act (CAA), Coastal Zone Management Act (CZMA), and National Historic Preservation Act (NHPA). Potential permits, coordination, and environmental protection plans include, but are not limited to, the following:

- CZMA consistency determination;
- Virginia Erosion and Sediment Control Plan;
- Virginia Water Protection Permit Program;
- Virginia Storm Water Discharge Permit for Construction Activities;
- Virginia Coastal Resources Management Program;
- U.S. Army Corps of Engineers (USACE) applicable permits; and
- Appropriate Joint Permit Application coordination with state and local agencies.

An abbreviated list of pertinent regulations and guidance is in Appendix A.

1.5 INRMP Implementation

1.5.1 Programming and Budgeting Priorities

The Office of Management and Budget (OMB) and the Environmental Protection Agency (EPA) require federal agencies to classify natural resources projects in order to assist with programming and budgeting priorities. Department of Defense Instruction (DoDI) 4715.3, Enclosure 4, provides detailed guidance on programming and budgeting natural resources projects. The priority classifications (Class 0 through Class III) are summarized below.

- **Class 0: Recurring Natural Resources Conservation Management Requirements.** Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing the Department of Defense's (DoD's) conservation program. Recurring costs consist of manpower, training, supplies, hazardous waste disposal, recycling activities, permits, fees, testing and monitoring and/or sampling and analysis, reporting and record keeping, maintenance of environmental conservation equipment, and compliance self-assessments.
- **Class I: Current Compliance.** Includes projects and activities needed because an installation is currently out of compliance; has a signed compliance agreement; has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, presidential Executive Orders (EOs), or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission.

- **Class II: Maintenance Requirements.** Includes projects and activities not currently out of compliance but which will be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.
- **Class III: Enhancement Actions Beyond Compliance.** Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

An additional assessment level is assigned to projects to assist in recognizing appropriate funding sources in Environmental Program Requirements (EPR) exhibits. The following descriptions of Navy Assessment Levels are summarized from the Navy Environmental Requirements Guidebook (Chief of Naval Operations [CNO] 2003). Navy Level 1 requirements are those prescribed by state or federal laws, regulations, and EOs; Level 1 requirements include OMB/EPA Class 0, I, or II projects and ongoing efforts. Navy Level 2 requirements are derived from DoD or Navy policy; Level 3 requirements are for pending regulation; Level 4 requirements meet future requirements; and Level 5 requirements are leadership initiatives.

1.5.2 Funding Sources

The Navy Environmental Requirements Guidebook (CNO 2003) also describes various potential funding mechanisms for natural resources projects. Operations and Maintenance, Navy (O&MN) environmental funds are the primary source of resources to support Navy Level 1 (OMB/EPA Classes 0, I, and II) actions, though these funds are generally not available for Navy Level 2 through Level 5 actions. In addition, only the initial procurement, construction, or modification of a facility or project is a valid use of O&MN funds. The subsequent operation and maintenance is considered a Real Property Maintenance funding requirement. When natural resources actions are required as part of a military construction (MILCON) project, costs should be paid by MILCON funds as part of the overall construction project.

Forestry revenues from the sale of forest products on Navy lands are a source of funding for two programs: Annual Navy Forest Funds and DoD Forestry Reserve Account. The DoD Forestry Reserve Account funds can be used for improvement of forestlands and for implementation of projects described in an approved management plan that provides for habitat improvement and protection. These funds are suitable for many of the types of natural resources management projects identified in the proposed INRMP. User fees collected from the base fishing program may be used only for the protection, conservation, and management of fish and wildlife such as habitat improvement and related activities. National Public Lands Day funds are available for projects that showcase public lands and the importance of protecting natural resources through volunteerism. The National Environmental Education and Training Foundation manages and coordinates this fund. The Legacy Resources Management Program (Legacy) can provide funding for a variety of conservation projects such as habitat preservation efforts and ecosystem management efforts. A project proposal must be submitted in order to be eligible for Legacy, Annual Navy Forest, or DoD Forestry Reserve Account funds. Across the Navy, projects are prioritized and funded annually.

1.5.3 Project Implementation Schedule

For prioritization and budgeting purposes, actions or projects recommended in the INRMP that require a request for funds are listed in a project implementation table in Appendix B. The prime legal drivers, programming and budgeting priority, and potential NEPA and CZMA requirements are identified for each project. All projects submitted for O&MN funding must be included in the INRMP or a clear justification for their omission must be provided. An INRMP increment addendum must be prepared annually to facilitate implementation of the INRMP. The annual increment addendum should provide concise detail and cost estimates of proposed work or projects planned for each fiscal year.

Relevant legal drivers and initiatives that were identified for each management issue in the INRMP are also summarized in the project implementation table. Primary statutes and regulations identified in the project table include the CWA, SAIA, ESA, NEPA, and Migratory Bird Treaty Act (MBTA); state conservation laws; DoN and DoD instructions and policies; and presidential EOs.

All projects would undergo annual review and reprioritization, and would be subject to budget constraints due to the cost of war or other mission related funding cuts. Projects would be assessed on an individual basis for compliance with the NEPA and other compliance related environmental requirements.

1.6 Scope of the Environmental Assessment

This EA has been prepared to evaluate the potential environmental impacts of implementing the proposed INRMP for NAVPHIBASE. The analysis compares and summarizes the environmental consequences of the proposed action and alternative management objectives rather than individual projects or practices and is therefore a programmatic EA. Site-specific environmental analyses that are required for future projects may be tiered to this EA provided the anticipated impacts of a specific project, project components, the affected resources, or circumstances do not differ substantially from those evaluated in this EA.

Relevant resources evaluated in this EA include land use, soil resources; water resources; marine resources; coastal zone resources; vegetation; wildlife; rare, threatened and endangered species; cultural resources; and socioeconomics and environmental justice. In compliance with NEPA and OPNAVINST 5090.1B guidelines, the scope of this EA focuses on those resources potentially subject to impact. Implementation of any of the alternatives would not be likely to affect noise, which was therefore not considered relevant to this assessment. Noise generated from implementation of any of the alternatives would not be above background levels.

2.0 PROPOSED ACTION AND ALTERNATIVES

This section of the EA describes and compares the proposed action, no action alternative, and alternatives that were considered but not evaluated further.

- **Alternative 1, No Action Alternative.** Under this alternative, NAVPHIBASE would continue implementation of the objectives and practices outlined in the previous natural resources management plan (U.S. Navy 1997). Ongoing natural resources practices would continue and there would be no change to the objectives outlined in the previous plan.
- **Alternative 2, Proposed Action.** The proposed action is to develop and implement an INRMP that emphasizes compliance with environmental statutes and regulations and is consistent with the military use of the property and the goals and objectives established in the SAIA. Under this alternative, only Navy Assessment Level 1 (OMB Classes 0 through II) projects would be implemented.
- **Alternative 3, Enhanced Alternative.** Like Alternative 2, the enhanced alternative would implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. In addition to the Navy Level 1 projects that would be implemented under the proposed action, projects and activities that enhance resources, the installations' mission, or those that address overall environmental goals would also be implemented. These projects are identified as Navy Assessment Level 2 through 5 requirements (OMB Class III).

2.1 Selection Criteria for Alternatives

Each alternative presented for analysis must be a reasonable alternative that meets the needs and purpose of the proposed action. Each alternative must integrate natural resources management at NAVPHIBASE with the base's military mission in a manner that ensures military preparedness and meets the requirements of SAIA and other conservation laws that regulate natural resources on federal lands. In order for an alternative to be viable it must maintain compliance with and follow guidance set forth by 32 CFR Part 190, DoDI 4715.3, OPNAVINST 5090.1B CH3, and the Sikes Act (16 USC §670a-f). Specifically, each alternative must:

1. Be based on the principles of ecosystem management;
2. Provide for sustainable multipurpose uses of natural resources;
3. Maintain compliance with relevant environmental regulations;
4. Provide for public access for use of natural resources subject to safety and military security considerations;
5. Establish specific natural resources management objectives and time frames for proposed actions; and
6. Prevent loss in the capability of military lands to support the military mission of the installation.

2.2 Alternatives Eliminated from Consideration

Alternatives to the proposed action that would disproportionately administer one portion of the natural resources program over others or not take multiple uses and ecosystem management into account were considered and eliminated from further discussion. Included was an alternative that proposed the implementation of a natural resources program that maximizes the sustained yield of timber products while minimizing wildlife management, outdoor recreation, and stewardship activities. While this alternative would meet criteria 3, 5, and 6, it would not meet criteria 1, 2, and 4, and would therefore not be compliant with the SAIA, DoDI 4715.3, or OPNAVINST 5090.1B. As such, this alternative is unreasonable and is excluded from further analysis (see 40 CFR § 1502.14(a)).

A second alternative, the implementation of a natural resources program for preservation of land resources that precludes multiple uses of forests, fish and wildlife, land resources, and outdoor recreation was also eliminated from further consideration. While this alternative would meet criteria 3 through 6, it would not meet criteria 1 and 2, and would therefore not be compliant with the SAIA, DoDI 4715.3, or OPNAVINST 5090.1B. As such, this alternative is unreasonable and is also excluded from further analysis (see 40 CFR § 1502.14(a)).

2.3 Mission Constraints on Natural Resources Management

Traditional natural resources management such as forestry, wildlife management, and outdoor recreation is limited throughout much of NAVPHIBASE because of the urban nature of the base. Opportunities for habitat improvement, wetlands and water quality protection, and urban tree care, however, are significant in these areas. Constraints from training or other mission-related activities at NAVPHIBASE are minor, though access to portions of the beaches and dunes is restricted during live firing exercises at the rifle range. The small arms range firing fans are directed toward the Chesapeake Bay and have little effect on natural resources management. Natural resources management, development, and most other land uses are also constrained by explosive safety quantity distance arcs associated with ordnance loading and storage in the western portion of the base.

2.4 Alternatives Considered

2.4.1 Alternative 1 – No Action

The no action alternative is the continued implementation of the 1997 natural resources management plan for NAVPHIBASE. The existing management program provides valuable information on natural resources management; however, the program does not set time frames for implementation of or provide cost estimates for natural resources projects. Also, many of the program management recommendations provided in the current natural resources management plan have been completed, and new projects described in the proposed INRMP would not be implemented under the no action alternative. In addition, no EA was completed for development of the existing management plan, nor was it provided for public review. Consequently, the existing plan does not meet the SAIA requirements for an INRMP. The no action alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations.

Program areas address management issues from a multipurpose use perspective, and emphasis is placed throughout on good stewardship of the natural resources entrusted to the base. Those management actions that will provide for the maximum sustained multipurpose uses are prioritized for implementation. This plan addresses land management practices that reduce grounds maintenance costs, conserve soil and water, improve real estate value, protect and enhance wetlands, floodplains, protect and restore dunes, abate nonpoint sources of water pollution, control noxious weeds, and prevent erosion. Management practices that conserve and promote conservation of fish and wildlife and their habitats, particularly habitats of state or federally listed rare, threatened, or endangered species, and that manage game fish and wildlife species and their habitats for optimum sustained yield are identified and recommended. In addition, coastal zone management practices that protect wetlands and water quality and promote conservation and biodiversity are identified and recommended.

2.4.2 Alternative 2 – Proposed Action

The proposed action is to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The plan discusses a number of management issues relevant to natural resources and describes specific management actions or projects related to each issue, as appropriate. A summary of all projects described in the INRMP including implementation schedules, legal drivers, estimated cost, and source of funding is in Appendix B. Under Alternative 2, only those projects classified as Navy Level 1 (OMB Classes 0 through III) would be implemented. A summary of activities that would be implemented under Alternative 2 follows.

Marine Resources Protection. Under the proposed action, the Navy would coordinate with the National Marine Fisheries Service (NMFS) and USFWS to obtain relevant permits prior to implementing actions with potential to impact marine resources. Sightings of stranded marine mammals or sea turtles on NAVPHIBASE beaches or in the Chesapeake Bay would be reported to natural resources staff that would report the incident to the Virginia Marine Science Museum's Stranding Center. Additionally, natural resources staff would assist base personnel with the identification of marine mammals, as needed. Further efforts to protect and enhance marine resources would include mapping and monitoring the submerged aquatic vegetation (SAV) bed known to occur in Little Creek Harbor and planting and monitoring additional sites at suitable locations.

Coastal Zone Management. Under the proposed action, all base plans and proposed actions would be reviewed to ensure consistency with the Virginia Coastal Zone Management Plan (CZMP) and assistance with obtaining coastal zone consistency determinations would be provided.

Wetlands and Water Quality Protection. Under the proposed action, water resources would continue to be managed in accordance to relevant federal, state, and local water protection laws and EOs. NAVPHIBASE would obtain all appropriate federal, state, interstate, and local certifications and permits required by point and nonpoint pollution control, groundwater

protection, dredge and fill operations, and storm water management programs for any action that may impact water quality. Updated wetlands information, including new wetlands maps that were created during preparation of the proposed INRMP would be made available for land planning under the proposed action. Wetlands and water quality protection projects and activities under this alternative include: conducting base wide wetlands mapping and obtaining a jurisdictional determination from the USACE; reviewing all base development plans and actions to ensure identification of conservation issues; and provide maps and information required for oil spill response planning.

Urban Forest Management. The forested area at NAVPHIBASE is considered an urban forest and consists of landscaped trees and shrubs, base parks and picnic areas, and small wooded patches. The primary goal of urban forest management under the proposed action would be to maintain the health and integrity of the urban forest, ensure the safety of personnel and their dependents, and protect Navy real estate. Under the proposed action, natural resources staff would promote the use of beneficial landscaping practices as described in the proposed INRMP; identify hazard trees for removal; monitor forest conditions and coordinate tree maintenance; review all development plans and actions where tree removal is proposed; and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites for development.

Fish and Wildlife Management. Under the proposed action, the basic objectives of fish and wildlife management would be to manage fish and wildlife species and their habitats within the constraints of the military mission; conserve and promote conservation of wildlife and their habitats, particularly habitats of state- or federal-listed rare, threatened, or endangered species; and balance wildlife population levels with habitat carrying capacity. Projects proposed under this alternative include: retrofitting light poles with raised platforms or raptor electrocution guards; monitoring nesting activity of osprey platforms and other bird nest boxes during the nesting season; and reducing mowing in selected areas to improve food and cover for wildlife.

Rare, Threatened, and Endangered Species. No federally listed species have been documented on NAVPHIBASE, though several plant species that are considered very rare or rare in Virginia are known to occur. Because it is in the interest of the Navy to protect and preserve these rare species to prevent their decline and eventual listing under the ESA, under the proposed action, NAVPHIBASE would strive to protect the areas of significant habitat known support rare species. The proposed INRMP presents location maps for the state-rare species and significant natural habitats as delineated by the Virginia Department of Conservation and Recreation-Division of Natural Heritage (VDCR-DNH). These maps would be used by all natural resources and land use planning personnel to avoid disturbance to these important natural resource areas.

Outdoor Recreation and Environmental Awareness. The primary objectives of outdoor recreation and environmental awareness initiatives under the proposed action would be to improve the quality of life for installation personnel, their dependents, and the military community by providing for outdoor recreational opportunities to the maximum extent possible within the constraints of the military mission and capability of the natural resources and to foster understanding and awareness of the environment through educational programs. Under this alternative, natural resources staff would oversee maintenance and repairs of recreational and environmental awareness facilities such as the Circle H Nature Trail and watchable wildlife-viewing platform.

Habitat Conservation and Restoration. Habitat conservation and restoration are important natural resources management issues in the proposed INRMP. Management efforts under Alternative 2 would focus on protection of the base's special interest areas and restoration of significant natural habitats. Projects proposed under this alternative include implementing dune protection and restoration; providing NEPA documentation for and implementing the initial phases of the Chesapeake Bay Shoreline Management Plan; and monitoring the health and extent of existing SAV beds and establishing additional beds in Little Creek Harbor.

Pest Management. The primary objective of pest management at NAVPHIBASE under the proposed action would be to prevent interference with military operations and preparedness by protecting infrastructure, real property, and human health and safety. The Regional Pesticide Compliance and Pest Management Plan (draft), which describes requirements, resources, responsibilities, and procedures for pest management throughout the region, would be implemented when finalized. Integrated pest management efforts would be implemented to control Canada geese and invasive alien plants at several identified locations at NAVPHIBASE.

Cultural Resources. No structures at NAVPHIBASE are eligible for listing on the National Register of Historic Places (NRHP) and a preliminary archaeological study revealed no archaeological resources of concern on the base (U.S. Navy 1999); however, it is possible that unknown archaeological resources may be destroyed by ground-disturbing activities. Under the proposed action, the Navy Regional Historic Preservation Officer (RHPO) would be consulted during the planning process for new construction or other activities with potential to impact cultural resources to avoid unauthorized or accidental disturbance.

Training and Professional Development. Personnel assigned natural and cultural resources management responsibilities are required to receive training as applicable to their specific job assignments. Under the proposed action, natural resources staff would attend training in basic ArcView and product updates; wetlands delineation and regulation; marine mammal stranding; and invasive species control; and coastal ecology and shoreline stabilization workshops, as appropriate.

2.4.3 Alternative 3 – Enhanced Alternative

The enhanced alternative would implement all projects described in the NAVPHIBASE INRMP, including those proposed for implementation by Alternative 2 as well as additional environmental stewardship projects not required for compliance or maintenance. A summary of all projects described in the INRMP including implementation schedules, legal drivers, estimated cost, and source of funding is in Appendix B. A summary of the additional activities that would be implemented under Alternative 3 follows.

Marine Resources Protection. The marine resource protection activities proposed under this alternative would be the same as those described above for the proposed action.

Coastal Zone Management. The coastal zone management activities proposed under this alternative would be the same as those described above for the proposed action.

Wetlands and Water Quality Protection. In addition to those projects that would be implemented under Alternative 2, the enhanced alternative includes projects to monitor and maintain existing designated "No Mowing " riparian buffers and establish or expand several additional buffers.

Urban Forest Management. In addition to the projects that would be implemented under the proposed action, the enhanced alternative includes projects to develop and implement an urban forest management plan that would increase beneficial landscaping practices and the use of native species at NAVPHIBASE and to monitor and maintain planted trees and shrubs at SEAL Park.

Fish and Wildlife Management. Under the enhanced alternative, an important function of the natural resources program would be to maintain and enhance habitats to support a full spectrum of native regional wildlife species, including fish, birds, mammals, herpetofauna, and invertebrates. In addition to the projects that would be proposed under Alternative 2, project proposed under Alternative 3 would include assessing potential locations for installing additional duck boxes; conducting periodic fisheries and water quality surveys on Lake Bradford; and monitoring the beach area for shorebird nesting activity.

Rare, Threatened, and Endangered Species. Rare, threatened, and endangered species management activities proposed under this alternative would be the same as those described above for the proposed action.

Outdoor Recreation and Environmental Awareness. In addition to the projects proposed under Alternative 2, natural resources staff would coordinate the development and presentation of instructional materials to inform planners, land managers, and other base personnel of natural resources issues relevant to development and construction projects and provide environmental awareness notifications and information regarding compliance issues to installation personnel via the base newsletter and website.

Habitat Conservation and Restoration. The habitat conservation and restoration projects implemented under this alternative would be the same as proposed under Alternative 2.

Pest and Invasive Species Management. In addition to the pest and invasive species management activities proposed under the proposed action, under the enhanced alternative natural resources staff would assist in the control of miscellaneous nuisance wildlife in the administrative and urban portions of the base and would monitor grassland communities for invasive species.

Cultural Resources. The cultural resources activities proposed under this alternative are the same as those described above for the proposed action.

Training and Professional Development. The training and professional development activities proposed under this alternative are the same as those described above for the proposed action.

3.0 AFFECTED ENVIRONMENT

This section describes the relevant existing environmental conditions that would be impacted by implementation of the alternatives discussed in Section 2.0. In accordance with CEQ regulations (§ 1502.15), the descriptions presented below are no longer than necessary to understand the potential effects of implementation of the proposed action or alternatives. More detailed information on the affected environment is presented in the INRMP for which this EA was developed.

3.1 Land Use

3.1.1 Regional Land Use

NAVPHIBASE is located in the northeast corner of Virginia Beach at the mouth of the Chesapeake Bay in the Tidewater region of Virginia. The surrounding land area is densely developed with residential, commercial, industrial developments, and recreational facilities. Several other military installations including Fort Story, Naval Air Station (NAS) Oceana, South Virginia Beach Annex (Camp Pendleton), and Dam Neck Annex are also located in Virginia Beach in close proximity to NAVPHIBASE.

3.1.2 Base Land Use

Though the overriding land use at NAVPHIBASE is mission support, the land and water resources may be divided into three areas with discrete land uses. The developed portions of the base encompass approximately 1,845 acres and include the operational, administrative, personnel and mission support, and housing activities. The beaches and dunes at NAVPHIBASE encompass approximately 190 acres along the Chesapeake Bay shoreline and are used for training and recreation. Two small arms firing ranges, the LCAC facility, training areas, and two recreational beaches are located in this portion of the base. The training areas in this unit are a critical resource for the Atlantic fleet's amphibious and land-based military exercises. The coastal setting, general topography, and vegetative cover are important features of the training environment. Undeveloped forests and salt marsh dominate the remaining areas of NAVPHIBASE. These areas support recreational areas, parks, and the larger base lakes. Recreation is the primary land use in the undeveloped areas.

3.2 Soil Resources

The U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) (USDA, SCS 1988) prepared a soil survey report for NAVPHIBASE. Sixteen soil types occur at NAVPHIBASE. A large percentage of the soils (68 percent) at NAVPHIBASE are disturbed soils and are mapped as Udorthents, Psammments, or Urban Land, and complexes with these and other soils.

The natural soil types at NAVPHIBASE include Augusta loam, Corolla fine sand, Duckston fine sand, Newhan fine sand, Rappahannock mucky peat, State loam, Tetotum loam, and complexes containing two or more of these soils. Of these soils, the Augusta loam, State loam, and Tetotum loam are designated as prime farmland (USDA, SCS 1985) and are regulated under the Farmland Protection Policy Act (7 USC §4201 et seq.). The Farmland Protection Policy Act aims to assure that actions of the federal government do not cause prime and unique farmland to

be irreversibly converted to nonagricultural uses. Portions of these soils that are already built-up, and are not considered prime farmland. The Duckston and Rappahannock soil series are listed as hydric by the National Resources Conservation Service (NRCS 1993). The remaining soils are upland soils that are well drained to moderately well drained.

3.3 Water Resources

3.3.1 Groundwater

The shallow aquifer system at Virginia Beach is composed of the Columbia aquifer, the Yorktown confining unit, and the Yorktown-Eastover aquifer. The Columbia aquifer is predominantly composed of sandy surficial deposits that lie above the Yorktown confining unit. The Yorktown confining unit is composed of a series of very fine sandy to silty clay units at or near the top of the Yorktown Formation. The Yorktown-Eastover aquifer is predominantly composed of sandy deposits of the Yorktown Formation and the upper part of the Eastover Formation. The shallow aquifer system is separated from deeper units by the continuous St. Mary's confining unit.

Because of concerns about the groundwater withdrawals and declining water levels in southeastern Virginia, the entire region, including Virginia Beach, was designated a Groundwater Management Area by the state in 1976 (Smith and Harlow 2002).

Potable water supply for NAVPHIBASE comes from the municipal water supply, which obtains water from Lake Gaston, a reservoir over 100 miles away; the City of Norfolk system; and several in-town supplemental reservoirs. Three of the supplemental reservoirs, including Lake Whitehurst, Smith Lake, and Little Creek Reservoir, lie immediately south of the base (City of Virginia Beach 2003).

3.3.2 Surface Water

Surface water represents an important natural resource at NAVPHIBASE as approximately 586 acres of the base are covered by water. The primary surface water resources at NAVPHIBASE are Little Creek Harbor, Lake Bradford, Chubb Lake, Varian Lake, and several golf course ponds.

Little Creek Harbor is a 470-acre tidal estuary of the Chesapeake Bay. Desert Cove, Little Creek Cove, Fisherman's Cove, and Little Creek Channel make up the main area of the harbor. Except for an area of salt marsh fringe on Little Creek Cove and an undeveloped beach along the LCAC landing pad, the shoreline consists almost entirely of bulkhead, riprap, and quay walls. Nontidal surface water resources at NAVPHIBASE include several freshwater lakes and ponds in the central and eastern portions of the base. Lake Bradford is the largest body of freshwater, equaling approximately 68 acres. Chubb Lake is the next largest lake and equals 21 acres. Varian Lake, Bigalow Hall Lake, and the golf course ponds are smaller and range from 1.5 to 7 acres.

3.3.3 Watersheds

NAVPHIBASE is located within the Chesapeake Bay watershed, which is recognized as one of the most important and productive estuarine ecosystems in the world and is protected by federal, state, and local regulations. The major tributary to the bay from NAVPHIBASE is Little Creek

Harbor, which directly or indirectly drains all but the beach area. The eastern half of the base drains first to Lake Bradford or Chubb Lake, which are drained by a canal connecting to the harbor. A weir on the canal near Nider Boulevard artificially controls flow from these two lakes. The golf course area drains to the golf course ponds, which are connected to Chubb Lake through pipes and channels. The municipal reservoirs, Lake Whitehurst and Little Creek Reservoir, also have overflow channels that discharge into the harbor from the south.

3.3.4 Floodplains

Federal Emergency Management Agency (FEMA) flood insurance rate maps show that a large portion of the base lies within the 100-year or 500-year floodplains associated with the Chesapeake Bay, Little Creek Harbor, and base lakes, ponds, and channels. FEMA defines the 100-year flood as an area that has a one percent chance of being equaled or exceeded in any given year and is the standard used by federal agencies for floodplain management. The 500-year floodplain is an area that has a 0.2 percent chance of a flood in a year. Since floodplains cover much of the base, many buildings, infrastructure, and developed areas occur within floodplains.

3.3.5 Wetlands

The USFWS National Wetlands Inventory (NWI) produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats. In support of this INRMP, Geo-Marine, Inc. (GMI) conducted a more detailed wetlands inventory. The recent wetland delineation identified approximately 650 acres of wetlands, including open water habitats, at NAVPHIBASE. This was a planning level delineation. A base wide jurisdictional determination has not been obtained from the USACE. Wetlands were classified according to the Cowardin classification of wetlands and deepwater habitats (Cowardin et al. 1979), which groups wetlands into five major systems: marine (M), estuarine (E), riverine (R), lacustrine (L), and palustrine (P). The estuarine wetlands at NAVPHIBASE consist of Little Creek Harbor, several tidal marshes around the harbor, and the shoreline along the Chesapeake Bay. The lacustrine wetlands at NAVPHIBASE are comprised of the base's larger lakes including Lake Bradford, Chubb Lake, Bigalow Hall Lake (formerly Lake 1), and Lake 2. Palustrine wetlands primarily include the base's freshwater marshes and the forested and scrub-shrub communities that occur around the lake and pond margins.

3.4 Coastal Zone Resources

The Federal CZMA of 1972 provides a procedure for the states to review federal actions for consistency with their own approved coastal management program. The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats. Virginia's coastal management area includes the entire Tidewater region. Although federal lands are excluded from state coastal management areas, activities on federal lands that are reasonably likely to affect use of lands or waters, or natural resources of Virginia's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Resources Management Program (CRMP).

The Virginia CRMP establishes policies and objectives to guide the use and development of coastal management areas to ensure their protection and preservation. Included are policies on fisheries management, sub aqueous lands management, wetlands, primary dunes, point and nonpoint source water pollution, air pollution, shoreline sanitation, and coastal lands management. Compliance with relevant state and federal regulatory programs constitutes consistency with Virginia's coastal management policies (such as Sections 401, 402, and 404 of the CWA; the Chesapeake Bay Local Assistance Department and counterpart county/municipality regulations; and state pollutant discharge elimination system permits).

3.5 Vegetation

The majority of the land area at NAVPHIBASE is developed and has vegetation types that consist of mowed lawn, shade trees, and ornamental trees and shrubs. The areas that are undeveloped, however, are diverse and include a number of natural ecological communities. Using the Virginia classification of ecological communities (Fleming et al. 2001), the vegetation at NAVPHIBASE can be classified into 10 community types.

The base's forested areas consist of mesic mixed hardwood, mesic mixed pine and hardwood, and pine forest, which are common forest types throughout the region. The mesic mixed pine-hardwood forests are species-rich, closed canopy stands of mesophytic species. Canopy dominants include loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), water oak (*Quercus nigra*), red maple (*Acer rubrum*), and sweet gum (*Liquidambar styraciflua*). The mesic mixed hardwood forests occur on level ridge tops, mesic uplands, and lower slopes on acidic, relatively poor soils. This forest type has a closed canopy dominated by various oak species, sweet gum, and tulip poplar (*Leriodendron tulipifera*). Lesser amounts of red maple and hickories (*Carya* spp.) also occur. The pine forests are dominated by loblolly pine, with a scattering of sapling hardwoods in the midstory. The understory is generally very sparse and includes few other than tangles of greenbrier (*Smilax* spp.) and honeysuckle (*Lonicera japonica*).

The beaches and dune area is comprised of vegetated primary and secondary dune systems and the beaches in front of them. Several natural ecological communities occur in this area including evergreen maritime forest, maritime dune woodlands, maritime scrub, interdune ponds, and maritime dune grasslands. Maritime evergreen forests are the most stable of the coastal communities at NAVPHIBASE. Maritime evergreen forests develop on stabilized dunes located behind foredunes that are large enough to provide sufficient protection from storm exposure. Live oak (*Quercus virginiana*) and loblolly pine are the dominant tree species. Maritime dune woodlands form on the relatively stable leeward side of the dunes and are generally well vegetated. Live oak is the dominant tree species though other trees such as bluejack (*Quercus incana*) and loblolly pine may be present. Maritime scrub communities occur in recently disturbed areas. Live oak and southern bayberry (*Morella cerifera*) form impenetrable thickets that protect each individual plant from salt and wind damage. The shrub canopy height reaches only 15 feet. Interdune ponds are wetland depressions in active or relict dunes that are seasonally to semi permanently flooded by groundwater or rainwater. They are protected from salt spray and wind shear by adjacent dunes, and support a greater variety of plants and animals than the dry dunes. Maritime dune grasslands occur along primary dunes and in the dunes and swales inland of the primary dunes. Salt spray limits the vegetation to salt-tolerant species including coastal panic grass (*Panicum amarulum*), sea oats (*Uniola paniculata*), and American beachgrass (*Ammophila breviligulate*) and sea rocket (*Cakile edentula*).

3.6 Fish and Wildlife

Though NAVPHIBASE has a diverse array of ecosystems that provide habitat for a number of faunal species native to the Chesapeake Bay and Tidewater area, the largest portion of the base is developed and supports a limited number of fauna that are typical of urban environments. No base wide faunal surveys have been conducted at NAVPHIBASE, however; incidental observations by DCR-DNH during an inventory of threatened and endangered species (VDCR-DNH 1990), bird surveys by the Cape Henry Audubon Society, the base natural resources specialist, and others, and an ecological assessment of the beaches and dunes area (U.S. Navy 2000b), have identified many species of mammals, reptiles and amphibians (herpetofauna), fish (ichthyofauna), and birds (avifauna) on the base and its adjacent waters.

Common mammal species include gray and red foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes* respectively), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), muskrat (*Ondatra zibethicus*), eastern mole (*Scalopus aquaticus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*) and white-footed mouse (*Peromyscus leucopus*). Of the marine mammals that are likely to utilize the waters adjacent to NAVPHIBASE, bottlenose dolphins (*Tursiops truncatus*) are the most common.

A total eight turtle species, two amphibian species, four lizard species, and five snake species are known to occur on the base (VDCR-DNH 1990, U.S. Navy 2000b). The most common herpetofauna to occur include the red-backed salamander (*Plethodon cinereus*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), leopard frog (*Rana utricularia*), gray treefrog (*Hyla chrysocelis*), Fowler's toad (*Bufo woodhousii*), red-eared slider (*Trachemys scripta elegans*), five-lined skink (*Eumeces fasciatus*), northern fence lizard (*Sceloporus undulatus*), northern water snake (*Nerodia sipedon*), black rat snake (*Elaphe obsoleta*) and eastern garter snake (*Thamnophis carolina*).

The avifaunal community at NAVPHIBASE is one of the most diverse faunal communities on base. Bird surveys conducted at NAVPHIBASE, including the Audubon's Societies Christmas Bird Count, the VDCR-DNH threatened and endangered species survey (VDCR-DNH 1990), and the Beaches and Dunes Ecological Assessment (U.S. Navy 2000b), have documented at least 181 species on the base and its adjacent waters. A large group of birds on the base are the Passeriformes (perching birds), which utilize the forested, open grounds, and other terrestrial portions of the base. This group includes common songbirds such as warblers, sparrows, finches and wrens. Many other birds are migratory seabirds and shorebirds that can be found along the base's shoreline at different times of the year. Common seabirds include pelicans, loons, grebes, and cormorants and common shorebirds include plovers and sandpiper. Several species of gulls, terns, ducks, and geese are also common offshore and in the beach area. The base's lakes and ponds support a number of waterfowl, including resident and migratory ducks and geese, and wading birds such as herons, egrets, and rails.

The ichthyofauna of NAVPHIBASE can be divided into two groups: freshwater fishes and estuarine fishes. The freshwater fishes are residents of the base's lakes, ponds, and nontidal ditches. Freshwater fisheries surveys conducted at Lake Bradford (VDCR-DNH 1990, Swihart and Galvez 1996, Galvez and Swihart 2000) indicate at least 19 species of fish occur in the lake. Important sport fishes include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), white perch (*Morone americana*), and

yellow perch (*Perca flavescens*). Common carp (*Cyprinus carpio*), American eel (*Anguilla rostrata*), bowfin (*Amia calva*), and gizzard shad (*Dorosoma cepedianum*) are the nonsport fish that are present. Estuarine fishes may be found in the base's tidal creeks, Little Creek Harbor, and the adjacent waters of the Chesapeake Bay. The estuarine fishes are primarily migratory; however some species are year round residents.

3.7 Rare, Threatened, and Endangered Species and Significant Ecological Communities

The VDCR-DNH (1990) conducted a survey in 1989 for rare, threatened, and endangered species at NAVPHIBASE. No state or federally listed threatened or endangered species were found at NAVPHIBASE; however, three state-rare plants were identified. These include two species that are currently considered very rare locally (S2) in Virginia, the bluejack oak and Spanish moss (*Tillandsia usneoides*). The other species, the Virginia Beach pinweed (*Lechea maritima* var. *virginica*), has since been down listed from the rare plant list to the plant watch list. Subsequent surveys have identified additional rare species at NAVPHIBASE. These species were wild olive (*Osmanthus americanus* var. *americanus*), an extremely rare plant in Virginia (S1), and tall yellow-eyed grass (*Xyris platylepis*), another S2 plant (U.S. Navy 2000b).

Several of the natural ecological communities occurring at NAVPHIBASE are state or globally rare. Of these communities, the maritime evergreen forest and maritime mixed forest are ranked as S1. The remaining rare communities, including maritime dune woodlands, maritime dune grasslands, maritime swamp forests, and interdune ponds are rare to uncommon in Virginia, but have not been assigned a state rank.

3.8 Cultural Resources

No structures at NAVPHIBASE are eligible for the NRHP and an archaeological study revealed no archaeological resources of concern occur on the base (U.S. Navy 2003). NAVPHIBASE is included in the Programmatic Agreement for Historic Buildings in Hampton Roads between the Navy, Virginia State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation. In a letter of 5 August 2004, the SHPO concurred with the finding that there are no National Register eligible or listed architectural or archaeological properties on, adjoining or nearby NAVPHIBASE that would be affected by future undertakings at the base.

3.9 Air Quality

National Ambient Air Quality Standards (NAAQS) have been established by the EPA for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter with a diameter less than or equal to a nominal 10 micrometers (PM₁₀), ozone (O₃), nitrogen dioxide (NO₂), and lead (Pb). In addition, the CAA of 1970 requires that states with designated ozone nonattainment areas regulate volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) because they are precursor pollutants to ozone formation.

NAVPHIBASE is in EPA Region 3, Hampton Roads Air Quality Control Region. In April 2004, Hampton Roads was designated as marginal nonattainment for ozone (EPA 2004). Section 107(d)(3)(E) of the 1990 Clean Air Act Amendments (CAAA) states that the following criteria must be met in order for an area to be redesignated from nonattainment to attainment:

- The EPA has determined that the NAAQS has been attained. This standard is 0.12 parts per million (ppm) for ozone.
- The applicable State Implementation Plan (SIP) has been fully approved by the EPA under Section 110(k).
- The EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions.
- The state has met all applicable requirements for the area under Section 110 and Part D.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

The CAAA state that federal agencies cannot support any action that does not conform to an EPA-approved SIP. A General Conformity Rule applicability analysis is required to demonstrate that the proposed federal action conforms to the SIP. Ongoing actions and actions that are identified in the SIP are exempt from demonstrating conformity. Other actions are assumed to be in conformity if total project emissions are below a minimum threshold level (*de minimis* level) and less than 10 percent of the regional emission inventory. Projects below the *de minimis* level are not subject to the General Conformity Rule; those projects at or above the levels are required to perform a conformity analysis. *De minimis* emissions levels for areas of ozone nonattainment areas are presented in Table 3-1.

Table 3-1. *De Minimis* Exemption Levels in Nonattainment Areas.

Pollutant/Maintenance Classification	Emissions (tons/year)
Ozone (NO _x)	
Marginal nonattainment areas	100
Ozone (VOCs)	
Marginal nonattainment areas	100

3.10 Socioeconomics and Environmental Justice

Socioeconomic analyses generally provide a detailed investigation of the prevailing population, income, employment, and housing conditions of a community or area of interest. This section provides a description of these demographics within the region of influence (ROI) for the social and economic environment, which is defined as the independent cities of Norfolk and Virginia Beach in Virginia.

Environmental justice is another important aspect of a socioeconomic analysis. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that each federal agency ensure that achieving environmental justice is part of its mission by identifying and addressing, as appropriate, disproportionately high human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Each year the U.S. Census Bureau (USCB) defines the national poverty thresholds, which are measured in terms of household income dependent upon

the number of persons within the household. In 2000, the average threshold was \$17,603 for a family of four and \$13,738 for a family of three (USCB 2001).

3.10.1 Demographics

In 2000, the total population within the ROI had reached 659,660, an approximately 0.8 percent increase over the 1990 population (USCB 1993, 2003). The population within Norfolk declined by approximately 10.3 percent to 234,403 during the period, while the population of Virginia Beach increased by 8.2 percent to 425,257 (USCB 1993, 2003).

In 2000, the demographic profile of the ROI was 61.4 percent White, non-Hispanic, 27.4 percent Black or African American, 0.4 percent American Indian or Alaska Native, 4.1 percent Asian, 4.1 percent was Hispanic, and 2.8 percent was all other races or combination of races (USCB 2003). The ROI would not be considered an area with a concentrated minority population. However, Norfolk with 53.1 percent of the population being minority would be considered an area with a concentrated minority population (USCB 2003). The largest minority component population within Norfolk was Black or African American accounting for 43.3 percent of the total population (USCB 2003).

3.10.2 Employment and Income

Unemployment in the ROI varied approximately 3.0 percent between the highest unemployment rates in 1992 and the lowest unemployment rates in 2000 (Bureau of Labor Statistics [BLS] 2004). Norfolk had higher unemployment rates than either Virginia Beach or the State of Virginia during this period. The labor force increased in the State of Virginia and in Virginia Beach between 1990 and 2000, while the labor force in Norfolk decreased by approximately 11.4 percent (BLS 2004). Norfolk had the highest unemployment rate of 7.4 percent in 1992 (BLS 2004). During this period the unemployment rate in Virginia Beach was 5.3 percent and in the State of Virginia it was 6.4 percent (BLS 2004). In 2000, the unemployment rates were 4.0 percent, 2.2 percent, and 2.2 percent in Norfolk, Virginia Beach, and the State of Virginia, respectively (BLS 2004). Total full- and part-time employment between 1990 and 2000 fell by approximately 34,000 positions in Norfolk (Bureau of Economic Analysis [BEA] 2002a). Total employment positions during this period in Virginia Beach increased by approximately 49,000 positions (BEA 2002a).

Total personal income within the ROI nominally increased 47.9 percent to \$18.5 billion between 1990 and 2001 (BEA 2002b). Total nonfarm personal income increased 48.0 percent to \$18.5 billion and total farm personal income declined by 64.8 percent to \$3.3 million during this period (BEA 2002b). Total nonfarm earnings increased 44.5 percent to \$16.0 billion (BEA 2002b). Total personal earnings from wage and salary employment increased 117.6 percent in the finance, insurance, and real estate industry and 71.6 percent in services between 1990 and 2001 (BEA 2002b). In 2001, private earnings accounted for 57.5 percent of total earnings from wage and salary employment (BEA 2002b). Government and government enterprises accounted for the remaining 42.5 percent (BEA 2002b).

In 2000, the median household income in the ROI ranged from \$48,705 in Virginia Beach to \$31,815 in Norfolk (USCB 2003). The per capita personal income also varied in 2000, from \$22,365 in Virginia Beach to \$17,372 in Norfolk (USCB 2003). In 2000, the poverty rate (10.8 percent) within the ROI declined 0.1 percent over the 1990 rate (10.9 percent) (USCB 1993,

2003). Within the immediate area of NAVPHIBASE the combined poverty rate of the census tracts in 2000 was 11.2 percent and in the combined block groups it was 11.0 percent (USCB 2003). None of these areas would be considered a concentrated poverty area.

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents an analysis of the potential environmental consequences of the alternatives described in Section 2.0. The potential impacts to the human and natural environment are evaluated relative to the existing environment described in Section 3.0. Resource areas analyzed in this EA include land use, soil, water, vegetation, marine resources, coastal zone resources, fish and wildlife, threatened and endangered species, cultural resources, socioeconomics, and environmental justice.

Land use would be impacted if natural resources management activities caused inconsistencies that reduced the viability of existing land use activities; created threats to public health, safety, and welfare of adjacent or nearby land users; or conflicted with the military mission. Soils would be impacted if current or proposed activities resulted in severe soil loss such that the areas could no longer maintain the existing land use or caused sedimentation in adjacent water bodies. Impacts to biological resources would be significant if species or habitats of concern are adversely affected or disturbances cause reductions in population size or distribution of a species of concern. Water resources would be impacted if activities resulted in a change to the groundwater or surface water quantity or quality and wetlands. Impacts to cultural resources would occur if natural resources management activities resulted in disturbance to significant historic structures or archaeological deposits. Socioeconomic resources would be impacted if activities resulted in a change to the population, employment, or income potential of NAVPHIBASE and the ROI. Environmental justice impacts would be considered if minority and/or low-income populations within or adjacent to NAVPHIBASE would experience disproportionate adverse effects from implementing the current or proposed natural resources management activities.

The overall management approach and management practices are evaluated on a programmatic level rather than a project-specific level. The intent is to evaluate the overall impacts of implementing the alternatives in a broad sense. Such a programmatic analysis provides opportunities for the installation to accommodate unforeseen projects, as well as changes to projects, as long as impacts are covered within the overall scope and analysis of this EA. The natural resources management activities evaluated were designed to avoid negative environmental impacts and include planning measures for compliance with applicable laws and regulations. Therefore, none of the activities currently being conducted nor any of the project actions recommended in the proposed action or enhanced alternative would have the potential to cause significant environmental impacts. The proposed action (Alternative 2) would provide greater environmental benefits than continuing the no action alternative (Alternative 1) because many additional management issues are addressed in the proposed INRMP and many management recommendations provided in the current natural resources plans have been completed. The enhanced alternative (Alternative 3) would provide additional benefits to the environment through the implementation of projects that are beyond the compliance level. The environmental consequences of each alternative are summarized in Table 4-1.

Table 4-1. Comparison of Alternatives.

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed Action	Alternative 3 Enhanced Alternative
Land Use	No change	Positive effects on the base's ability to sustain military land use through protecting soil and water resources and providing information for future land planning.	Same as Alternative 2
Soil Resources	No change	Positive effects from review of soil erosion and control plans, implementation of dune protection and monitoring, installation of vehicle exclusion fencing, planting beach grasses, and implementing shoreline stabilization efforts.	Same as Alternative 2 with additional benefits to soil resources resulting from enhancing riparian buffers and no mow zones.
Water Resources	No change	Positive effects from review of permitting requirements, compliance with wetlands regulations, and implementation of projects including base wide jurisdictional wetlands delineation, dune restoration, and shoreline stabilization efforts.	Same as Alternative 2 with additional benefits from enhancing riparian buffers and no mow zones and conducting fisheries surveys on Lake Bradford
Marine Resources	No change	Positive impacts to marine resources could result from coordination with the NMFS and USFWS and the identification and reporting of marine animal strandings.	Same as Alternative 2
Coastal Zone Resources	No change	Positive effects from implementing dune protection and monitoring; installation of vehicle exclusion fencing, implementing successional shoreline management plan structures outlined in the VIMS shoreline management plan update of 2005, the review of projects to ensure consistency with the Virginia CZMP; and mapping and enhancing SAV ¹ beds in Little Creek Harbor.	Same as Alternative 2
Vegetation	No change	Positive effects from invasive species control and monitoring tree diseases and insect infestations, dune restoration, beach grass planting, and SAV establishment.	Same as Alternative 2 with additional benefits from developing an urban forest management plan and monitoring planted materials.

Table 4-1. Comparison of Alternatives (cont'd).

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed Action	Alternative 3 Enhanced Alternative
Fish and Wildlife	No change	Positive effects from retrofitting light poles with raptor electrocution guards and installing raised osprey platforms, nest box monitoring and maintenance, and habitat restoration activities.	Same as Alternative 2 with additional benefits from the distribution of additional duck boxes, conducting fisheries surveys, and monitoring the beach for shorebird nesting activity.
Rare, Threatened, and Endangered Species	No change	Positive effects from rare species surveys and tracking of and compliance with regulations.	Same as Alternative 2
Cultural Resources	No change	Positive impacts to undiscovered cultural resources from consultation with SHPO during project planning.	Same as Alternative 2
Air Quality	No Change	No Change from baseline conditions is expected since none of the proposed projects is expected to impact local or regional air quality	Same as Alternative 2
Socioeconomics	No change	No change to population, income, or employment.	Same as Alternative 2
Environmental Justice	No change	No disproportionately high adverse impact on minority or low-income populations.	Same as Alternative 2

¹ submerged aquatic vegetation

4.1 Alternative 1 – No Action

Under the no action alternative, natural resources would continue to be managed in accordance with existing plans and programs. However, without implementation of the INRMP (Alternative 2 or Alternative 3), future actions and projects would not be planned and accounted for as required by the SAIA. Baseline conditions of the affected environment would not change under the no action alternative, nor would the full benefits realized under the INRMP be achieved.

4.1.1 Land Use

Selecting the no action alternative would not adversely impact land use since the continuation of the current natural resources programs would not reduce the capability of lands to support the military mission on NAVPHIBASE nor affect land use in the surrounding area. Whereas mission activities must consider protection measures for natural resources as part of standard operating procedures, implementation of the natural resources program does not formally constrain mission activities or dictate land use. Mission security and safety and/or regulatory requirements are primary considerations for imposing land use restrictions.

4.1.2 Soil Resources

Under the no action alternative, baseline conditions for soil resources would continue at NAVPHIBASE. Digital maps of base soils would continue to be used for planning purposes to protect and manage soil resources. In addition, best management practices (BMPs) would continue to be used to minimize potential impacts from soil disturbance.

4.1.3 Water Resources

Implementation of the no action alternative would not change baseline conditions of water resources at NAVPHIBASE. Management actions would continue to be conducted in accordance with state and federal regulations for water quality and wetlands protection. Review of permitting requirements for storm water management plans and compliance with wetlands regulations would continue under the current management program. Implementation of current natural resources management practices such as erosion and sediment control measures and BMPs would continue to protect water resources.

4.1.4 Marine Resources

Selecting the no action alternative would not change baseline conditions for marine resources due to the continuation of current management practices. The Navy would continue to comply with any relevant regulations prior to implementing an action having the potential to impact these protected resources. Sightings of stranded marine mammals or sea turtles on NAVPHIBASE beaches or in the bay would also continue to be reported to the Virginia Marine Science Museum's Stranding Center.

4.1.5 Coastal Zone Resources

There would be no change to coastal zone resources under the no action alternative. All projects and actions would continue to be consistent to the maximum extent possible with the Virginia CRMP.

4.1.6 Vegetation

Selecting the no action alternative would not result in adverse impacts to vegetation resources since current management practices would continue. No additional vegetative management actions would be implemented therefore benefits from invasive species control, oversight of the regional tree protection and replacement instruction, riparian buffer enhancements, and other habitat enhancement would not be achieved.

4.1.7 Fish and Wildlife

Selecting the no action alternative would not result in adverse impacts to wildlife resources since current management practices such as the osprey nest pole program would continue. Existing positive effects would continue through the management of important habitats.

4.1.8 Rare, Threatened, and Endangered Species

Under the no action alternative, there would be no effect to rare, threatened, and endangered species since current management practices and abundance of regulations would continue.

4.1.9 Cultural Resources

Selecting the no action alternative would not change baseline conditions for cultural resources due to the continuation of current management practices. Protection and management of cultural resources under the no action alternative would continue as a compliance requirement in the natural resources program. Currently, there are no National Register eligible or listed architectural or archaeological properties on NAVPHIBASE that would be affected by future undertakings at the base. Under the programmatic agreement further Section 106 consultations are not required for land disturbing activities at NAVPHIBASE. However, consultations would be conducted as necessary with the SHPO in the event that a previously unidentified archaeological resource is discovered during ground disturbing activities.

4.1.10 Air Quality

Implementing the no action alternative would not change the local or regional air quality. There are no stationary pollution sources involved in the current natural resources management programs.

4.1.11 Socioeconomics and Environmental Justice

Implementing the no action alternative would not result in significant impacts to the social or economic resources within the ROI. Under this alternative, natural resources management at NAVPHIBASE would continue to follow the 1997 INRMP and no additional activities would be undertaken. This alternative would not increase regional spending; therefore, there would not be any effects to the employment or income of the ROI. Additionally, since there would be no new employment opportunities, there would be no changes to the population or demographics due to this alternative. Since there would be no social or economic impacts associated with this alternative, there would be no impacts to minority or low-income populations within the ROI. Therefore, implementing this alternative would not result in environmental justice impacts.

4.2 Alternative 2 – Proposed Action

Selecting the proposed action would implement a broad range of natural resources management activities and practices, which support Navy policy on good stewardship and ecosystem management. Adaptive management would be used to assess and improve management practices and help ensure stated objectives are achieved. Baseline conditions would be maintained or improve under this alternative.

4.2.1 Land Use

Implementing the proposed action would not result in change to land use, impact existing or future land uses in terms of achieving the military mission, and would not affect planned land uses in the regional area. However, benefits to the installation's ability to sustain military training and other land use by maintaining ecosystem integrity would be provided by protecting soil and water resources and providing information for future land use management decisions. Delineation of wetlands and other natural resources management actions would provide basic information for planning purposes. Implementing the proposed action would not result in adverse impacts to land use or impact planned land uses in the regional area.

4.2.2 Soil Resources

Implementation of the proposed action would not result in adverse impacts, but would create positive effects on soil resources due to review of erosion and sediment control plans for construction projects and specifically planned project implementation. Management practices would be implemented under Alternative 2 to provide long-term benefits to soil resources. Proposed management practices include encouraging growth of additional vegetation by reducing the mowing activities along forest edges and riparian buffers; implementing dune protection and restoration; and constructing breakwaters as prescribed by the Chesapeake Bay Shoreline Management Plan.

4.2.3 Water Resources

Selecting the proposed action would result in positive effects on water resources from review of permitting requirements, compliance with wetlands regulations, and project implementation. Under Alternative 2, water resources would continue to be protected in accordance with state and federal water quality and wetlands protection laws. Additional projects that would enhance water quality include: maintaining and enhancing riparian buffers; obtaining a base wide jurisdictional wetland determination; and implementing the 2005 NAB Little Creek shoreline management plan. This plan is critical to preserving mission training areas. Avoiding development in wetland areas and forest riparian buffers and implementing other BMPs would minimize impacts to water quality and wetlands from sedimentation. In addition, wetlands protection would enhance groundwater recharge, surface water quality, and flood protection.

4.2.4 Marine Resources

Positive effects would occur under the proposed action. Regulations such as the Marine Mammal Protection Act (16 USC 1361-1407), the Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801-1883), and the ESA require the Navy to coordinate with the NMFS and USFWS to obtain relevant permits prior to implementing an action having the

potential to impact these protected resources. Accordingly, all training and other base activities at NAVPHIBASE that have the potential to impact marine resources are coordinated and permitted through the appropriate state and federal agencies. Sightings of stranded marine mammals or sea turtles on NAVPHIBASE beaches or in the bay will be reported to natural resources staff who will report the incident to the Virginia Marine Science Museum's Stranding Center.

4.2.5 Coastal Zone Resources

There would be benefits to coastal zone resources as a result of implementing the proposed action. Proposed management activities that would benefit coastal zone resources include the protection and enhancement of dunes and their vegetation as outlined in the VIMS shoreline management plan update of 2005, shoreline erosion control, and enhancement and monitoring of SAV beds in Little Creek Harbor. All projects and actions would be reviewed to ensure consistency to the maximum extent practicable with the Virginia CRMP and consistency determinations would be obtained when required.

4.2.6 Vegetation

Under the proposed action, there would be overall positive impacts to vegetation resources at NAVPHIBASE. Invasive species control, promotion of beneficial landscaping and other tree care initiatives, dune restoration, and establishing SAV beds implemented under this alternative would provide benefits to vegetative communities. Potential problems such as loss of nontarget species from chemical control of invasive plant species would be avoided by using appropriate application methods, adhering to label instructions, and using appropriate, approved herbicides. In addition, only certified pesticide applicators would be permitted to apply pesticides.

4.2.7 Fish and Wildlife

Implementing the proposed action would result in positive effects on fish and wildlife populations and habitats from game and nongame management activities. Because of the high level of development in the region and at NAVPHIBASE, the conservation and enhancement of the remaining natural habitats is important to protecting the base's wildlife resources. Conservation efforts would focus on maintaining a diversity of forested habitats that provide year-round food and cover (coniferous stands) as well as seasonal food and cover (deciduous stands) for wildlife. Activities that would further benefit wildlife include the continued management of the bird nest boxes and osprey platforms program and retrofitting additional utility poles with raptor electrocution guards; habitat management and restoration activities.

4.2.8 Rare, Threatened, and Endangered Species

Implementation of the proposed action is not expected to have an effect on state or federally listed threatened or endangered species as no listed species are known to occur on the base. State rare species would benefit from the protection and enhancement of significant maritime communities and the beaches and dune system at NAVPHIBASE proposed in Alternative 2.

4.2.9 Cultural Resources

Implementation of the proposed action would result in positive effects from integration with the cultural resources management plans for NAVPHIBASE. Although no architectural or archaeological at NAVPHIBASE are eligible for the NRHP, it is possible that unknown archaeological resources may be destroyed by ground disturbing activities. To avoid unauthorized or accidental disturbance, the RHPO should be consulted during the planning process. The RHPO working in consultation with the SHPO will ensure compliance with applicable laws.

4.2.10 Air Quality

None of the projects proposed under the proposed action is expected to impact local or regional air quality.

4.2.11 Socioeconomics and Environmental Justice

Selecting Alternative 2 would not result in negative impacts to the social or economic resources within the ROI. Under this alternative, the NAVPHIBASE would undertake all Navy Level 1 natural resources management activities recommended in the INRMP. Social and economic benefits generated through implementation of this alternative include improved water quality, increased conservation benefits, increased recreational opportunities, and increased conservation awareness through educational programs. Since there would be no adverse social or economic impacts associated with this alternative there would be no adverse impacts to minority or low-income populations within the ROI. Therefore, selecting this alternative would not result in environmental justice impacts.

4.3 Alternative 3 – Enhanced Alternative

Selecting the enhanced alternative would implement all of the projects proposed under the proposed action as well as additional projects not considered compliance or maintenance projects. Like the proposed action, the enhanced alternative would support Navy ecosystem management, as well as environmental stewardship.

4.3.1 Land Use

As with the proposed action, the enhanced alternative would not result in change to land use, would not impact existing or future land uses in terms of achieving the military mission, and would not affect planned land uses in the regional area. The benefits to the base's ability to sustain military training and other land use by maintaining ecosystem integrity would be the same as that realized by implementing the proposed action.

4.3.2 Soil Resources

Under the enhanced alternative, all the projects proposed by the proposed action would be carried out and benefits to soil resources would be the same. Additional benefits would result from additional projects that would increase or establishment of additional riparian buffer no mow zones.

4.3.3 Water Resources

Implementing the enhanced alternative would result in all of the programs and benefits to water resources described for the proposed action. Additional benefits to water resources would result from the establishment and enhancement of riparian buffers and conducting water quality surveys on Lake Bradford.

4.3.4 Marine Resources

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out and benefits to marine resources would be the same as those resulting from the proposed action.

4.3.5 Coastal Zone Resources

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out and benefits to coastal zone resources would be the same as those resulting from the proposed action.

4.3.6 Vegetation

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out with the same benefits to vegetation resources. Additional benefits would be realized through additional projects including initiating the development of an urban forest management plan and monitoring planted vegetation at parks and other locations.

4.3.7 Fish and Wildlife

The same benefits to fish and wildlife would be realized under the enhanced alternative by implementation of the actions proposed under Alternative 2. Additional Navy Level 2 projects such as installing additional duck nest boxes in appropriate locations, conducting fisheries surveys, and monitoring the beach for shorebird nesting activity proposed under this alternative would provide additional benefits to select wildlife species.

4.3.8 Rare, Threatened, and Endangered Species

The same benefits to rare, threatened, and endangered species would be realized under implementation of this alternative as Alternative 2.

4.3.9 Cultural Resources

Under the enhanced alternative, the same coordination described for the proposed action is proposed. Therefore, the positive impacts to cultural resources would be the same under this alternative.

4.3.10 Air Quality

The impacts to air quality under the enhanced alternative are expected to be the same as those resulting from implementation of the proposed action. None of the projects proposed by the enhanced alternative is expected to result in impacts to air quality.

4.3.11 Socioeconomics and Environmental Justice

The impacts to socioeconomics and environmental justice under the enhanced alternative are expected to be the same as those resulting from implementation of the proposed action. None of the additional projects proposed by the enhanced alternative is expected to result in measurable impacts to these resources.

4.4 Cumulative Impacts

Cumulative impacts are the incremental impacts of an action when added to the impacts of other federal or nonfederal past, present, or reasonably foreseeable future actions. Implementing any of the alternatives analyzed in this EA would not result in any negative cumulative impacts to the environment at or in the vicinity of NAVPHIBASE

In addition to the current management practices conducted at the installation, the preferred and enhanced action alternatives would implement projects that directly support regional ecosystem management initiatives and would enhance and protect the human and natural environment, including state and federally listed threatened and endangered species. Monitoring programs, annual reviews, and five-year reviews of the INRMP would allow continuous reassessment of management goals and objectives (adaptive management) and would help to avoid undesirable cumulative impacts. Additionally, appropriate NEPA procedures and coordination with stakeholders such as the USFWS and VDGIF would be undertaken for any actions that could result in cumulative impacts.

NAVPHIBASE is one of 22 Navy installations (including annexes and other supporting facilities) in the Mid-Atlantic region. In order to minimize cumulative impacts and conflicts with current and future planned actions on Navy lands, the Navy has developed a Regional Shore Infrastructure Plan (RSIP) (U.S. Navy 2002). The goal of the RSIP is to optimize use of Navy land, facilities, and infrastructure to achieve maximum cost-effectiveness and operational efficiency. The RSIP is a planning process that includes facility programming and site planning. Land use changes, construction, renovations, and other actions resulting from RSIP recommendations would require appropriate NEPA analysis and documentation. No cumulative impacts would result from any foreseeable future actions of the RSIP and implementation of the proposed INRMP.

The proposed INRMP complements this regional planning effort and provides information on sensitive resources and other natural resources issues that must be considered in developing an overall regional vision and land use zones. Other regional and base environmental protection and land use planning initiatives consulted during the development of the proposed INRMP that would avoid or minimize cumulative impacts and conflicts in management include:

- Little Creek Naval Amphibious Base Chesapeake Bay Shoreline, Shoreline Management Plan Update (Virginia Institute of Marine Science 2003);
- Installation Restoration Program Five-Year Site Management Plan, Fiscal Year 2003, NAVPHIBASE (CH2MHILL 2003);
- The Commander Navy Regional Mid-Atlantic On-Scene Coordinator Oil and Hazardous Substance Pollution Contingency Plan (U.S. Navy 2001);

- Chesapeake Bay Riparian Forest Buffer Site Assessments for Navy/Marine Corps Lands (U.S. Navy 2000a); and
- Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan, NAVPHIBASE, Norfolk, Virginia (U.S. Navy 2000c);

4.5 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (such as energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (such as extinction of a threatened or endangered species or the disturbance of a cultural resources site).

For the proposed action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting but negligible. Implementation of the proposed action would, however, require the use of energy for natural resources management activities. This energy would be in the form of fossil fuels and labor and would be used as these activities continue.

5.0 COORDINATION AND PUBLIC INVOLVEMENT

In accordance with the SAIA, NAVPHIBASE has worked cooperatively with the USFWS and VDGIF to ensure that the INRMP reflects the mutual agreement of these parties concerning the conservation, protection, and management of fish and wildlife resources on the Station. Draft copies of the INRMP were provided to these agencies. All comments were considered in the preparation of the final INRMP, and letters of mutual agreement from each agency were obtained (Appendix C). To facilitate public involvement, also required by the SAIA, a copy of the Draft INRMP was placed in the Virginia Beach Public Library, Central Library Branch for one month and a notice announcing its availability was published in *The Virginian-Pilot* newspaper for three days (see Appendix C). No comments were received from the public.

The following persons and agencies were consulted in preparation of the INRMP.

Federal Agencies

Karen Mayne
U.S. Fish and Wildlife Service
Virginia Field Office
Gloucester, Virginia

David L. Perkins
U.S. Fish and Wildlife Service,
Region 5
Hadley, Massachusetts

State Agencies

Raymond T. Fernald
Nongame and Environmental Program
Virginia Department of Game and Inland Fisheries
Williamsburg, Virginia

Nancy Van Alstine
Virginia Department of Conservation and Recreation,
Division of Natural Heritage,
Richmond, Virginia

6.0 LIST OF PREPARERS

Joseph Campo, Ph.D.
Sr. Wildlife Biologist/Forester
Geo-Marine, Inc.

Meegan Wallace
Environmental Project Manager
Geo-Marine, Inc.

Paul A. Block
Environmental Scientist/Ecologist
Geo-Marine, Inc.

Rae Lynn Schneider
NEPA Project Manager/Economist
Geo-Marine, Inc.

Elizabeth Pruitt
Program Manager
Geo-Marine, Inc.

7.0 REFERENCES

- Bureau of Labor Statistics (BLS). 2004. Local Area Unemployment Statistics. <http://data.bls.gov>.
- CH2MHILL 2003. Five-Year Site Management Plan, Fiscal Year 2003, Naval Amphibious Base Little Creek, Virginia Beach, Virginia.
- Chief of Naval Operations (CNO). 2003. Navy Environmental Requirements Guidebook, 2002 Update. http://155.252.252.6/wrs/guidebook/WRSGB_TOC.HTM.
- City of Virginia Beach. 2003. Annual Water Quality Report. Virginia Beach Department of Public Utilities. <http://www.vbgov.com/dept/putility/wq/wq2003/ccr2003.pdf>.
- Fleming, G.P., D.P. Coulling, K.M., McCoy, and M.R. Parrish. 2001. The Natural Communities of Virginia: Classification of Ecological Community Groups. First Approximation. Natural Heritage Technical Report 01-1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia.
- Galvez J.I. and G.L Swihart. 2000. Assessment of Fishery Resources and Water Quality Parameters on Little Creek Naval Amphibious Base, Virginia. USFWS Office of Fishery Assistance, Gloucester, Virginia.
- Natural Resources Conservation Service (NRCS). 1993. Hydric Soils of the United States, 1995 update. Miscellaneous Publication Number 1491. Government Printing Office, Washington, D.C. <http://www.statlab.iastate.edu/soils/hydric/va.html>.
- Naval Amphibious Base (NAVPHIBASE) Little Creek. 2003. Naval Amphibious Base Little Creek. Public Affairs Office notice on base-loading.
- Smith, B.S. and G.E. Harlow, Jr. 2002. Conceptual Hydrogeologic Framework of the Shallow Aquifer System at Virginia Beach, Virginia. Water-Resources Investigations Report 01-4262. U.S. Department of the Interior. Geological Survey, and City of Virginia Beach, Department of Public Utilities Richmond.
- Swihart, G.L. and J.I. Galvez. 1996. Assessment of Fishery Resources and Water Quality Parameters on Little Creek Naval Amphibious Base, Virginia. U.S. Fish and Wildlife Service, Office of Fishery Assistance, Gloucester, Virginia.
- U.S. Census Bureau (USCB). 1993. 1990 Census of Population and Housing. Detailed Tables P001, P008, P010, P012, P080A, P117, H001, and H004. <http://factfinder.census.gov>.
- U.S. Census Bureau (USCB). 2001. Overview of Race and Hispanic Origin. Census 2000 Brief. C2KBR/01-1.
- U.S. Census Bureau (USCB). 2003. 2000 Census of Population and Housing. Demographic Profile. <http://www.factfinder.census.gov>.
- U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS). 1985. Soil Survey of Virginia Beach.
- U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS). 1988. Soil Survey Report for Naval Amphibious Base Little Creek, Virginia Beach, Virginia.

- U.S. Navy. 1997. Integrated Natural Resources Management Plan, Naval Amphibious Base Little Creek, Virginia Beach, Virginia. Prepared for Atlantic Division, Naval Facilities Engineering Command (LANTDIV), by Geo-Marine, Inc., Newport News, Virginia.
- U.S. Navy. 2000a. Chesapeake Bay Riparian Forest Buffer Site Assessments for Navy/Marine Corps Lands. Prepared for Atlantic Division, Naval Facilities Engineering Command (LANTDIV), by Geo-Marine, Inc., Newport News, Virginia.
- U.S. Navy. 2000b. Ecological Assessment of the Beaches and Dunes Management Unit at Naval Amphibious Base Little Creek, Virginia Beach, Virginia. Prepared for Atlantic Division, Naval Facilities Engineering Command (LANTDIV), by Geo-Marine, Inc., Newport News, Virginia.
- U.S. Navy. 2000c. Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan, Naval Amphibious Base Little Creek, Norfolk, Virginia. Navy Public Works Center Norfolk, Virginia.
- U.S. Navy. 2001. The CNRMA Navy On-Scene Coordinator Oil and Hazardous Substance Pollution Contingency Plan. <http://www.cnrma.navy.mil/Staff/5090-1.pdf>.
- U.S. Navy. 2002. Mid-Atlantic Region Overview Regional Shore Infrastructure Plan. Prepared for Commander by Navy Region Mid-Atlantic Division, Naval Facilities Engineering Command (LANTDIV) and EDAW, Inc.
- U.S. Navy. 2003. An Archaeological Assessment of Naval Amphibious Base Little Creek Virginia Beach, Virginia. Atlantic Division, Naval Facilities Engineering Command (LANTDIV), Norfolk, Virginia.
- Virginia Department of Conservation and Recreation-Division of Natural Heritage (VDC-DNH). 1990. An Inventory of the Rare, Threatened, and Endangered Species of the Little Creek Naval Amphibious Base, Virginia Beach, Virginia. Natural Heritage Technical Report 90-3. Richmond, Virginia.
- Virginia Institute of Marine Science. 2003. Little Creek Naval Amphibious Base Chesapeake Bay Shoreline, Shoreline Management Plan Update. Shoreline Studies Program, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, Virginia.

APPENDIX A
Applicable Laws and Regulations

Navy Instructions and Policies Related to Natural Resources

OPNAVINST P80.3-Airfield Safety

OPNAVINST 5090.1B CH 3- Environmental Natural Resources Program Manual

OPNAVINST 6250.4A -Pest Management Program

DoD Publications Related to Natural Resources

DoD Directive 4150.7-Pest Management

DoD Directive 4165.59-DoD Implementation of the Coastal Zone Management Program

DoD Instruction 4715.3-Environmental Conservation Program, 3 May 1996

DoD Instruction 4715.9-Environmental Planning and Analysis, 3 May 1996

Executive Orders (EOs) Related to Natural and Cultural Resources Management

EO 11593-Protection and Enhancement of the Cultural Environment, 13 May 1971

EO 11644-Use of Off-Road Vehicles on the Public Lands, 8 Feb 1972

EO 11988-Floodplain Management, 24 May 1977

EO 11989-Off-Road Vehicles on Public Lands, 24 May 1977

EO 11990-Protection of Wetlands, 24 May 1977

EO 12777-Implementation of the Federal Water Pollution Control Act and Oil Pollution Act, 18 Oct 1991

EO 12898-Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 11 Feb 1994

EO 12962-Recreational Fisheries, 7 Jun 1995

EO 13112-Invasive Species, 3 Feb 1999

EO 13148-Greening the Government, 14 Sep 1998

Federal Statutes Related to Natural and Cultural Resources Management

American Indian Religious Freedom Act of 1978 (42 USC § 1996)

Antiquities Act of 1906 (16 USC § 431-433)

Animal Damage Control Act (7 USC § 426-426b)

Archaeological Resources Protection Act of 1979 (16 USC § 470aa-470mm)

Bald and Golden Eagle Protection Act of 1940 (16 USC § 668 et seq.)

Endangered Species Act of 1973, as amended (16 USC § 1531-1544)

Farmland Protection Act (7 USC § 4201 et seq.)

Federal Facilities Compliance Act (42 USC § 6901 et seq.)

Federal Insecticide, Fungicide, and Rodenticide Act as amended (7 USC § 136 et seq.)
Federal Land Policy and Management Act of 1976 (43 USC § 1701)
Federal Noxious Weed Act of 1974 (7 USC § 2809 et seq.)
Federal Water Pollution Control Act (Clean Water Act) as amended 1987 (33 USC § 1251-1387)
Fish and Wildlife Conservation Act of 1980 (16 USC § 2901 et seq.)
Fish and Wildlife Coordination Act (16 USC § 661 et seq.)
Forest and Rangeland Renewable Resources Planning Act of 1974 (16 USC § 1601 et seq.)
Lacey Act of 1900 (16 USC § 701; 31 Stat. 187, 32 Stat. 285)
Migratory Bird Conservation Act of 1918 (16 § USC 715)
Multiple Use Sustained Yield Act of 1960 (16 § USC 528 et seq.)
National Environmental Policy Act of 1969 (42 § USC 4321 et seq.)
National Forest Management Act of 1976 (16 § USC 1600 et seq.)
National Historic Preservation Act (16 USC § 470 et seq.)
Rivers and Harbors Act of 1899 (33 USC § 401 et seq.)
Safe Drinking Water Act (42 USC § 201 et seq.)
Sikes Act, as amended 1997 (16 USC § 670a-670f)
Soil and Water Conservation Act (16 § USC 2001)
Timber Sales on Military Lands (10 USC § 2665)
Wild and Scenic Rivers Act (16 USC § 1274 et seq.)
Wilderness Act of 1964 (16 USC § 1131-1136; 78 Stat. 890)

APPENDIX B
Project Summary Table

NAVPHIBASE Natural Resources Implementation Schedule, 2005-2009.

Project #	Project Description	Implementation Schedule ¹ (FY)	Legal Diver/ Initiative ²	Class ³	Navy Level ⁴	NEPA	CCD
Marine Resources Protection							
1	Report marine animal strandings to the Virginia Marine Science Museum's Stranding Center.	As needed	F, H, T	0	1	No	No
2	Serve as liaison between the activity and regulatory agencies in cases of marine animal sightings or strandings.	As needed	F, H, T	0	1	No	No
3	Assist base personnel with the identification of marine mammals as needed.	As needed	F, H, T	0	1	No	No
4	Coordinate with and obtain the required permits from the appropriate state and federal agencies for any installation activities with the potential to impact marine resources.	As needed	F, H, T	0	1	No	No
Coastal Zone Protection							
5	Review base plans and proposed actions to ensure coastal zone consistency.	As needed	G, K, L, Q	0	1	No	No
6	Obtain a coastal consistency determination when required.	As needed	G, K, L, Q	0	1	No	Yes
7	Implement shoreline stabilization structures per the VIMS shoreline management plan update of 2005.	FY05 & beyond	G, K, L, Q	0	1	No	Yes
Wetlands/Water Quality Protection							
8	Assist action proponents in applying for, reviewing, and obtaining required state and federal wetlands protection permits.	As needed	G, K, L, Q	0	1	No	No
9	Conduct base wide wetlands mapping and obtain a USACE jurisdictional determination.	2005	G, K, L, Q	II	1	No	No
10	Monitor and maintain designated "No Mowing" areas at the Boone Clinic, Lake Bradford, and Little Creek Channel riparian buffer sites.	Ongoing	K, Q	III	2	No	No
11	Increase extent of "No Mowing" zone at the Little Creek Channel site to include additional areas recommended in the Chesapeake Bay riparian forest buffer assessment.	2006	K, Q	III	2	No	No

NAVPHIBASE Natural Resources Implementation Schedule, 2005-2009 (cont'd).

Project #	Project Description	Implementation Schedule ¹ (FY)	Legal Diver/ Initiative ²	Class ³	Navy Level ⁴	NEPA	CCD
12	Provide maps and other information pertaining to the base's sensitive natural resources that are required for oil spill response planning as requested.	As needed	G, K, L, Q	0	1	No	No
13	Review all base development plans and actions to ensure conservation issues are identified and considered early in the planning process for NEPA consistency.	As needed	J	0	1	No	No
Urban Forestry							
14	Conduct an urban tree inventory and develop base Urban Forest Management Plan.	2006	P, S	III	2	No	No
15	Participate in the identification and marking of damaged or hazard trees for removal.	Ongoing	P, S	0	1	No	No
16	Review development plans and actions where tree removal is proposed. Provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.	Ongoing	P, S	0	1		
17	Promote the use of beneficial landscaping practices and the importance of using native species.	Ongoing	P, S	0	1	No	No
18	Monitor forest conditions in the Natural Areas Management Unit and coordinate any required tree maintenance or removal with the First Lieutenants Division or Seabees.	Annual	P, S	0	1	No	No
19	Periodically monitor the planted small trees and shrubs at SEAL Park to identify major health problems. Trim or prune only when required for health problems.	2005, 2007, 2009	P, S	III	2	No	No
Fish and Wildlife Management							
20	Assess potential site locations and install nesting baskets in locations appropriate for mallards or black ducks.	2005	A, B, C, E	III	2		
21	Retrofit light poles and install osprey nesting platforms to reduce risk of fire and electrocution (coordinate with USFWS and VDGIF).	As needed	D	I	1	CATEX	No

NAVPHIBASE Natural Resources Implementation Schedule, 2005-2009 (cont'd).

Project #	Project Description	Implementation Schedule ¹ (FY)	Legal Diver/ Initiative ²	Class ³	Navy Level ⁴	NEPA	CCD
22	Monitor nesting activity at osprey nesting platforms and bluebird nest boxes throughout the nesting season.	Annual	A, B, C, E	0	1	No	No
23	Encourage the growth of vegetation by reducing mowing along forest edges, lake shorelines and elsewhere to improve food and cover for wildlife.	Ongoing	A, B, C, E	0	1	No	No
24	Coordinate with USFWS, Office of Fishery Assistance to conduct fish and water quality surveys approximately every four years on Lake Bradford.	2005, 2009	A, B, C, E, N	III	2	No	No
25	Monitor the beach area for shorebird nesting activity from April through July.	Annual	D, F	III	5	No	No
Outdoor Recreation and Environmental Awareness							
26	Post notices in appropriate media outlets (newsletter, base paper, website) as needed to provide environmental information to base personnel and residents.	Ongoing	A, B, C	III	2	No	No
27	Develop instructional materials to inform planners, project managers, and others of natural resources issues that need to be considered when developing project and construction plans.	2005	A, B, C	III	2	No	No
28	Inspect the Circle H Trail and picnic area and other park areas and coordinate with the Seabees and the First Lieutenants Division for needed repairs and maintenance to prevent erosion.	Annual	A, B, C	0	1	No	No
Habitat Conservation and Restoration							
29	Implement dune protection and restoration measures including installing fencing, posting informational signs, and planting beach grasses.	Ongoing	A, B, C, O	II	1	No	No
30	Provide NEPA documentation on implementation of the 2003 update to the Chesapeake Bay Shoreline Management Plan.	2006	J	I	1	EA	Yes
31	Implement the initial phase (construction of breakwaters #3 and #4) of the Chesapeake Bay Shoreline Management Plan.	2007	G, H	II	1	EA	Yes

NAVPHIBASE Natural Resources Implementation Schedule, 2005-2009 (cont'd).

Project #	Project Description	Implementation Schedule ¹ (FY)	Legal Diver/ Initiative ²	Class ³	Navy Level ⁴	NEPA	CCD
32	Initiate a community action project to stabilize the areas inland of breakwaters #3 and #4 by planting native beach grasses.	2009	G, H	II	I	EA	Yes
33	Monitor the health and extent of the existing SAV beds and establish additional beds.	Annual	Q	II	I	No	No
Pest Management							
34	Assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas.	As needed	A, B, C	III	2	No	No
35	Identify and mark targeted invasive species in the Circle H Recreational Area and wildlife viewing platform to be treated and coordinate with trained, certified pesticide applicators to conduct treatments.	Ongoing	M	II	I	No	No
36	Implement common reed control and monitor in identified areas.	Ongoing	M	II	I	Done	Done
37	Monitor the maritime grassland communities for invasive species, including Asiatic sand sedge.	Ongoing	M	III	2	No	No
38	Conduct egg addling to control the Canada geese population around the golf course ponds as needed.	Annual	M	0	I	No	No
Cultural Resources Protection							
39	Consult with the RHPO during the planning process of any activity that has the potential to impact cultural resources.	As needed	A, B, C, U	0	I	No	No
Training/Professional Development							
40	Attend basic Arc View and product update training.	As needed	A, B, C	0	I	No	No
41	Attend wetlands delineation and regulatory training.	As needed	A, B, C	0	I	No	No
42	Attend marine mammal stranding training.	As needed	A, B, C	0	I	No	No
43	Attend invasive species control workshop.	As needed	A, B, C	0	I	No	No
44	Attend coastal ecology and shoreline stabilization workshop.	As needed	A, B, C	0	I	No	No
45	Develop a 5-year update to the INRMP	2009	A, B, C, E	II	I	No	No

NAVPHIBASE Natural Resources Implementation Schedule, 2005-2009 (cont'd).

¹Implementation/Completion Project Frequency: Annual= 1-10 days/year during a specific season; Ongoing = multi day, multi season activity

²Legal Divers and Initiatives:

A	OPNAVINST 5090.1B	L	Executive Order 11988, Floodplain Management
B	DoDI 4715.3, Environmental Conservation Program	M	Executive Order 13112, Invasive Species
C	32 CFR 190, Natural Resources Management Program	N	Executive Order 12962, Recreational Fisheries
D	Migratory Bird Treaty Act	O	Executive Order 11989, Use of Off-Road Vehicles on the Public Lands
E	Sikes Act Amendment Act	P	Executive Order 13148, Greening the Government through Leadership in Environmental Management
F	Endangered Species Act	Q	Chesapeake Bay Agreements
G	Clean Water Act	R	CNO Guidance of Feral Cats and Dogs
H	Coastal Zone Management Act	S	Regional Tree Preservation and Replacement Instruction
I	Soil and Water Conservation Act	T	Marine Mammal Protection Act
J	National Environmental Policy Act	U	National Historic Preservation Act
K	Executive Order 11990, Protection of Wetlands		

³ Class 0: recurring staff costs; Class I: current compliance; Class II: maintenance requirements; Class III: enhancement actions beyond compliance

⁴ Navy Assessment Level: Level 1 = legal requirement; Level 2 = DoD/ Navy policy; Level 3 = pending regulation; Level 4 = future requirement; Level 5 = leadership initiative

⁵ Fund Source: O&MN = Operations and Maintenance, Navy; SAIA = Sikes Act Revenues; FOR = Navy Forestry; FR = DoD Forestry Reserve; LP= Legacy Program, NWCFF = Navy Working Capital Fund; NPLD = National Public Lands Day Funds
 NA = Not Applicable
 FY = Fiscal Year

**DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY**

**FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR THE
DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL
RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL AMPHIBIOUS
BASE, LITTLE CREEK, VIRGINIA BEACH, VIRGINIA.**

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations § 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy, gives notice that an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) have been prepared for the development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Amphibious Base (NAVPHIBASE) Little Creek and an Environmental Impact Statement (EIS) is not being prepared.

Proposed Action: The proposed action (Alternative 2) is to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP is to implement an ecosystem based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The proposed INRMP would address and implement land management, forest management, fish and wildlife management, outdoor recreation, cultural resources protection, conservation education, and natural resources program administration. A total of 45 ongoing and new management actions and projects are proposed to meet compliance and stewardship objectives for natural resources management at the installation.

Existing Conditions: Impacts to relevant resources that were evaluated for each alternative included land use, soil resources, wetlands and water quality, coastal zone resources, vegetation, wildlife, threatened and endangered species, cultural resources, air quality, environmental justice and socioeconomics.

Alternatives Analyzed: The no action alternative (Alternative 1) is the continued implementation of the management objectives and practices specified in the natural resources plans for NAVPHIBASE Little Creek (U.S.

Navy 1997). The existing management plan provides valuable information on natural resources management; however, the plan does not set time frames for implementation of or provide cost estimates for natural resources projects. Also, many of the project management recommendations provided in the current natural resources plan have been completed, and new projects described in the proposed INRMP would not be implemented under this alternative. In addition, no EA was completed for development of the existing plan, nor was it provided for public review. Consequently, the existing plan does not meet the SAIA requirements for an INRMP. The no action alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations.

A third alternative, an enhanced version of the natural resources management plan, was analyzed as well. Under this alternative, the projects implemented would not only meet compliance and stewardship objectives for natural resources management at the installation but would provide additional natural resource benefits. Implementation would be based on availability of funding.

Environmental Effects: This EA demonstrated that implementation of the proposed action or the enhanced alternative would result in no impact, or positive impacts to environmental resources.

Finding: Based on information gathered during preparation of the EA, the Department of the Navy finds that implementing the proposed action or the enhanced alternative will not significantly impact the quality of the environment. The EA and FONSI addressing this action may be obtained by interested parties by contacting Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street, Norfolk, Virginia 23511-2699 (Attn: Mr. Chris Petersen), telephone (757) 322-4560. A limited number of copies of the EA are available to fill single copy requests.

DEC 06 2005

Date



C. E. WEAVER
Rear Admiral, U. S. Navy
Commander, Navy Installations Command

APPENDIX D: AGENCY CORRESPONDENCE

ADDENDUM TO JEBLCFS INRMP

December 13, 2017

(1) Section 1.11 State Wildlife Action Plan

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

The Virginia State Wildlife Action Plan (SWAP) was adopted in 2005. This SWAP includes an evaluation of the location and relative abundance of wildlife and the habitat required to support these species; an assessment of problems facing Virginia species and habitats; recommended conservation actions to address these problems; research and survey needs; and monitoring program and needs (VDGIF 2005).

The SWAP was updated in 2015, outlining alternatives and strategies for the conservation of wildlife and habitat enhancement amidst increasing challenges in the 21st century. The 2015 SWAP provides cost-effective techniques and practical solutions to advance the protection and enhancement of natural resources, including focused conservation efforts for declining species, minimizing the need for enacting protective federal regulations (VDGIF 2015).

The 2015 SWAP identified 883 species of greatest conservation need (SGCN) in Virginia. These species are further grouped into four tiers of relative conservation need: critical (I), very high (II), high (III), and moderate (IV). Each species was also assigned a Conservation Opportunity Ranking based on past data to prioritize actions that can be taken to address an SGCN species' needs. The 2015 SWAP abandoned several concepts utilized in the 2005 SWAP and set new goals, including:

- Using a habitat approach to address threats and conservation issues
- Focus on a more local geographic scale
- Prioritizing SGCN species and actions
- Identifying SWAP partners
- Establishing measures to identify the effectiveness of conservation actions
-

The 2015 SWAP identified 13 habitat types in Virginia and divided them into 21 individual Local Action Plan summaries. This approach supports natural resource partners enact the plan at varying levels while still prioritizing SGCN and proper management of habitat (VDGIF 2015). Natural resources management strategies and recommendations included in this INRMP also satisfy the goals and objectives of the Virginia SWAP in conserving the state's natural resources for future generations.

(2) Section 3.51 Wildlife; Section 3.7.1 Invasive Wildlife; Section 3.12 Conservation Law Enforcement; Section 4.16 Nuisance Wildlife; Section 6.5.1 Wildlife; Section 6.7.1 Invasive Wildlife; Section 6.7.4 Invasive Control Methods; Section 6.12 Conservation Law Enforcement; Section 7.1.5 Nuisance Wildlife; Section 7.2.2 Wildlife and Fisheries Management; Section 7.2.7 Invasive Species and Pest Management; Section 7.2.8 Summary of Natural Areas Management Objective; Section 9.1.4 Environmental Readiness Level 1: Navy Environmental Stewardship; 9.2.2 Environmental Readiness Level 3: Navy Pro-Active Involvement; Section 9.2.4 Environmental Readiness Level 1: Navy Environmental Stewardship; Appendix A: Implementation Schedules

Within text of the INRMP, including but not limited to the sections mentioned above, change “game warden” to “Conservation Law Enforcement Officer.” This designation is consistent with OPNAV 5090.1D *Environmental Readiness Manual*, DoD Instruction 4715.03 *Natural Resource Conservation Program*, and other USN natural resource policy documents for identifying DoD/USN personnel assigned with Conservation Law Enforcement duties.

(3) Section 2.11 Rare, Threatened, and Endangered Species and Significant Ecological Communities; Section 5.11 Rare, Threatened, and Endangered Species and Significant Ecological Communities

Insert as second paragraph in Section 2.11 and 5.11 -

The VDGIF has regulatory and enforcement jurisdiction over all vertebrate and invertebrate species designated under the state threatened and endangered species listing, excluding listed insects. Governor-appointed citizens make up the Board of Game and Inland Fisheries and are responsible for the listing of threatened and endangered wildlife in Virginia. The Board approves the addition and removal of species from the Virginia threatened and endangered species lists based on data and recommendations from the Director of the Department of Conservation and Recreation (VLIS, 2017). In addition, VDGIF manages an online database, the Virginia Fish and Wildlife Information Service, which contains current and comprehensive information on all of Virginia’s wildlife resources. During the 2017 update to this INRMP, all federally-listed wildlife species discussed in this INRMP were also state-listed with the same designation.

The Virginia Department of Agriculture and Consumer Services is the regulatory agency responsible for the listing, management, and protection of threatened and endangered plants and insects in Virginia (VDACS, 2017). The mission of the VDCR-DNH is to conserve Virginia’s biodiversity through inventory, protection, and stewardship (VDCR-DNH, 2017). The VDCR-DNH works cooperatively with the VDGIF, VDACS, and USFWS to generate rare plant and animal inventories and track species ranks based on the number of individuals of a particular species that are estimated to occur within the state (VDACS, 2017). The VDCR-DNH recommends coordination with the VDGIF staff during initial project review to identify potential adverse impacts to critical wildlife resources.

**(4) Addressed in Number 3. Designation also included in one absent Federal threatened/endangered species profiles:
Section 2.11.1 Piping Plover**

First sentence –

Piping plover (*Charadrius melodus*) is a federally and state-threatened species that has the potential to occur at JEB Little Creek.

Table 2-6 and Table 5-4 are being updated and will be included as an Addendum. This data will be finalized and presented at the 2018 Annual Metric Review.

Section 3.5.1 and Section 6.5.3 Marine Animal Stranding Protocol

Updated phone number -

- If a marine mammal (dolphin, porpoise, whale, seal, or manatee) or sea turtle is discovered on JEB, immediately contact the Command Duty Officer (CDO):
Working hours: (757) 462-7385/86 (Quarterdeck)
After hours: (757) 438-3901 (CDO)

Section 10 References

Virginia Department of Agriculture and Consumer Services (VDACS). 2017. Endangered Species. <http://www.vdacs.virginia.gov/plant-industry-services-endangered-species.shtml>. Accessed 14 December 2017.

VDCR-DNH. 2017. An Overview of the Virginia Natural Heritage Program. <http://www.dcr.virginia.gov/natural-heritage/mission>. Accessed 14 December 2017

Virginia Department of Game and Inland Fisheries (VDGIF) 2015. Virginia's 2015 Wildlife Action Plan. Virginia Department of Game and Inland Fisheries, Henrico, Virginia. <http://bewildvirginia.org/wildlife-action-plan/> Accessed 13 December 2017.

Virginia Legislative Information System (VLIS). 2017. Code of Virginia § 3.2-1002. Listing of threatened and endangered species; powers of Board; further powers of Commissioner. <https://law.lis.virginia.gov/vacode/title3.2/chapter10/section3.2-1002/>. Accessed 14 December 2017.

Table 2-6. State Rare Species and Natural Communities Occurring at JEB Little Creek

Common Name (Scientific Name)	State Status	Federal Status	WAP Tier	WAP Rank
Birds				
Peregrine falcon (<i>Falco peregrinus</i>)	ST	-	I	a
Piping plover (<i>Charadrius melodus</i>)	ST	FT	II	a
Roseate Tern (<i>Sterna dougallii</i> ssp. <i>dougallii</i>)	SE	FE	-	-
Red Knot (<i>Calidris canutus</i> ssp. <i>rufa</i>)	ST	FT	I	a
Reptiles				
Green sea turtle (<i>Chelonia mydas</i>)	ST	FT	I	b
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)	SE	FE	-	-
Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>)	SE	FE	I	a
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	SE	FE	I	c
Loggerhead sea turtle (<i>Caretta caretta</i>)	ST	FT	I	a
Freshwater Fish				
Atlantic sturgeon (<i>Acipenser oxyrinchus</i>)	SE	FE	I	b
<p><u>Virginia Department of Game and Inland Fisheries: Special Status Faunal Species in Virginia</u> <u>Federal and State Wildlife Status</u> ST – State threatened; SE – State endangered; FT – State threatened; FE – State endangered</p> <p>WAP Tier - Species of Greatest Conservation Need List (Tier Ranking for Wildlife)</p> <p>S1 – Tier I. Critical Conservation Need - Faces an extremely high risk of extinction or extirpation. Populations of these species are at critically low levels, face immediate threat(s), or occur within an extremely limited range. Intense and immediate management action is needed.</p> <p>S2 – Tier II. Very High Conservation Need - Has a high risk of extinction or extirpation. Populations of these species are at very low levels, face real threat(s), or occur within a very limited distribution. Immediate management is needed for stabilization and recovery.</p> <p>S3 – Tier III. High Conservation Need - Extinction or extirpation is possible. Populations of these species are in decline, have declined to low levels, or are restricted in range. Management action is needed to stabilize or increase populations.</p> <p>S4 – Tier IV. Moderate Conservation Need - The species may be rare in parts of its range, particularly on the periphery. Populations of these species have demonstrated a declining trend or a declining trend is suspected which, if continued, is likely to qualify this species for a higher tier in the foreseeable future. Long-term planning is necessary to stabilize or increase populations.</p> <p>WAP Rank - Conservation Opportunity Rank for wildlife</p> <p>a – Managers have identified “on the ground” species or habitat management strategies expected to benefit the species; at least some of which can be implemented with existing resources and are expected to have a reasonable chance of improving the species’ conservation status.</p> <p>b – Managers have only identified research needs for the species or managers have only identified “on the ground” conservation actions that cannot be implemented due to lack of personnel, funding, or other circumstance.</p> <p>c – Managers have failed to identify “on the ground” actions or research needs that could benefit this species or its habitat or all identified conservation opportunities for a species have been exhausted.</p> <p>Source: VDGIF. 2017. Special Status Faunal Species in Virginia. https://www.dgif.virginia.gov/wp-content/uploads/virginia-threatened-endangered-species.pdf. Accessed December 21, 2017.</p>				

Common Name (Scientific Name)	State Rank
Plants	
Bluejack oak (<i>Quercus incana</i>)	S2
Virginia beach pinweed (<i>Lechea maritima</i> var. <i>virginica</i>)	S3
Tall yellow-eyed grass (<i>Xyris platylepis</i>)	S2
Wild olive (<i>Osmanthus americanus</i> var. <i>americanus</i>)	S1
Dune marsh elder (<i>Iva imbricata</i>)	S1
Spanish moss (<i>Tillandsia usneoides</i>)	S1S2
<p>Virginia Department of Natural Heritage – Natural Community State Ranks for Rare Plants</p> <p>S1 - Critically Imperiled – At very high risk of extirpation from the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.</p> <p>S2 - Imperiled – At high risk of extirpation from the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.</p> <p>S3 - Vulnerable – At moderate risk of extirpation from the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.</p> <p>Source: VDCR-DNH. 2016. Commonwealth of Virginia Natural Heritage Resources of Virginia: Rare Plants. http://www.dcr.virginia.gov/natural-heritage/document/plantlist17.pdf. Accessed January 2, 2018.</p>	
Natural Communities	
Maritime upland forests Maritime live oak forest	S1
Maritime dune woodland Live oak-bluejack oak woodlands	S1
Maritime dune grassland North Atlantic mixed dune grassland	S2
Maritime dune scrub Northern Bayberry dune scrub Live oak dune scrub	S2? S1
Interdune swales and ponds/maritime swamps Interdune swale (saltmeadow cordgrass brackish type)	S2?
Maritime swamps Maritime wet loblolly pine forest Maritime swamp forest (black willow type)	S2? SU
<p>Virginia Department of Natural Heritage – Natural Community State Ranks for Ecological Groups and Communities</p> <p>S1 - Critically Imperiled - Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state; generally with 5 or fewer occurrences state-wide, and/or covering less than 50 ha (124 ac) in aggregate; or covering a larger area but highly threatened with destruction or modification.</p> <p>S2 - Imperiled - Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Generally with 6–20 occurrences state-wide, and/or covering less than 250 ha (618 ac) in aggregate; or covering a larger area but threatened with destruction or modification.</p> <p>SU – Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.</p> <p>? – Inexact or Uncertain – A question mark added to a rank expresses an uncertainty about the rank in the range of 1 in either way on the 1-5 scale.</p> <p>Source: VDCR-DNH. 2016. The Natural Communities of Virginia: Ecological Groups and Community Types. http://www.dcr.virginia.gov/natural-heritage/natural-communities/document/comlist04-17.pdf. Accessed January 2, 2018.</p>	

Table 5-4. State Rare Species and Natural Communities Occurring at JEB Fort Story

Common Name (Scientific Name)	State Status	Federal Status	WAP Tier	WAP Rank
Birds				
Peregrine falcon (<i>Falco peregrinus</i>)	ST	-	I	a
Piping plover (<i>Charadrius melodus</i>)	ST	FT	II	a
Roseate Tern (<i>Sterna dougallii</i> ssp. <i>dougallii</i>)	SE	FE	-	-
Red Knot (<i>Calidris canutus</i> ssp. <i>rufa</i>)	ST	FT	I	a
Reptiles				
Green sea turtle (<i>Chelonia mydas</i>)	ST	FT	I	b
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)	SE	FE	-	-
Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>)	SE	FE	I	a
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	SE	FE	I	c
Loggerhead sea turtle (<i>Caretta caretta</i>)	ST	FT	I	a
Mammals				
Little brown bat (<i>Myotis lucifugus</i>)	SE	-	I	a
Northern long-eared bat (<i>Myotis septentrionalis</i>)	ST	FT	I	a
Rafinesque's eastern big-eared bat (<i>Corynorhinus rafinesquii macrotis</i>)	SE	-	I	a
Tri-colored bat (<i>Perimyotis subflavus</i>)	SE	-	I	a
<p><u>Virginia Department of Game and Inland Fisheries: Special Status Faunal Species in Virginia Federal and State Wildlife Status</u> ST – State threatened; SE – State endangered; FT – State threatened; FE – State endangered</p> <p><u>WAP Tier - Species of Greatest Conservation Need List (Tier Ranking for Wildlife)</u> S1 – Tier I. Critical Conservation Need - Faces an extremely high risk of extinction or extirpation. Populations of these species are at critically low levels, face immediate threat(s), or occur within an extremely limited range. Intense and immediate management action is needed. S2 – Tier II. Very High Conservation Need - Has a high risk of extinction or extirpation. Populations of these species are at very low levels, face real threat(s), or occur within a very limited distribution. Immediate management is needed for stabilization and recovery. S3 – Tier III. High Conservation Need - Extinction or extirpation is possible. Populations of these species are in decline, have declined to low levels, or are restricted in range. Management action is needed to stabilize or increase populations. S4 – Tier IV. Moderate Conservation Need - The species may be rare in parts of its range, particularly on the periphery. Populations of these species have demonstrated a declining trend or a declining trend is suspected which, if continued, is likely to qualify this species for a higher tier in the foreseeable future. Long-term planning is necessary to stabilize or increase populations.</p> <p><u>WAP Rank - Conservation Opportunity Rank for wildlife</u> a – Managers have identified “on the ground” species or habitat management strategies expected to benefit the species; at least some of which can be implemented with existing resources and are expected to have a reasonable chance of improving the species’ conservation status. b – Managers have only identified research needs for the species or managers have only identified “on the ground” conservation actions that cannot be implemented due to lack of personnel, funding, or other circumstance. c – Managers have failed to identify “on the ground” actions or research needs that could benefit this species or its habitat or all identified conservation opportunities for a species have been exhausted.</p>				
<p><u>Source:</u> VDGIF. 2017. Special Status Faunal Species in Virginia. https://www.dgif.virginia.gov/wp-content/uploads/virginia-threatened-endangered-species.pdf. Accessed December 21, 2017.</p>				

Common Name (Scientific Name)	State Rank
Plants	
Walter's sedge (<i>Carex striata</i>)	S3
Pineland tick-trefoil (<i>Desmodium strictum</i>)	S2
Viviparous spikerush (<i>Eleocharis vivipara</i>)	S1
Coastal bedstraw (<i>Galium hispidulum</i>)	S3
Dune marsh elder (<i>Iva imbricata</i>)	S1
American halfchaff sedge (<i>Lipocarpa maculata</i>)	S1
Dune ground-cherry (<i>Physalis walteri</i>)	S3
Bluejack oak (<i>Quercus incana</i>)	S2
Darlington's oak (<i>Quercus hemisphaerica</i>)	S1
Wild olive (<i>Osmanthus americanus</i> var. <i>americanus</i>)	S1
Spanish moss (<i>Tillandsia usneoides</i>)	S1S2
Virginia Department of Natural Heritage – Natural Community State Ranks for Rare Plants	
S1 - Critically Imperiled – At very high risk of extirpation from the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.	
S2 - Imperiled – At high risk of extirpation from the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.	
S3 - Vulnerable – At moderate risk of extirpation from the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.	
Source: VDCR-DNH. 2016. Commonwealth of Virginia Natural Heritage Resources of Virginia: Rare Plants. http://www.dcr.virginia.gov/natural-heritage/document/plantlist17.pdf . Accessed January 2, 2018.	
Natural Communities	
Maritime upland forests Maritime live oak forest	S1
Maritime dune woodland Live oak-bluejack oak woodlands	S1
Maritime dune grassland North Atlantic mixed dune grassland	S2
Maritime dune scrub Northern Bayberry dune scrub Live oak dune scrub	S2? S1
Virginia Department of Natural Heritage – Natural Community State Ranks for Ecological Groups and Communities	
S1 - Critically Imperiled - Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state; generally with 5 or fewer occurrences state-wide, and/or covering less than 50 ha (124 ac) in aggregate; or covering a larger area but highly threatened with destruction or modification.	
S2 - Imperiled - Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Generally with 6–20 occurrences state-wide, and/or covering less than 250 ha (618 ac) in aggregate; or covering a larger area but threatened with destruction or modification.	
SU – Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.	
? – Inexact or Uncertain – A question mark added to a rank expresses an uncertainty about the rank in the range of 1 in either way on the 1-5 scale.	
Source: VDCR-DNH. 2016. The Natural Communities of Virginia: Ecological Groups and Community Types. http://www.dcr.virginia.gov/natural-heritage/natural-communities/document/comlist04-17.pdf . Accessed January 2, 2018.	

U.S. Department of the Navy Correspondence

From: [Waller, Blake E CIV NAVFAC MIDLANT, EV](#)
To: Sara.Kent@CH2M.com
Cc: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Subject: FW: JEBLCFS INRMP Signature Page
Date: Monday, December 18, 2017 12:23:23
Attachments: [MIDLANT NRM Page from PreFinal INRMP Update LC-FS 11-9-17.pdf](#)

Sara,

Here is the regional endorsement on the JEB LC/FS INRMP.

Blake

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Sent: Tuesday, November 21, 2017 2:36 PM
To: Carawan, Emmett CIV NAVFAC MIDLANT, EV
Cc: Waller, Blake E CIV NAVFAC MIDLANT, EV
Subject: JEBLCFS INRMP Signature Page

Emmett,

I've attached the signature page for the JEBLCFS revision. Can you please sign this page so it can be sent to the INRMP contractor for inclusion in the final, revised draft?

Thank you!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
To: ["cindy_schulz@FWS.gov"](mailto:cindy_schulz@FWS.gov); ["Nystrom.Sarah"](mailto:Nystrom.Sarah); ["troy_anderson@fws.gov"](mailto:troy_anderson@fws.gov); ["Ewing.Amy \(DGIF\)"](mailto:Ewing.Amy); ["Boettcher.Ruth \(DGIF\)"](mailto:Boettcher.Ruth); ["Duncan.Bob \(DGIF\)"](mailto:Duncan.Bob); ["Acker.Pete"](mailto:Acker.Pete); ["Kimberly.Damon-Randall@noaa.gov"](mailto:Kimberly.Damon-Randall@noaa.gov); ["William.Barnhill - NOAA Federal"](mailto:William.Barnhill); ["david.l.o'brien@noaa.gov"](mailto:david.l.o'brien@noaa.gov); Lynn.Lankshear
Cc: [Waller.Blake.E CIV NAVFAC MIDLANT, EV](mailto:Waller.Blake.E); ["Kent.Sara/ATL"](mailto:Kent.Sara); [Carawan.Emmett CIV NAVFAC MIDLANT, EV](mailto:Carawan.Emmett); [Waligora.Sharon.L CIV NAVFAC MIDLANT, PWD Little Creek](mailto:Waligora.Sharon.L)
Subject: JEB Little Creek-Fort Story INRMP: Follow-up
Date: Tuesday, November 14, 2017 10:26:00

All,

Last week I sent everyone a copy of the revised Integrated Natural Resources Management Plan (INRMP) for Joint Expeditionary Base Little Creek-Fort Story. I wanted to follow-up and ensure that everyone was able to download the document from the AMRDEC site. If you did not receive an email with download instructions or were unable to download the INRMP, please let me know.

A hard copy of the INRMP have been sent out and should be arriving at each agency location soon if they haven't already.

Our target date for all comments is 8 December. Comments will be addressed and our goal is to obtain signatures for this INRMP by 15 December.

Please let me know if you have any questions regarding the INRMP, the review/signature schedule, or any other concerns.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

From: [Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Subject: RE: INRMP Signature Page - JEBCFS staff
Date: Tuesday, November 21, 2017 15:02:07
Attachments: [JEBCFS Page from PreFinal INRMP Update LC-FS 11-9-17.pdf](#)

Here you go.

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Sent: Tuesday, November 21, 2017 2:32 PM
To: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek
Subject: INRMP Signature Page - JEBCFS staff

Sharon,

Please see attached...

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
To: ["cindy_schulz@FWS.gov"](mailto:cindy_schulz@FWS.gov); ["sarah_nystrom@fws.gov"](mailto:sarah_nystrom@fws.gov); ["bob.duncan@dgif.virginia.gov"](mailto:bob.duncan@dgif.virginia.gov);
["amy.ewing@dgif.virginia.gov"](mailto:amy.ewing@dgif.virginia.gov); ["ruth.beottcher@dgif.virginia.gov"](mailto:ruth.beottcher@dgif.virginia.gov); ["todd.engelmeyer@dgif.virginia.gov"](mailto:todd.engelmeyer@dgif.virginia.gov)
Cc: [Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek](#); [Waller, Blake E CIV NAVFAC MIDLANT, EV](#)
Subject: Review: Joint Expeditionary Base Little Creek-Fort Story INRMP
Date: Wednesday, September 20, 2017 10:20:00

Hello,

My name is Kyle Russell and I am the Natural Resources Specialist at Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS), Virginia Beach, Virginia. I am contacting you in regards to our Installation's Integrated Natural Resources Management Plan (INRMP) which is currently being updated for the 5-year revision.

In advance of the Navy Natural Resources Annual Metrics Meeting on 19 October, I am providing a draft version of the revised INRMP for your review. Changes may still be made to this draft document. However, in an effort to efficiently expedite the review period to advance the document for signature, I would like to discuss and address any comments or concerns you may have at the Metrics Meeting in October. I will be in attendance the entire day of the Metrics Meeting, and will be available after the meeting to discuss this revised INRMP.

I will be sending the document through a file sharing system called AMRDEC. Instructions will be sent by email that will include a hyperlink and password to access the file for download. If you have any problems using this site, please let me know.

Thank you, and I look forward to speaking with you all soon!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

National Oceanic and Atmospheric Administration Correspondence

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
To: ["Kimberly.Damon-Randall@noaa.gov"](mailto:Kimberly.Damon-Randall@noaa.gov)
Cc: ["William Barnhill - NOAA Federal"](#); ["david.l.o'brien@noaa.gov"](mailto:david.l.o'brien@noaa.gov); [Lynn Lankshear](#); [Brian D Hopper - NOAA Federal](#); [Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek](#); [Waller, Blake E CIV NAVFAC MIDLANT, EV](#); ["Kent. Sara/ATL"](#)
Subject: JEBLCFS Preliminary Final Integrated Natural Resources Management Plan - Agency Review
Date: Thursday, November 09, 2017 14:35:00
Attachments: [JEBLCFS INRMP Update Comment-Response Matrix.xlsx](#)
[NOAA Signature Page from PreFinal INRMP Update LC-FS 11-9-17-3.pdf](#)

Hi Kimberly,

I am contacting you regarding the operation and effect review of the revised Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS) Integrated Natural Resources Management Plan (INRMP). During this revision, several changes have been made to the document, including: the merger of the JEB Little Creek and JEB Fort Story INRMPs into one document, updating survey data, project information, policy references, and documents. A preliminary final draft INRMP is being submitted for your review. Although NOAA is not required to sign INRMPs, a signature page is provided.

A hard copy of the INRMP will be sent by mail to the NOAA Greater Atlantic Region Fisheries Office and the Virginia Field Office. Electronic copies will be sent using a file sharing system (called AMRDEC). Instructions will be sent by email that will include a hyperlink and password to access the file for download. Let me know if you have any problems using this site.

Included in this email is a comment matrix (attached). I would like to request that any comments you have for the INRMP be returned by Friday, 8 DEC 2017. Your comments will be updated the following week and a revised draft will be sent for review.

Also included is an extracted agency signature page. Again, although NOAA is not required to sign this INRMP, if you do not have any comments to provide and would like to sign, please endorse the signature page and return it before Friday, 15 DEC 2017.

Thank you in advance for your continued support of the JEBLCFS Natural Resources program during this INRMP revision. Please do not hesitate to contact me if you have any questions.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

 SAFE	Home	About	Help
---	------	-------	------



SAFE is designed to provide AMRDEC and its customers an alternative way to send files other than email. SAFE supports file sizes up to 2GB.

[Click here for Getting Started Guide](#)

Package Status

Package ID:	11375316
Sender's Name:	Kyle B. Russell
Sender's Email:	kyle.b.russell@navy.mil
Date Uploaded:	11/9/2017 1:41:08 PM
Delete Date:	11/19/2017
Encrypt Email:	False
Notification when Download Starts:	False
Notification when Download Ends:	True
Require CAC:	False

Description
Joint Expeditionary Base Little Creek-Fort Story Revised INRMP 2017

File Information

File(s)	Privacy Act Data	Date Uploaded
PreFinal INRMP Update LC-FS_11-9-17.pdf (55 MB)	No	11/9/2017 1:41:08 PM

Recipients List

Recipients	User Status
kimberly.Damon-Randall@noaa.gov	Not Downloaded
William.Barnhill@noaa.gov	Not Downloaded
david.l.o'brien@noaa.gov	Not Downloaded
brian.d.hopper@noaa.gov	Downloaded

What is AMRDEC

The U. S. Army Aviation and Missile Research Development and Engineering Center, a subordinate laboratory to the Research, Development and Engineering Command, is the Army's focal point for providing research, development, and engineering technology and services for aviation and missile platforms across the lifecycle.

[Learn More](#)

Quick Links

[Home](#)

[About](#)

[Getting Started Guide](#)

Resources

[Security Notice](#)

[Accessibility Notice](#)

[ISalute](#)

Support

[Knowledge Base](#)

[Version 3.0.2](#)

U.S. Fish and Wildlife Service Correspondence

From: [Nystrom, Sarah](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Subject: [Non-DoD Source] INRMP Comments
Date: Friday, October 20, 2017 17:29:00
Attachments: [JEBLCFS INRMP Update Comments BLANK.xlsx](#)

Hi Kyle,

I just have a couple of comments on the INRMP, easy changes. I've attached the comment matrix you provided.

Thanks!

Sarah

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

From: [Troy Andersen](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Cc: [Cindy Schulz](#)
Subject: [Non-DoD Source] INRMP Signature Page - JEB Little Creek - Fort Story
Date: Thursday, December 14, 2017 16:02:57
Attachments: [image001.jpg](#)
[20171120_Fort Story Signature Page_Signed.pdf](#)

Kyle:

Attached is the signature page that I signed on Cindy's behalf. Thanks for your patience and flexibility while Cindy has been out of the office. That .pdf summary you provided was a great method of highlighted the changes. If your leadership chain balks, we can certainly try again.

Have a great weekend.

Troy

Troy Signature_small

Endangered Species/Conservation Planning Assistance Supervisor

USFWS - Virginia Field Office

Phone: 804-824-2428

Visit us at: <http://www.fws.gov/northeast/virginiafield/>

From: [Nystrom, Sarah](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Cc: cindy_schulz@FWS.gov; [Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek](#)
Subject: [Non-DoD Source] Re: JEBCFS INRMP - Follow up
Date: Wednesday, September 27, 2017 16:44:26

Hi Kyle,

Thanks for your email. We did receive the draft INRMP that you sent last week.

We'll do our best to provide comments by the end of October. I am planning to participate in the Metrics meeting so I can provide some feedback there.

Right now, we're working on a high priority project that is taking a lot (if not all) of our time. So our ability to get comments back to you in a timely manner will depend somewhat on the amount of time available away from that project.

Thanks!

Sarah

On Wed, Sep 27, 2017 at 3:19 PM, Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek <kyle.b.russell@navy.mil> wrote:

Cindy/Sarah,

I just wanted to follow up and ensure you received the draft Integrated Natural Resources Management Plan (INRMP) sent last week for Joint Expeditionary Base Little Creek-Fort Story, VA.

I also wanted to pass along a comment matrix. Our goal is to have the final draft finished by the end of October for review and signature. However, to expedite the process, we are seeking any comments or concerns you may have, and would like to address them now ahead of the final draft submission. I am also prepared to discuss any questions about the INRMP during our Annual Metrics meeting at Oceana NAS on 19 October.

If you have any questions regarding the document, please let me know. Thank you, and I look forward to working with you both!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

From: [Nystrom, Sarah](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Cc: [Troy Andersen](#)
Subject: [Non-DoD Source] Re: JEBCFS INRMP
Date: Wednesday, November 22, 2017 9:45:24

Hi Kyle,

Thanks for your email. I did download the INRMP successfully. Since I'm on a work detail, I've passed it and the signature page along to my Supervisor, Troy Andersen, cc'd above, to get it to Cindy for signature. We just wrapped up a large project so hopefully she'll be able to take a look at it next week. In the past, we haven't had additional comments after our first review, but there's always a first time.

Feel free to contact Troy directly if you'd like to follow up with him about the signature process.

Have a good Thanksgiving!

Sarah

On Tue, Nov 21, 2017 at 2:37 PM, Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek <kyle.b.russell@navy.mil> wrote:

Sarah,

Just checking in...wanted to ensure you were able to get the INRMP downloaded for use.

Do you anticipate the installation getting a signature for the current copy? If there are no comments from USFWS on this draft, is there any way the signature page can be returned before 8 December?

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek

From: Nystrom, Sarah <sarah_nystrom@fws.gov>
Sent: Friday, October 20, 2017 17:27
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Subject: [Non-DoD Source] INRMP Comments
Attachments: JEBLCFS INRMP Update Comments_BLANK.xlsx

Hi Kyle,

I just have a couple of comments on the INRMP, easy changes. I've attached the comment matrix you provided.

Thanks!

Sarah

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
To: ["Nystrom, Sarah"](#)
Cc: ["cindy_schutz@FWS.gov"](#); ["troy_anderson@fws.gov"](#); [Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek](#); [Waller, Blake E CIV NAVFAC MIDLANT, EV](#); ["Kent, Sara/ATL"](#)
Subject: JEBLCFS Preliminary Final Integrated Natural Resources Management Plan - Agency Review
Date: Thursday, November 09, 2017 14:06:00
Attachments: [JEBLCFS INRMP Update Comment-Response Matrix.xlsx](#)
[USFWS Signature Page from PreFinal INRMP Update LC-FS 11-9-17.pdf](#)

Hi Sarah,

I am contacting you regarding the operation and effect review of the revised Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS) Integrated Natural Resources Management Plan (INRMP). Last month, I forwarded you a draft version of our revised INRMP and discussed the updates and revisions to this INRMP. The most significant change during this revision has been the merger of the JEB Little Creek and JEB Fort Story INRMPs into one document. Other changes include updating survey data, project information, policy references, and documents. We have compiled all comments and are submitting a preliminary final draft INRMP for your review and signature.

A hard copy of the INRMP will be sent by mail to the USFWS Virginia Field Office. Electronic copies will be sent using a file sharing system (called AMRDEC). Instructions will be sent by email that will include a hyperlink and password to access the file for download. Let me know if you have any problems using this site.

Included in this email is a comment matrix (attached). I would like to request that any comments you have for the INRMP be returned by Friday, 8 DEC 2017. Your comments will be updated the following week and a revised draft will be sent for review and signature.

Also included is an extracted agency signature page. If you do not have any comments to provide, please sign this page and return it before Friday, 15 DEC 2017.

Thank you in advance for your continued support of the JEBLCFS Natural Resources program during this INRMP revision. Please do not hesitate to contact me if you have any questions.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek

From: Nystrom, Sarah <sarah_nystrom@fws.gov>
Sent: Wednesday, September 27, 2017 15:36
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Cc: cindy_schulz@FWS.gov; Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek
Subject: [Non-DoD Source] Re: JEBCFS INRMP - Follow up

Hi Kyle,

Thanks for your email. We did receive the draft INRMP that you sent last week.

We'll do our best to provide comments by the end of October. I am planning to participate in the Metrics meeting so I can provide some feedback there.

Right now, we're working on a high priority project that is taking a lot (if not all) of our time. So our ability to get comments back to you in a timely manner will depend somewhat on the amount of time available away from that project.

Thanks!

Sarah

On Wed, Sep 27, 2017 at 3:19 PM, Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek <kyle.b.russell@navy.mil> wrote:

Cindy/Sarah,

I just wanted to follow up and ensure you received the draft Integrated Natural Resources Management Plan (INRMP) sent last week for Joint Expeditionary Base Little Creek-Fort Story, VA.

I also wanted to pass along a comment matrix. Our goal is to have the final draft finished by the end of October for review and signature. However, to expedite the process, we are seeking any comments or concerns you may have, and would like to address them now ahead of the final draft submission. I am also prepared to discuss any questions about the INRMP during our Annual Metrics meeting at Oceana NAS on 19 October.

If you have any questions regarding the document, please let me know. Thank you, and I look forward to working with you both!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165

1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek

From: Nystrom, Sarah <sarah_nystrom@fws.gov>
Sent: Wednesday, November 22, 2017 9:30
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Cc: Troy Andersen
Subject: [Non-DoD Source] Re: JEBCFS INRMP

Hi Kyle,

Thanks for your email. I did download the INRMP successfully. Since I'm on a work detail, I've passed it and the signature page along to my Supervisor, Troy Andersen, cc'd above, to get it to Cindy for signature. We just wrapped up a large project so hopefully she'll be able to take a look at it next week. In the past, we haven't had additional comments after our first review, but there's always a first time.

Feel free to contact Troy directly if you'd like to follow up with him about the signature process.

Have a good Thanksgiving!

Sarah

On Tue, Nov 21, 2017 at 2:37 PM, Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek <kyle.b.russell@navy.mil> wrote:

Sarah,

Just checking in...wanted to ensure you were able to get the INRMP downloaded for use.

Do you anticipate the installation getting a signature for the current copy? If there are no comments from USFWS on this draft, is there any way the signature page can be returned before 8 December?

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

--

Sarah Nystrom

Fish and Wildlife Biologist
Virginia Field Office - Ecological Services
6669 Short Lane
Gloucester, Virginia 23061
(804) 824-2413

 SAFE	Home	About	Help
---	------	-------	------



SAFE is designed to provide AMRDEC and its customers an alternative way to send files other than email. SAFE supports file sizes up to 2GB.

[Click here for Getting Started Guide](#)

Package Status

Package ID:	11482824
Sender's Name:	Kyle B. Russell
Sender's Email:	kyle.b.russell@navy.mil
Date Uploaded:	11/20/2017 1:11:52 PM
Delete Date:	11/30/2017
Encrypt Email:	False
Notification when Download Starts:	False
Notification when Download Ends:	True
Require CAC:	False

Description
Joint Expeditionary Base Little Creek-Fort Story Integrated Natural Resources Management Plan - Revised 2017

File Information

File(s)	Privacy Act Data	Date Uploaded
USFWS Signature Page from PreFinal INRMP Update LC-FS_11-9-17.pdf (113 KB)	No	11/20/2017 1:11:52 PM
PreFinal INRMP Update LC-FS_11-9-17.pdf (55 MB)	No	11/20/2017 1:11:52 PM

Recipients List

Recipients	User Status
sarah_nystrom@fws.gov	Downloaded

What is AMRDEC

The U. S. Army Aviation and Missile Research Development and Engineering Center, a subordinate laboratory to the Research, Development and Engineering Command, is the Army's focal point for providing research, development, and engineering technology and services for aviation and missile platforms across the lifecycle.

[Learn More](#)

Quick Links

[Home](#)

[About](#)

[Getting Started Guide](#)

Resources

[Security Notice](#)

[Accessibility Notice](#)

[ISalute](#)

Support

[Knowledge Base](#)

[Version 3.0.2](#)

Virginia Department of Game and Inland Fisheries Correspondence

From: [Ewing, Amy \(DGIF\)](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Subject: [Non-DoD Source] RE: JEB Little Creek-Fort Story INRMP
Date: Monday, November 27, 2017 12:50:16

Hi Kyle,

The draft INRMP is currently under review by me and regional staff. Comments have been coming in, but if I remember correctly, nothing significant. I have requested ALL comments/input by Dec 6th so that I can get them to you by Dec 8th for you to update the document (if needed) and get back to me for signature by the 15th. I am keeping your deadlines in mind and we will do our best to meet them.

I am in a meeting, but wanted to get back in touch sooner rather than later. If you'd like to chat, I am most available Tuesday afternoon or Friday.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager
Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Wednesday, November 22, 2017 10:12 AM
To: Ewing, Amy (DGIF)
Subject: JEB Little Creek-Fort Story INRMP

Hi Amy,

Just wanted to follow up with you regarding the review of the revised JEB Little Creek-Fort Story Integrated Natural Resources Management Plan. Do you foresee VDGIF providing any comments? At the earliest, we would like to have any comments addressed before December 8th and obtain agency signatures no later than 15 December. Could you please give me a call when you return to the office? Thank you!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

From: [Ewing, Amy \(DGIF\)](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Cc: [Engelmeyer, Todd \(DGIF\)](#); ruth.beottcher@dgif.virginia.gov; [Duncan, Bob \(DGIF\)](#)
Subject: [Non-DoD Source] RE: Review: Joint Expeditionary Base Little Creek-Fort Story INRMP
Date: Monday, September 25, 2017 9:40:48

Kyle,

Thank you for the advance copy of the draft INRMP. Please coordinate, as needed with Ruth, Todd, and other regional staff as you continue to finalize that draft. Once it is ready for formal review by DGIF, please send that draft to me (and others) just as you have done here. I will ensure all staff who need to weigh in on the document, including those with which you have already coordinated, have a chance to review and provide input on the draft INRMP. Once the document is finalized, we can receive it for signature.

Please contact me at any time if you need anything additional. We look forward to working with you on development of the INRMP to support installation operations over the next 5 years.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager
Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Wednesday, September 20, 2017 10:21 AM
To: cindy_schulz@FWS.gov; sarah_nystrom@fws.gov; Duncan, Bob (DGIF); Ewing, Amy (DGIF); ruth.beottcher@dgif.virginia.gov; Engelmeyer, Todd (DGIF)
Cc: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Waller, Blake E CIV NAVFAC MIDLANT, EV
Subject: Review: Joint Expeditionary Base Little Creek-Fort Story INRMP

Hello,

My name is Kyle Russell and I am the Natural Resources Specialist at Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS), Virginia Beach, Virginia. I am contacting you in regards to our Installation's Integrated Natural Resources Management Plan (INRMP) which is currently being updated for the 5-year revision.

In advance of the Navy Natural Resources Annual Metrics Meeting on 19 October, I am providing a draft version of the revised INRMP for your review. Changes may still be made to this draft document. However, in an effort to efficiently expedite the review period to advance the document for signature, I would like to discuss and address any comments or concerns you may have at the Metrics Meeting in October. I will be in attendance the entire day of the Metrics Meeting, and will be available after the meeting to discuss this revised INRMP.

I will be sending the document through a file sharing system called AMRDEC. Instructions will be sent by email that will include a hyperlink and password to access the file for download. If you have any problems using this site,

please let me know.

Thank you, and I look forward to speaking with you all soon!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42

Public Works Department, Joint Expeditionary Base Little Creek - Fort Story

Building 3165

1450 Gator Blvd Suite 100

Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

From: [Ewing, Amy \(DGIF\)](#)
To: [Russell, Kyle B CIV NAVFAC MIDLANT, P\)WD Little Creek](#)
Subject: [Non-DoD Source] signature page attached!
Date: Tuesday, December 19, 2017 12:02:01
Attachments: [JEBLittleCreekFtStory_signedINRMP_Duncan_20171219pdf.pdf](#)
Importance: High

Thanks and happy holidays.

Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager
Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Monday, December 18, 2017 7:06 AM
To: Ewing, Amy (DGIF)
Subject: RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Good morning Amy,

Just checking in on the signature page for the JEBLCFS INRMP. Do you have an update when this document may be signed? Please let me know...thank you!

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

-----Original Message-----

From: Ewing, Amy (DGIF) [<mailto:Amy.Ewing@dgif.virginia.gov>]
Sent: Thursday, December 14, 2017 4:07 PM
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Subject: [Non-DoD Source] RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

It is working its way up to the Director. I will be here tomorrow and will keep an eye on it.

Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Thursday, December 14, 2017 2:56 PM
To: Ewing, Amy (DGIF)
Subject: RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Thank you Amy. I really appreciate your help with this. If I could receive the signed electronic copy before COB tomorrow, that would be great.

Kyle

-----Original Message-----

From: Ewing, Amy (DGIF) [<mailto:Amy.Ewing@dgif.virginia.gov>]
Sent: Thursday, December 14, 2017 11:02 AM
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Subject: [Non-DoD Source] RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Ok, thanks for the updates and clarification. With the updated Appendix, I will request the Director's signature. You should expect that via email soon....and follow up in the mail with the hard copy.

I thought the reference to "game warden" was a reference to our LE officers, not ones on the installation. I was asking that reference to our officers be updated to reflect their correct title. So, it seems we are ok on this point.

Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Thursday, December 14, 2017 9:40 AM
To: Ewing, Amy (DGIF)
Subject: RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Amy,

In response to your request for clarification:

Section 2: The INRMP can be updated to replace "game warden" with "Conservation Law Enforcement Officer." Throughout this document, identification of the "game warden" position is referencing the Navy Conservation Officer that operates regionally within Hampton Roads. The use of "Conservation Law Enforcement Officer" is a more consistent title for this position, referencing Department of Defense, US Navy, and Installation instruction and policy guidance for conservation law enforcement, including: OPNAV 5090.1D Navy Environmental Readiness Manual, Department of Defense Instruction 4715.03 Natural Resource Conservation Program, and JEBLCFS Instruction 11015.1D Fishing Onboard JEBLCFS. In past documents, game warden was an accepted title designation on the installation, and was used to help identify this individual with base personnel unfamiliar with the natural resources program.

Section 3: The provided references were used to update the responsibilities of each state agency in managing state listed species. This is updated in the addendum that will be included with the INRMP (current version attached).

Hopefully these clarifications will help. Please let me know if you have any additional questions.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

-----Original Message-----

From: Ewing, Amy (DGIF) [<mailto:Amy.Ewing@dgif.virginia.gov>]
Sent: Wednesday, December 13, 2017 4:05 PM
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Cc: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Fernald, Ray (DGIF); White, Roger L JR CIV NAVFAC MIDLANT, PWD Little Creek
Subject: [Non-DoD Source] RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Kyle, thank you. Regarding the Appendix you prepared, there are two items that need clarification:

Section 2: Please explain why "game warden" is not being changed to "Conservation Police Officer", the official title? Is that title not consistent with manual and program you reference?

Section 3: The first sentence of the last paragraph is incorrect. VDACS is responsible for plant listing in VA and is the regulatory authority for their protection and management. They have a MOA with VDCR-DNH for inventory of species and project review. VDCRDNH also keeps track of RANKS, which are different from designations or listings. I recommend you see: <https://law.lis.virginia.gov/vacode/3.2-1002/> and/or <http://www.vdacs.virginia.gov/plant-industry-services-endangered-species.shtml> and update that paragraph accordingly.

I will prepare the signature page for routing to the Director's office. As soon as I receive an updated Appendix to attach to it, I'll send it down for signature.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Wednesday, December 13, 2017 3:17 PM
To: Ewing, Amy (DGIF)
Cc: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Fernald, Ray (DGIF); White, Roger L JR CIV NAVFAC MIDLANT, PWD Little Creek
Subject: RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Amy,

Attached is an addendum to the INRMP that will be included at the front of the document to reflect an update to this INRMP for signature. I am currently working to update Table 2-6 and 5-4 to reflect current data for species on the Installation, and will have that graphic prepared for inclusion as new tables in an addendum for the Annual Metric Review in 2018. If you require any additional information, please let me know.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351
FAX: 462-7060
CELL: 757-636-4313

-----Original Message-----

From: Ewing, Amy (DGIF) [<mailto:Amy.Ewing@dgif.virginia.gov>]
Sent: Monday, December 11, 2017 10:48 AM
To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
Cc: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Fernald, Ray (DGIF)
Subject: [Non-DoD Source] RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Kyle,

We recognize that the changes recommended are administrative in nature and do not alter our cooperative efforts to manage wildlife on the installations, but before I can obtain Executive Director signature, I need a commitment from the Navy to update the document as we requested or provide appropriate rationale for not making the changes. A commitment to discuss the recommendations during 2018 is not sufficient, in my mind. Please provide via email, INRMP cover letter, or INRMP Appendix, a commitment to update the document during 2018, prior to the next annual metrics reviews/meetings with our staff.

Once I get that, I can send this down for signature.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist/FWIS Program Manager Chair, Team WILD (Work, Innovate, Lead and Develop)
804-367-2211 www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

-----Original Message-----

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek [<mailto:kyle.b.russell@navy.mil>]
Sent: Friday, December 08, 2017 2:31 PM
To: Ewing, Amy (DGIF)
Cc: Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek
Subject: RE: ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Amy,

Thank you for your response and comments regarding the 2017 pre-final version of the JEB Little Creek-Fort Story INRMP. Many of these comments appeared to include primarily administrative needs in the document, including references to the current Virginia SWAP, consistent designation status of state listed species, and reciprocating the VDGIF's responsibilities already defined in the INRMP into other applicable sections.

I've included an initial response to these comments:

1. The 2015 version of the State Wildlife Action Plan (SWAP) was identified at the provided site. Current SWAP data may be appropriate to update the identified section and version reference of the SWAP.
2. The designation of "Game Warden" is used in this INRMP for practical interdisciplinary use. The designation of a conservation law enforcement title in the INRMP would need to be consistent with Navy polices and definitions.
3. The recommended language desired for section 2.11 and 5.11 is already included in the INRMP version. This language may need to be relocated to other locations in the document to establish the designating authority of the VDGIF more effectively in the mentioned sections.
4. Inconsistencies were identified within two tables for state rare species at each geographic location of JEBLCFS, and would need to be updated according to current listing designations. All federally listed wildlife evaluated within species profiles of section 2.11 and 5.11 respectively have a state designation included as well.

None of the VDGIF comments included deficiencies in management of wildlife species. If the VDGIF is willing to sign the current version of this INRMP, the Navy will evaluate, address, and update the INRMP from these comments for discussion with VDGIF during the next annual INRMP review in 2018.

Thank you again for your continued support as a partner for natural resources management at JEB Little Creek-Fort Story.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

-----Original Message-----

From: Ewing, Amy (DGIF) [<mailto:Amy.Ewing@dgif.virginia.gov>]

Sent: Thursday, December 07, 2017 3:41 PM

To: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek

Subject: [Non-DoD Source] ESSLog# 38584_JEBLittleCreekFt.Story_DraftINRMP_DGIF_AME20171207

Kyle,

We have reviewed the DRAFT 2017 INRMP for JEB Little Creek-Fort Story and offer the following comments and recommendations;

1. Please update section 1.11 to include information from the currently approved 2015 version of the Wildlife Action Plan available at www.bewildvirginia.org. Updates regarding the WAP also may be necessary in section 3.6.2.

2. Please make sure that throughout the document, "Game Warden" is changed to "Conservation Police Officer (CPO)".
3. It is not clear in section 2.11 or 5.11 that VDGIF is the regulatory authority for wildlife in Virginia, including listed species but excluding insects. State listing (species status) is done by our Board. Nothing in this section is necessarily incorrect, VDCR-DNH and their partners are responsible for designating ranks, but threatened and endangered wildlife are designated such by the Board of VDGIF. We recommend including language in these sections that is similar to that in section 3.6.1 lines 9-18.
4. Any federally-listed wildlife species also is state listed, assuming adoption of the federal list by our Board, most recently done in early 2017. Please update the document, in all sections, to reflect that federally listed wildlife, excluding insects, are also state listed (there is inconsistency from one section to another and from one species to another). You may also consider adding federally-listed species to table 2-6 and 5-4, as they also are state-listed.

Please either update the document as recommended above and submit the updated document to us or a copy of the document that includes an appendix that calls out the changes recommended above and which expresses a commitment from the Navy to include the necessary updates in upcoming iterations of the document no later than the next 5-year update, preferably during the annual update in 2018. Upon receipt of such, I will send the signature page down to the front office for Executive Director signature.

Thanks, Amy

Amy M. Ewing

Environmental Services Biologist/FWIS Program Manager

Chair, Team WILD (Work, Innovate, Lead and Develop)

804-367-2211 [www.dgif.virginia.gov <<http://www.dgif.virginia.gov/>>

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948

From: Russell, Kyle B CIV NAVFAC MIDLANT, P)WD Little Creek
To: [Duncan, Bob \(DGIF\)](#)
Cc: ["Ewing, Amy \(DGIF\)"; Acker, Pete; "Boettcher, Ruth \(DGIF\)"; Waliqora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Waller, Blake E CIV NAVFAC MIDLANT, EV; "Kent, Sara/ATL"](#)
Subject: JEBLCFS Preliminary Final Integrated Natural Resources Management Plan - Agency Review
Date: Thursday, November 09, 2017 14:18:00
Attachments: [JEBLCFS INRMP Update Comment-Response Matrix.xlsx](#)
[VDGIF Signature Page from PreFinal INRMP Update LC-FS 11-9-17-2.pdf](#)

Robert,

I am contacting you regarding the operation and effect review of the revised Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS) Integrated Natural Resources Management Plan (INRMP). Last month, several VDGIF staff were sent a draft version of the revised INRMP and discussed the updates and revisions to this document. The most significant change during this revision has been the merger of the JEB Little Creek and JEB Fort Story INRMPs into one document. Other changes include updating survey data, project information, policy references, and documents. All comments were included into a preliminary final draft INRMP that is being submitted for your review and signature.

A hard copy of the INRMP will be sent by mail to the 4010 West Broad Street, Richmond, VA 23230. Electronic copies will be sent using a file sharing system (called AMRDEC). Instructions will be sent by email that will include a hyperlink and password to access the file for download. Let me know if you have any problems using this site.

Included in this email is a comment matrix (attached). I would like to request that any comments you have for the INRMP be returned by Friday, 8 DEC 2017. Your comments will be updated the following week and a revised draft will be sent for review and signature.

Also included is an extracted agency signature page. If you do not have any comments to provide, please sign this page and return it before Friday, 15 DEC 2017.

Thank you in advance for your continued support of the JEBLCFS Natural Resources program during this INRMP revision. Please do not hesitate to contact me if you have any questions.

R/

Kyle B. Russell

Natural Resources Specialist

NAVFAC MIDLANT PRL42
Public Works Department, Joint Expeditionary Base Little Creek - Fort Story
Building 3165
1450 Gator Blvd Suite 100
Virginia Beach, VA 23459-2616

OFFICE: 757-462-5351

FAX: 462-7060

CELL: 757-636-4313

 SAFE	Home	About	Help
---	----------------------	-----------------------	----------------------



SAFE is designed to provide AMRDEC and its customers an alternative way to send files other than email. SAFE supports file sizes up to 2GB.

[Click here for Getting Started Guide](#)

Package Status

Package ID:	11374955
Sender's Name:	Kyle B. Russell
Sender's Email:	kyle.b.russell@navy.mil
Date Uploaded:	11/9/2017 1:23:55 PM
Delete Date:	11/19/2017
Encrypt Email:	False
Notification when Download Starts:	False
Notification when Download Ends:	True
Require CAC:	False

Description
Joint Expeditionary Base Little Creek-Fort Story Revised INRMP 2017

File Information

File(s)	Privacy Act Data	Date Uploaded
PreFinal INRMP Update LC-FS_11-9-17.pdf (55 MB)	No	11/9/2017 1:23:55 PM

Recipients List

Recipients	User Status
bob.duncan@dgif.virginia.gov	Not Downloaded
amy.ewing@dgif.virginia.gov	Downloaded
ruth.boettcher@dgif.virginia.gov	Not Downloaded
peter.acker@dgif.virginia.gov	Not Downloaded

What is AMRDEC

The U. S. Army Aviation and Missile Research Development and Engineering Center, a subordinate laboratory to the Research, Development and Engineering Command, is the Army's focal point for providing research, development, and engineering technology and services for aviation and missile platforms across the lifecycle.

[Learn More](#)

Quick Links

[Home](#)

[About](#)

[Getting Started Guide](#)

Resources

[Security Notice](#)

[Accessibility Notice](#)

[ISalute](#)

Support

[Knowledge Base](#)

[Version 3.0.2](#)

APPENDIX E: CHESAPEAKE BAY AGREEMENTS
AND DOCUMENTS

COOPERATIVE AGREEMENT
BETWEEN
DEPARTMENT OF DEFENSE
AND
ENVIRONMENTAL PROTECTION AGENCY
CONCERNING
CHESAPEAKE BAY ACTIVITIES

PREFACE

1. The Chesapeake Bay is a national treasure and a resource of worldwide significance. Its ecological, economic, and cultural importance is felt far beyond its waters and the communities that line its shores. In recent decades, however, the Bay has suffered serious declines in quality and productivity.
2. The 1987 Chesapeake Bay Agreement between the Environmental Protection Agency (EPA), representing the Federal government, the District of Columbia, the State of Maryland, the Commonwealths of Pennsylvania and Virginia, and the Chesapeake Bay Commission, established a policy to reverse this decline, and a framework for continued cooperative efforts to restore and protect the Chesapeake Bay. It contains goals and priority commitments to achieve these objectives for living resources; water quality; population growth and development; public information, education and participation; public access; and governance.
3. The Department of Defense (DoD) continues its ongoing commitment to protect the environment and the natural resources which have been entrusted to its care, while at the same time accomplishing its primary mission of national defense.
4. DoD maintains over 60 installations in the Chesapeake Bay drainage basin, encompassing approximately 350,000 acres. Recognizing its role as a major Federal user of the land and waters of the Chesapeake Bay region, DoD completed a water quality assessment study to determine the relative impact of its activities on the water quality and living resources of this important estuary.
5. EPA has regulatory responsibility for the control and abatement of pollution in areas of air, water, solid waste, toxic substances, pesticides, noise, and radiation. This includes setting and enforcing environmental standards; conducting research on the

- cause, effect, control, and prevention of environmental problems; and assisting State and local cooperators.
6. EPA, in conjunction with Federal, State and local cooperators, has been conducting studies, environmental surveys and assessments and developing strategies for improving and restoring the Chesapeake Bay.
 7. DoD and EPA share a mutual interest in restoring and protecting the Chesapeake Bay. The actions carried out under this Agreement will strengthen coordination, increase understanding and action on key environmental issues, and reduce duplication of resources and expertise.
 8. Therefore, DoD and EPA agree to cooperate to implement the goals and objectives of the Chesapeake Bay Agreement.

PURPOSE

This Cooperative Agreement establishes a policy of coordination and cooperation between DoD and EPA on Chesapeake Bay activities, consistent with the goals, objectives, and commitments of the 1987 Chesapeake Bay Agreement. It supersedes the September 13, 1984 Joint Resolution between DoD and EPA on pollution abatement in the Chesapeake Bay.

AUTHORITY

1. Executive Order 12088 directs each Executive Agency responsible for compliance with pollution control standards to take necessary actions for prevention, control, and abatement of environmental pollution from activities under its control.
2. EPA has statutory authority (e.g. Section 117, Clean Water Act as Amended) to develop increased Federal participation in cooperative Chesapeake Bay activities. These efforts are supported and encouraged by DoD.
3. Nothing in this Agreement diminishes or expands the administrative authority of each agency in execution of its statutory requirements. The Agreement is intended to facilitate those authorities through cooperative means.

DEFINITIONS

"exceptions list" and "significant noncompliance (SNC)" as they are defined and used in this agreement are terms that apply to compliance under the requirements of the federal National Pollution Discharge Elimination System (NPDES) program.

The EPA Exceptions List is an internal tracking mechanism used by EPA to track facilities that are chronic noncompliers. It is based on a compilation of major NPDES permit holders that have been in significant noncompliance for two consecutive quarters or more. The Exceptions List is developed quarterly by EPA Region III based on the Quarterly Noncompliance Report (QNCR).

"Major NPDES Permit Holder" is generally defined as a facility that discharges 1 million gallons per day (MGD) or more of wastewater or is rated at 80 or above on the EPA Major Industrial Rating Scale for NPDES Facilities.

significant Noncompliance (SNC): For purposes of determining SNC, any and all violations which meet the criteria listed in 40 CFR, Section 123.45 for Category I noncompliance and some of the criteria for Category II noncompliance are to be considered in SNC. For a detailed explanation of Category I and II, and SNC refer to 40 CFR, Section 123.45 and to Appendix I of the Guidance for Preparation of Quarterly and Semi-Annual Noncompliance Reports in the Enforcement Management System Guide (September 1989).

RESPONSIBILITIES

IT IS AGREED THAT:

A. The Environmental Protection Agency will:

1. Support DoD membership on the Federal Agencies Coordinating Committee, Implementation Committee, and other Agreement entities as appropriate.
2. Coordinate with DoD concerning the development of programs, technical policies, regulations, guidelines, training, research, demonstrations and pollution prevention initiatives relative to the Chesapeake Bay Program.

3. In cooperation with the delegated States, act to insure the issuance or reissuance of all major and other significant DoD National Pollution Discharge Elimination System (NPDES) permits in the Chesapeake Bay region. These permits will contain requirements (including reducing or eliminating toxic pollutants) appropriate to insure the protection of the waters of the Chesapeake Bay.
4. Provide on-site evaluations of specified programs to DoD installations in the Chesapeake Bay region upon request. EPA and delegated states will inspect DoD facilities for compliance in accordance with appropriate Federal, State and local environmental statutes and regulations. EPA will ensure that annual inspections are conducted by EPA or delegated States for all major NPDES permittees in the Chesapeake Bay Region and that findings are provided to the inspected facility on a timely basis.
5. Provide DoD with technical advice and assistance on controlling nonpoint and other water pollution sources, tidal and nontidal wetlands protection and enhancement, and shoreline protection. Facilitate cooperation with the Soil Conservation Service, the Forest Service, the Fish and Wildlife Service, and the Geological Service in these activities. Technical publications on these subjects will be made available to DoD installations in the Chesapeake Bay region upon request.
6. Conduct annual workshops for all federal facility coordinators and managers in the Chesapeake Bay region. Facilitate DoD participation in EPA on-site operator training Programs for wastewater treatment plant operators pursuant to Section 104(g) of the Clean Water Act.
7. Provide access to data in the Chesapeake Bay Program's (CBP) computerized data files. EPA further agrees to provide DoD with appropriate training and assistance in the use of the computer facility to promote DoD's contributions to the Bay's restoration efforts.
8. Provide copies of all documents prepared under the CBP to the Office of the Deputy Assistant Secretary of Defense for Environment, to the headquarters

offices of the Military Services, and to all DoD installations in the Chesapeake Bay region.

9. Meet with DoD at least annually to review progress and activities in implementing this Agreement and to discuss the compliance status of DoD facilities in the Chesapeake Bay Region.
10. Assist the Military Services and DoD installations in developing their public information programs on Chesapeake Bay issues.
11. Coordinate SARA Title III requirements with Federal facilities in the Chesapeake Bay basin as called for in the basin-wide Toxics Reduction Strategy.

B. The Department of Defense will:

Participation

1. Continue to actively participate in the Chesapeake Bay Program (CBP) through central coordination of all related activities. The designated representative of the Secretary of Defense will represent the interests of DoD on the Implementation Committee.
 - (a) DoD will provide annually an updated list of Commanders' addresses and telephone numbers for all facilities listed in attachment C.
 - (b) DoD representatives will also actively participate on the Federal Agencies Committee and other subcommittees or work groups as appropriate.
 - (c) DoD installations will enhance internal communications on the Chesapeake Bay cleanup program by actively promoting knowledge of and participation in CBP restoration efforts.
 - (d) DoD installations will cooperate with state, regional, local and other Federal agencies through the CBP and other coordination mechanisms to identify separate and joint opportunities for Bay restoration activities. DoD will evaluate its programs with other agencies on a continuing basis to improve

effectiveness of Chesapeake Bay activities within its existing programs of natural resources conservation and environmental quality management.

(e) DoD installations will ensure that their wastewater treatment plant operators will receive adequate training and proper certifications through EPA/State On-site operator Training Programs or other means as appropriate.

2. Support achieving goals and commitments made in Nutrient, Toxics, and Conventional Pollutant Control Strategies, including coordination with EPA regarding SARA Title III requirements for federal facilities in the basin.

Planning

3. Develop, and review annually, implementation plans for all installations identified in DoD's water quality assessment study as having a significant impact potential on the Chesapeake Bay consistent with the Chesapeake Bay Federal Facilities Strategy. (Appendix A and B). Ensure such plans integrate other environmental planning requirements provided for under this Agreement. Provide copies of plans to EPA and affected states upon request.

4. Integrate at all facilities listed in Appendix C CBP goals and concerns into DoD's existing integrated natural resources management plans and practices, including:

(a) Implement best management practices (BMPs) for nonpoint source pollution control on leased farmland, commercial forest land, and on all other DoD lands.

(b) Remove impediments to passage of migratory fishes in the Chesapeake Bay watershed.

(c) Identify, protect, enhance, restore, and create wetlands.

(d) Cooperate with other agencies to identify and protect existing submerged aquatic vegetation (SAV) beds.

- (e) Control sediment and erosion at Defense construction sites.
 - (f) Control shoreline erosion and sedimentation.
 - (g) Maintain integrated pest management (IPM) practices for all pest control operations on DoD lands.
 - (h) Maintain and enhance waterfowl and wildlife habitat.
5. (a) Incorporate the practice of pollution prevention into the policies, program procedures and operations of DoD's Chesapeake Bay facilities policies, program procedures and operations of DoD's Chesapeake Bay facilities through implementation of an environmental management hierarchy which emphasizes pollution prevention through source reduction first and then environmentally-sound recycling of materials that cannot be reduced, avoided or eliminated.
- (b) Select a DoD installation within the Chesapeake Bay Region to serve as a model community to demonstrate how pollution prevention techniques can be combined into an integrated pollution prevention plan.
6. Identify environmental projects (e.g. evaluation of biological nutrient removal techniques or the use of wetlands as nutrient reduction methods, testing of stormwater runoff control techniques, shoreline erosion control measures, agricultural practices on outlease areas) as potential demonstration projects for EPA or State programs.
7. Design, locate, and construct new development in a manner that will minimize its impact on the Chesapeake Bay and its tributaries, and in consonance with the President's goal of no net loss of wetlands.
8. Ensure that DoD projects and activities at facilities listed in Appendix B do not conflict with policies, standards and activities in the States' Nonpoint source management Programs

pursuant to the Federal consistency provision in Section 319 of the Clean Water Act.

Funding

9. Ensure funding is obtained by the most expeditious means possible for pollution abatement and prevention projects and studies needed for those facilities on the EPA Exceptions List or in significant noncompliance or whenever necessary to meet final effluent limits.
 - (a) Review and fund major pollution abatement project design, construction, operation, prevention, and maintenance management practices to ensure their effectiveness in protecting the Chesapeake Bay and its tributaries.
 - (b) Give appropriate consideration to other pollution abatement and prevention projects and to natural resources management projects required to meet the objectives of this agreement.
 - (c) Make maximum use of the OMB Circular A-106 process to integrate compliance objectives, funding and coordination with EPA.

Audits and Inspections

10. Conduct periodic multi-media environmental audits (as defined by EPA) at all major (Appendix A) DoD facilities in the Chesapeake Bay Region on a regular ongoing basis and make the results and audit findings available to EPA and the states. Audits will be conducted in a manner consistent with the EPA Generic Protocol for Environmental Audits at Federal Facilities.
11. Take all appropriate actions necessary to ensure compliance with all provisions of NPDES permits, with special attention to effluent limits, all chemical and/or biological toxics monitoring programs and pretreatment requirements. Ensure that all Discharge Monitoring Reports required by NPDES permits are complete and submitted to EPA within the time frame required by the permit.

12. Continue to provide information to EPA or the States necessary to issue or reissue all major National Pollutant Discharge Elimination System (NPDES) wastewater discharge permits.
13. Ensure future water quality monitoring results are in a form compatible with the CBP's data base, and forward results to appropriate offices on a timely basis.
14. Meet with EPA at least annually to report on progress and activities in implementing this agreement and to discuss the compliance status of DoD facilities.

DELEGATION

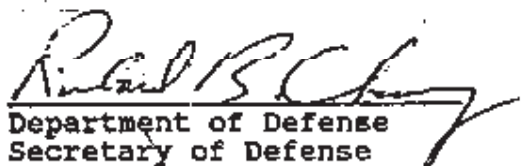
Authorized representatives of EPA and DoD may enter into supplemental agreements within the scope of this document.

MODIFICATION AND TERMINATION

This Agreement may be modified or amended upon request of either party and the concurrence of the other. The Agreement may be terminated with 60-day notice of either party.

IMPLEMENTATION

This Agreement becomes effective when signed by both parties and shall remain in effect until modified or terminated.


Department of Defense
Secretary of Defense


Environmental Protection Agency
Administrator

Date: 4/20/90

Date: April 20, 1990

APPENDIX A

DoD Installations in the Chesapeake Bay Region
with NPDES permits 1.0 MGD or greater.

Aberdeen Proving Ground (Aberdeen and Edgewood Areas), MD
Army Corps of Engineers Washington Aqueduct-Dalecarlia Plant, DC
David W. Taylor NSRDC - Annapolis, MD
Fort Detrick, MD
Fort Eustis, VA
Fort George G. Meade, MD
Letterkenny Army Depot, PA
Naval Air Station/Naval Air Test Center - Patuxent River, MD
Naval Base - Norfolk, VA
Naval Base Supply Center - Norfolk, VA
Naval Ordnance Station - Indian Head, MD
Naval Shipyard - Norfolk, VA
Naval Surface Weapons Center - White Oak, MD
U.S. Marine Corps - Quantico, VA

APPENDIX B

DoD Installations in the Chesapeake Bay Region
with a Significant Impact Potential
on the Bay's Water Quality

Aberdeen Proving Ground (Aberdeen and Edgewood Areas)
Allegheny Ballistics Lab
Andrews Air Force Base
Defense General Supply Center - Richmond
Fort Belvoir
Fort Eustis
Fort George G. Meade
Harry Diamond Lab - Blossom Point
Langley Air Force Base
Letterkenny Army Depot
Naval Air Station - Oceana
Naval Air Station/ Naval Air Test Center - Patuxent River
Naval Amphibious Base - Little Creek
Naval Ordnance Station - Indian Head
Naval Shipyard - Norfolk
Naval Supply Center - Cheatham Annex
Naval Supply Center - Craney Island
Naval Supply Center - Yorktown
Naval Surface Weapons Center - Dahlgren
Naval Surface Weapons Center - White Oak
Naval Weapons Station - Yorktown
Navy Ships Part Control Center - Mechanicsburg
Sewells Point Navy Complex (Naval Station, Naval Air Station,
Naval Aviation Depot, Public Works Center, Supply
Center)
U.S. Marine Corps - Quantico
Vint Hill Farms Station

APPENDIX C

DoD Installations in the Chesapeake Bay Region

AIR FORCE

Andrews Air Force Base, Andrews AFB, MD
Bolling Air Force Base, Washington, DC
Brandywine RDV Site, Brandywine, MD
Davidsonville RDV Site, Davidsonville, MD
Langley Air Force Base, Hampton, VA

ARMY

Aberdeen Proving Ground Complex, Aberdeen, MD
Aberdeen Proving Ground, Aberdeen, MD
Aberdeen Proving Ground, Edgewood, MD
Cameron Station, Alexandria, VA
Carlisle Barracks, Carlisle, PA
Fort A.P. Hill, Bowling Green, VA
Fort Belvoir, Fort Belvoir, VA
Fort Detrick, Frederick, MD
Fort Eustis, Newport News, VA
Fort Lee, Fort Lee, VA
Fort Monrith, Washington, DC
Fort Meade, Fort Meade, MD
Fort Monroe, Fort Monroe, VA
Fort Myer, Arlington, VA
Fort Ritchie, Fort Ritchie, MD
Fort Stony, Virginia Beach, VA
Harry Diamond Lab-Adelphi, MD
Harry Diamond Labs-Blossom Point, MD
Harry Diamond Labs-Woodbridge, Woodbridge, VA
Letterkenny Army Depot, Chambersburg, PA
New Cumberland Army Depot, New Cumberland, PA
Vint Hill Farms Station, Warrenton, VA
Walter Reed Army Medical Center, Silver Spring, MD

DEFENSE LOGISTICS AGENCY

Defense General Supply Center, Richmond, VA

NAVY

Allegheny Ballistics Lab-Plant L. Rocket Center, WV
David W. Taylor NSRDC-Annapolis, Annapolis, MD
David W. Taylor NSRDC-Bethesda, Bethesda, MD
Sewell's Point Navy Complex, Norfolk, VA
Naval Aviation Depot, Norfolk, VA
Naval Air Station-Norfolk, Norfolk, VA

Naval Station-Norfolk, Norfolk, VA
Naval Supply Center-Norfolk, Norfolk, VA
Public Works Center-Norfolk, Norfolk, VA
Naval Air Station-Oceana, Virginia Beach, VA
Naval Air Station, Patuxent River Complex, Lexington Park, MD
Naval Air Station, Lexington Park, MD
Naval Air Test Center, Lexington Park, MD
Naval Air Station-Solomons Annex, Solomons, MD
Naval Amphibious Base-Little Creek, Norfolk, VA
Naval Communications Unit, Cheltenham, MD
Naval Electronic Systems Engineering Activity, St. Inigoes, MD
Naval Medical Command-National Capital Region, Bethesda, MD
Naval Observatory, Washington, DC
Naval Ordnance Station, Indian Head, MD
Naval Radio Station-Sugar Grove, Sugar Grove, WV
Naval Radio Transmitter Facility, Annapolis, MD
Naval Research Lab, Washington, DC
Naval Research Lab-Chesapeake Bay Detachment, Randle Cliff Beach, MD
Naval Shipyard-Norfolk, Portsmouth, VA
Naval Station-Annapolis, Annapolis, MD
Naval Supply Center-Cheatham Annex, Williamsburg, VA
Naval Supply Center-Craney Island, Portsmouth, VA
Naval Supply Center-Yorktown, Yorktown, VA
Naval Surface Weapons Center-Dahlgren, Dahlgren, VA
Naval Surface Weapons Center-White Oak, Silver Spring, MD
Naval Weapons Station, Yorktown, VA
Navy Ships Parts Control Center, Mechanicsburg, PA
St. Juliens Creek Annex, Portsmouth, VA
U.S. Marine Corps-Quantico, Quantico, VA
U.S. Naval Academy, Annapolis, MD
U.S. Naval Academy Farm, Gambrills, MD
Washington Navy Yard, Washington, DC



Chesapeake Bay Program

FEDERAL AGENCIES' CHESAPEAKE ECOSYSTEM UNIFIED PLAN



NOVEMBER 5, 1998

WHEREAS, the *Clean Water Action Plan* charts a course toward fulfilling the original goals of the *Clean Water Act* and calls upon Federal agencies to develop a unified policy to enhance watershed management in which Federal, state, and local governments and the public work together to identify critical problems, focus resources, recognize waters of exceptional value, include watershed goals in Federal planning, and implement effective strategies to solve problems; and

WHEREAS, as reported in the April 1997 *Second Biennial Progress Report of the 1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*, the Federal agency partners of the Chesapeake Bay Program have accomplished, and are committed to accomplish, the numerous goals of that 1994 Agreement; and

Now, therefore, we the undersigned representatives of the participating Federal agencies, establish the following unified plan to meet the goals of the 1987 *Chesapeake Bay Agreement* and subsequent amendments and directives, and to build on the achievements of the 1994 *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*, consistent with our missions and our success in securing the necessary resources. Specifically, we further agree to be:

PARTNERS FOR THE CHESAPEAKE

creating new opportunities for Federal agencies to work with states to carry out the commitments of the Clean Water Action Plan. We commit to:

1. target Conservation Reserve Enhancement funds to Bay watershed states in support of efforts to protect farmland and forests and reduce nutrient inputs to the Chesapeake Bay (USDA lead);
2. work to integrate opportunities to benefit the Bay through existing Federal initiatives such as USDA's Environmental Quality Incentives Program and the Wetlands Reserve program (USDA lead);
3. support the development of state Unified Watershed Assessments and Action Plans for Priority Watersheds;
4. encourage the development of permanent teams within each Bay watershed state, comprised of Federal and state officials with responsibilities for implementing the Clean Water Action Plan;
5. promote the addition of new Federal partners, including agencies that deal with transportation and other infrastructure; establish or update memoranda of understanding with all Federal partners; and strengthen relationships among existing partners through resource sharing and unified program planning and implementation; and
6. develop and adopt a Bay Partner Facility program by March 1, 1999, and seek the designation of at least 30 Federal facilities as partners by December 31, 2000, and 60 Federal facilities by December 31, 2005.

WHEREAS, the community of Federal agencies with signed formal Chesapeake Bay partnership agreements has expanded to include 15 agencies dedicated to enhancing stewardship on Federally-managed public lands, supporting cooperative state and community implementation, and contributing expertise in resource management, science and planning to achieve ecosystem-based management; and

WHEREAS, the Chesapeake Bay Program's directives on Nutrient Reduction, Habitat Restoration, Wetlands, and Riparian Forest Buffers, and its Local Government Participation Action Plan and Community Watershed Initiative continue to advance the Program as a national leader in the use of partnerships and sound science for targeting, developing and implementing restoration and protection programs.

PROTECTORS OF PRIORITY WATERSHEDS

targeting various Federal programs and resources to meet the needs of priority watersheds, particularly those designated by states under the Clean Water Action Plan. We commit to:

1. support geographically-specific programs, such as the Chesapeake Bay Program's Regions of Concern for toxics and Nutrient Areas of Concern;
2. develop, by June 30, 1999, a mechanism to implement wet weather pollution prevention on Federal facilities in the Anacostia River and Rock Creek watersheds and transfer these technologies to other appropriate Federal facilities and urban areas (EPA lead);
3. implement the Biennial Federal Workplan for the Anacostia River Watershed and provide biennial updates beginning in June 30, 1999 (COE lead);
4. support the 18-point restoration plan for the Elizabeth River through active participation in the programs and projects of the Elizabeth River Coalition (COE lead); and
5. participate fully in the American Heritage Rivers Program for the Potomac and Upper Susquehanna/Lackawanna Rivers by: a) identifying relevant Federal landholdings by December 31, 1998; b) establishing partnership agreements with community-based efforts in the Heritage Rivers watersheds by April 30, 1999; c) and supporting directed application of technical and funding resources to aid revitalization efforts (EPA lead).

STEWARDS OF THE BAY'S LIVING RESOURCES AND HABITATS

supporting the restoration of Chesapeake Bay living resources and their habitats by fully implementing fish and wildlife conservation efforts and all habitat restoration authorities on all lands, including Federal lands, in the Bay watershed.

We commit to:

1. develop an inventory of habitat restoration needs on Federal lands in the Chesapeake Bay watershed to aid in the creation of an annual list of restoration priority areas, from which two projects will be completed each year beginning in 2000 (NOAA lead);
2. support the Chesapeake Bay Program's Wetlands Directive by assisting states in implementation of their strategies for net gain of wetlands and establishing a restoration goal for Federal facilities of 100 acres per year beginning in 2000 (EPA lead);
3. support conservation and restoration of stream corridors on Federal lands by: a) establishing demonstration sites and implementing restoration technology on three Federal facilities by December 31, 1999 (USFWS lead); b) adopting riparian area conservation policies for Federal lands by September 30, 2000 (USFS lead); c) adopting a stream assessment and inventory protocol for Federal lands by May 31, 2000 and an inventory of stream systems on Federal lands by January 1, 2005 (USFWS lead); and d) restoring 200 miles of riparian forest buffers on Federal lands by January 1, 2010 (USFS lead);
4. identify additional blockages to anadromous fish on Federal lands by December 31, 1999, and open priority blockages to 50 miles of streams by December 31, 2003 (NOAA lead);
5. identify 4 areas for aquatic reef siting at near shore areas adjacent to Federal facilities, in accordance with the Chesapeake Bay Program's Framework for Habitat Restoration and the Aquatic Reef Habitat Plan, by December 31, 1999 (NOAA lead);
6. target priority areas for terrestrial and aquatic invasive species control on Federal facilities by January 1, 2000 and implement controls on priority sites (USFWS lead);
7. expand conservation landscaping on Federal facilities, in keeping with the Presidential directive on beneficial landscaping, by: a) completing a Conservation Landscaping and BayScapes Guide for Federal Land Managers by January 1, 2000; and b) integrating conservation landscaping into Federal agency specifications and design criteria by July 31, 2001 (USFWS lead);
8. develop model lease provisions by September 30, 1999 for facilities, outleases, rights-of-way, and other Federal actions to provide a means for Chesapeake Bay stewardship goals to be considered in the issuance of leases by or to Federal agencies within the watershed (GSA lead); and
9. work with state conservation agencies to determine the effects of nutria on tidal wetland loss and to evaluate methods of controlling this exotic species (USGS lead).

LEADERS IN NUTRIENT AND TOXICS PREVENTION AND REDUCTION ON FEDERAL LANDS AND FACILITIES

working to meet and maintain the nutrient and toxics prevention and reduction goals of the Chesapeake Bay Program, with an emphasis on non-point source controls, and extending our efforts beyond year 2000. We commit to:

1. provide technical assistance and training for Federal landholders for development of nutrient management plans by December 31, 1999 (NRCS lead), and develop nutrient management plans for Federal lands within the watershed by December 31, 2000, emphasizing agricultural, construction, turf, golf course and recreation, and developed lands;
2. assess the performance of Federal on-site septic systems and adopt management plans for priority improvements by December 31, 2000 (USPS lead);
3. expand our existing Chesapeake Bay Program Federal facility site assessment protocol beyond nutrients to include toxics reduction and habitat restoration opportunities, and continue to complete at least five such assessments annually within the Bay watershed (NRCS lead);
4. ensure, by December 31, 2000, that personnel are trained to strengthen and implement comprehensive Integrated Pest Management (IPM) on 75% of all Federally-owned lands in the watershed, and establish a peer review panel to evaluate at least five Federal IPM plans annually (USDA lead);
5. implement pollution prevention and related technologies to achieve, by January 1, 2000, a 75% voluntary reduction from a 1994 baseline in releases of Chesapeake Bay Toxics of Concern and chemicals required for reporting under section 313(c) of the Emergency Planning and Community Right-to-Know Act for Federal facilities in the Chesapeake Bay basin (EPA lead);
6. establish, by January 1, 2000, participation of 30 Federal facilities as mentors in the Chesapeake Bay Program's Businesses for the Bay to implement pollution prevention initiatives (DoD lead); and
7. compile and provide information on the reported occurrence of toxics in wildlife in the Bay ecosystem by January 1, 2003 (USGS lead).

GUARDIANS OF HUMAN HEALTH

focusing renewed efforts on the protection of human health through actions we take to control the effects of harmful pollutants in the Bay watershed. We commit to:

1. coordinate Federal funding and response systems in support of state and local efforts in the Chesapeake Bay watershed for major events, including Pfiesteria-type outbreaks and other harmful algal blooms (NOAA lead);
2. support and target research and monitoring efforts on the relation of harmful microorganisms such as Pfiesteria to aquatic resources and human health (NOAA lead) and the effects of other physical and biological stressors on fin fish and shellfish (USGS lead);

3. provide preliminary identification of nitrate levels over the maximum drinking water contaminant level in shallow aquifers throughout the watershed by January 1, 2001 (USGS lead);
4. identify closed shellfish beds adjacent to Federal lands in the Chesapeake Bay watershed by December 31, 1998 and participate in re-opening priority areas by January 1, 2005 (NOAA lead);
5. locate releases of toxics from Federal facilities in the Chesapeake Bay watershed, with priority on drainage areas where fish consumption advisories exist, and work cooperatively to address these releases by December 31, 2000 (EPA lead); and
6. work with local governments to address pollution from storm drain outfalls on Federal lands that pose a human health risk through exposure by inhalation, ingestion, or body contact such as swimming (EPA lead).
7. develop an index that demonstrates the changes in climate affecting the Chesapeake Bay ecosystem, as needed to refine restoration strategies by January 1, 2003 (NOAA lead);
8. conduct research and provide information needed to identify species and habitats on Federal lands in need of special management efforts to maintain biodiversity and the integrity of the Chesapeake ecosystem by January 1, 2003 (USGS lead); and
9. complete an analysis of forest distribution and condition in the Chesapeake Bay watershed and host a regional conference to discuss issues related to fragmentation of forest landscape by January 1, 2000 (USFS lead).

SUPPORTERS OF SMART GROWTH

identifying and implementing new mechanisms to avoid development patterns that increase pollution problems, to encourage redevelopment of urban areas, and to raise the quality of life. We commit to:

1. sign Memoranda of Agreements to make Chesapeake Bay-related data and information Internet accessible by all Bay Program partners through the Chesapeake Information Management System by July 1, 1999 (EPA lead);
2. complete, by March 1, 1999, a Bay watershed-wide assessment of potential levels of nutrient loadings (USDA lead) and water quality parameters (USGS lead) that support the identification of Nutrient Areas of Concern and serve as a basis for strengthening the ability of local and state jurisdictions to achieve their tributary basins' nutrient reduction goals;
3. complete an inventory, by January 1, 2000, of current science-based technology available for implementation to achieve the agricultural component of Bay nutrient reduction goals (USDA lead), and identify the sources that restrict the production of submerged aquatic vegetation and associated habitat in the middle and upper Bay and tidal tributaries (USGS lead);
4. define and assess, by January 1, 2003, the contribution and implications of nitrogen compound emissions (e.g., ammonia) from agricultural activities; and develop models that characterize the transport of emissions and deposition of these compounds (NOAA lead);
5. provide an assessment, by July 1, 2000, of the amount of nutrients and associated lag times in ground water, and of implications for adjustments to tributary strategies' nutrient reduction goals, and identify follow-up research needs to further address management needs by January 1, 2002 (USGS lead);
6. develop an index of river flow, by January 1, 2001, and other tools to document the long-term changes in water quality, living resources, and sea-level rise (USGS lead);
7. evaluate and implement alternative work practices and other policies of Federal agencies in the watershed to reduce vehicle miles traveled (EPA lead);
2. promote funding for research into the effects of road and highway construction on growth and development within the Chesapeake Bay watershed, and on increasing storm water flow and inputs of nutrients and toxics to the Bay and its tributaries, including air pollution and land use changes (FHWA lead);
3. give preference to re-use and recycling of Federal brownfield sites, and discourage development in greenfield sites (EPA lead);
4. fully cooperate with local governments, states, and other Federal agencies in carrying out voluntary and mandatory actions to comply with the management of storm water (EPA lead);
5. encourage construction design that: a) minimizes natural area loss on new and rehabilitated Federal facilities; b) adopts low impact development and best management technologies for storm water, sediment and erosion control, and reduces impervious surfaces; c) utilizes energy efficient technologies; and d) considers the Conservation Landscaping and Bay-Scapes Guide for Federal Land Managers (GSA lead);
6. develop, by January 1, 2000, a protocol by which Federal facilities proposed for relocation or major expansion within the Chesapeake Bay watershed will assess the direct and secondary ecological, economic, and community effects (DoD lead);
7. increase public access to the Chesapeake Bay, with at least 200 additional miles of Federally-owned shoreline and tidal waters opened or enhanced for public access by January 1, 2005, and participate in the development of water trails to improve access and appreciation of the Bay and its resources (NPS lead); and
8. establish annual meetings, beginning in 1999, with the Office of Management and Budget to assess regional impacts associated with major Federally-funded actions in the Chesapeake Bay watershed (EPA lead).

Finally, we agree to supplement our biennial reporting on the 1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay with progress in the implementation of this new unified plan, beginning April 1, 1999 (EPA lead).

FOR THE ENVIRONMENTAL PROTECTION AGENCY



Carol M. Browner
Carol M. Browner, Administrator

Jonathan C. Fox
Jonathan C. Fox, Assistant Administrator
for Water

W. Michael McCabe
W. Michael McCabe, Regional Administrator,
Region III

William Matuszeski
William Matuszeski, Director, Chesapeake
Bay Program Office

FOR THE DEPARTMENT OF THE INTERIOR



Bruce Babbitt
Bruce Babbitt, Secretary

Donald J. Barry
Donald J. Barry, Assistant Secretary for
Fish & Wildlife & Parks

Patricia J. Beneke
Patricia J. Beneke, Assistant Secretary for
Water & Science

FOR THE FISH AND WILDLIFE SERVICE



Jamie Rappaport Clark
Jamie Rappaport Clark, Director

FOR THE U.S. GEOLOGICAL SURVEY



Thomas J. Casadevall
Thomas J. Casadevall, Acting Director

FOR THE NATIONAL PARK SERVICE



Robert G. Stanton
for Robert G. Stanton, Director

FOR THE DEPARTMENT OF DEFENSE




Sherri W. Goodman, Deputy Under Secretary of
Defense for Environmental Security

FOR THE DEPARTMENT OF THE NAVY

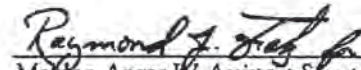



Robert B. Pirie, Jr., Assistant Secretary for
Installations and Environment

FOR THE DEPARTMENT OF THE ARMY

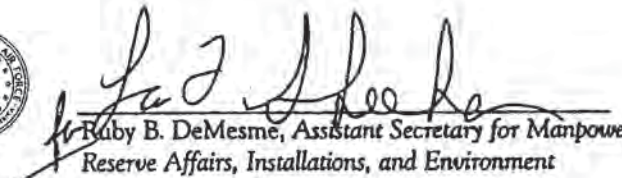



Joseph W. Westphal, Assistant Secretary for Civil Works


Malton Apgar IV, Assistant Secretary for
Installations, Logistics and Environment

FOR THE DEPARTMENT OF THE AIR FORCE




Ruby B. DeMesme, Assistant Secretary for Manpower,
Reserve Affairs, Installations, and Environment

FOR THE DEFENSE LOGISTICS AGENCY




Lt. Gen. Henry T. Glisson, Director

FOR THE DEPARTMENT OF TRANSPORTATION




Rodney E. Slater, Secretary

FOR THE U.S. COAST GUARD




Admiral James M. Loy, Commandant

FOR THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION




D. James Baker, Administrator

FOR THE DEPARTMENT OF AGRICULTURE



Blanca Huerta for
James R. Lyons, Under Secretary for Natural Resources & Environment

FOR THE FARM SERVICE AGENCY



Keith C. Kelly
Keith C. Kelly, Administrator

FOR THE U.S. FOREST SERVICE



Mike Dombeck
Michael P. Dombeck, Chief

FOR THE NATURAL RESOURCES CONSERVATION SERVICE



Pearlie S. Reed
Pearlie S. Reed, Chief

FOR THE GENERAL SERVICES ADMINISTRATION



David J. Barram
David J. Barram, Administrator

FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



Daniel S. Goldin
Daniel S. Goldin, Administrator

FOR THE U.S. POSTAL SERVICE



William J. Henderson
William J. Henderson, Postmaster General and Chief Executive Officer

FOR THE NATIONAL CAPITAL PLANNING COMMISSION



Harvey B. Gantt
Harvey B. Gantt, Chairman

FOR THE SMITHSONIAN INSTITUTION

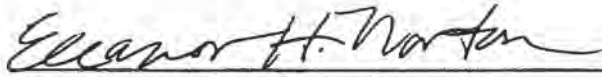


I. Michael Heyman
I. Michael Heyman, The Secretary

OBSERVERS:



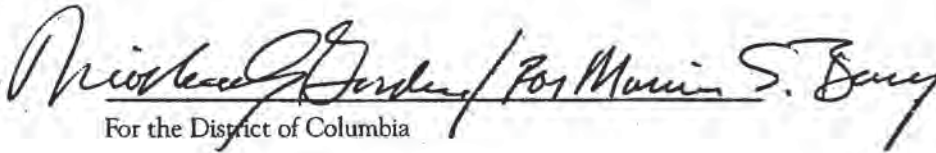
U.S. Senator Paul S. Sarbanes



Congresswoman Eleanor Holmes Norton



For the State of Maryland



For the District of Columbia



For the Chesapeake Bay Commission

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

May 12, 2009

EXECUTIVE ORDER

- - - - -

CHESAPEAKE BAY PROTECTION AND RESTORATION

By the authority vested in me as President by the Constitution and the laws of the United States of America and in furtherance of the purposes of the Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*), and other laws, and to protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed, it is hereby ordered as follows:

PART 1 - PREAMBLE

The Chesapeake Bay is a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world. The Federal Government has nationally significant assets in the Chesapeake Bay and its watershed in the form of public lands, facilities, military installations, parks, forests, wildlife refuges, monuments, and museums.

Despite significant efforts by Federal, State, and local governments and other interested parties, water pollution in the Chesapeake Bay prevents the attainment of existing State water quality standards and the "fishable and swimmable" goals of the Clean Water Act. At the current level and scope of pollution control within the Chesapeake Bay's watershed, restoration of the Chesapeake Bay is not expected for many years. The pollutants that are largely responsible for pollution of the Chesapeake Bay are nutrients, in the form of nitrogen and phosphorus, and sediment. These pollutants come from many sources, including sewage treatment plants, city streets, development sites, agricultural operations, and deposition from the air onto the waters of the Chesapeake Bay and the lands of the watershed.

Restoration of the health of the Chesapeake Bay will require a renewed commitment to controlling pollution from all sources as well as protecting and restoring habitat and living resources, conserving lands, and improving management of natural resources, all of which contribute to improved water quality and ecosystem health. The Federal Government should lead this effort. Executive departments and agencies (agencies), working in collaboration, can use their expertise and resources to contribute significantly to improving the health of the Chesapeake Bay. Progress in restoring the Chesapeake Bay also

more

(OVER)

will depend on the support of State and local governments, the enterprise of the private sector, and the stewardship provided to the Chesapeake Bay by all the people who make this region their home.

PART 2 - SHARED FEDERAL LEADERSHIP, PLANNING, AND ACCOUNTABILITY

Sec. 201. Federal Leadership Committee. In order to begin a new era of shared Federal leadership with respect to the protection and restoration of the Chesapeake Bay, a Federal Leadership Committee (Committee) for the Chesapeake Bay is established to oversee the development and coordination of programs and activities, including data management and reporting, of agencies participating in protection and restoration of the Chesapeake Bay. The Committee shall manage the development of strategies and program plans for the watershed and ecosystem of the Chesapeake Bay and oversee their implementation. The Committee shall be chaired by the Administrator of the Environmental Protection Agency (EPA), or the Administrator's designee, and include senior representatives of the Departments of Agriculture (USDA), Commerce (DOC), Defense (DOD), Homeland Security (DHS), the Interior (DOI), Transportation (DOT), and such other agencies as determined by the Committee. Representatives serving on the Committee shall be officers of the United States.

Sec. 202. Reports on Key Challenges to Protecting and Restoring the Chesapeake Bay. Within 120 days from the date of this order, the agencies identified in this section as the lead agencies shall prepare and submit draft reports to the Committee making recommendations for accomplishing the following steps to protect and restore the Chesapeake Bay:

(a) define the next generation of tools and actions to restore water quality in the Chesapeake Bay and describe the changes to be made to regulations, programs, and policies to implement these actions;

(b) target resources to better protect the Chesapeake Bay and its tributary waters, including resources under the Food Security Act of 1985 as amended, the Clean Water Act, and other laws;

(c) strengthen storm water management practices at Federal facilities and on Federal lands within the Chesapeake Bay watershed and develop storm water best practices guidance;

(d) assess the impacts of a changing climate on the Chesapeake Bay and develop a strategy for adapting natural resource programs and public infrastructure to the impacts of a changing climate on water quality and living resources of the Chesapeake Bay watershed;

(e) expand public access to waters and open spaces of the Chesapeake Bay and its tributaries from Federal lands and conserve landscapes and ecosystems of the Chesapeake Bay watershed;

more

(f) strengthen scientific support for decisionmaking to restore the Chesapeake Bay and its watershed, including expanded environmental research and monitoring and observing systems; and

(g) develop focused and coordinated habitat and research activities that protect and restore living resources and water quality of the Chesapeake Bay and its watershed.

The EPA shall be the lead agency for subsection (a) of this section and the development of the storm water best practices guide under subsection (c). The USDA shall be the lead agency for subsection (b). The DOD shall lead on storm water management practices at Federal facilities and on Federal lands under subsection (c). The DOI and the DOC shall share the lead on subsections (d), (f), and (g), and the DOI shall be lead on subsection (e). The lead agencies shall provide final reports to the Committee within 180 days of the date of this order.

Sec. 203. Strategy for Protecting and Restoring the Chesapeake Bay. The Committee shall prepare and publish a strategy for coordinated implementation of existing programs and projects to guide efforts to protect and restore the Chesapeake Bay. The strategy shall, to the extent permitted by law:

(a) define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals;

(b) identify key measureable indicators of environmental condition and changes that are critical to effective Federal leadership;

(c) describe the specific programs and strategies to be implemented, including the programs and strategies described in draft reports developed under section 202 of this order;

(d) identify the mechanisms that will assure that governmental and other activities, including data collection and distribution, are coordinated and effective, relying on existing mechanisms where appropriate; and

(e) describe a process for the implementation of adaptive management principles, including a periodic evaluation of protection and restoration activities.

The Committee shall review the draft reports submitted by lead agencies under section 202 of this order and, in consultation with relevant State agencies, suggest appropriate revisions to the agency that provided the draft report. It shall then integrate these reports into a coordinated strategy for restoration and protection of the Chesapeake Bay consistent with the requirements of this order. Together with the final reports prepared by the lead agencies, the draft strategy shall be published for public review and comment within 180 days of the date of this order and a final strategy shall be published within 1 year. To the extent practicable and authorized under their existing authorities, agencies may begin implementing core elements of restoration and protection programs and strategies,

more

(OVER)

in consultation with the Committee, as soon as possible and prior to release of a final strategy.

Sec. 204. Collaboration with State Partners. In preparing the reports under section 202 and the strategy under section 203, the lead agencies and the Committee shall consult extensively with the States of Virginia, Maryland, Pennsylvania, West Virginia, New York, and Delaware and the District of Columbia. The goal of this consultation is to ensure that Federal actions to protect and restore the Chesapeake Bay are closely coordinated with actions by State and local agencies in the watershed and that the resources, authorities, and expertise of Federal, State, and local agencies are used as efficiently as possible for the benefit of the Chesapeake Bay's water quality and ecosystem and habitat health and viability.

Sec. 205. Annual Action Plan and Progress Report. Beginning in 2010, the Committee shall publish an annual Chesapeake Bay Action Plan (Action Plan) describing how Federal funding proposed in the President's Budget will be used to protect and restore the Chesapeake Bay during the upcoming fiscal year. This plan will be accompanied by an Annual Progress Report reviewing indicators of environmental conditions in the Chesapeake Bay, assessing implementation of the Action Plan during the preceding fiscal year, and recommending steps to improve progress in restoring and protecting the Chesapeake Bay. The Committee shall consult with stakeholders (including relevant State agencies) and members of the public in developing the Action Plan and Annual Progress Report.

Sec. 206. Strengthen Accountability. The Committee, in collaboration with State agencies, shall ensure that an independent evaluator periodically reports to the Committee on progress toward meeting the goals of this order. The Committee shall ensure that all program evaluation reports, including data on practice or system implementation and maintenance funded through agency programs, as appropriate, are made available to the public by posting on a website maintained by the Chair of the Committee.

PART 3 - RESTORE CHESAPEAKE BAY WATER QUALITY

Sec. 301. Water Pollution Control Strategies. In preparing the report required by subsection 202(a) of this order, the Administrator of the EPA (Administrator) shall, after consulting with appropriate State agencies, examine how to make full use of its authorities under the Clean Water Act to protect and restore the Chesapeake Bay and its tributary waters and, as appropriate, shall consider revising any guidance and regulations. The Administrator shall identify pollution control strategies and actions authorized by the EPA's existing authorities to restore the Chesapeake Bay that:

(a) establish a clear path to meeting, as expeditiously as practicable, water quality and environmental restoration goals for the Chesapeake Bay;

(b) are based on sound science and reflect adaptive management principles;

more

- (c) are performance oriented and publicly accountable;
- (d) apply innovative and cost-effective pollution control measures;
- (e) can be replicated in efforts to protect other bodies of water, where appropriate; and
- (f) build on the strengths and expertise of Federal, State, and local governments, the private sector, and citizen organizations.

Sec. 302. Elements of EPA Reports. The strategies and actions identified by the Administrator of the EPA in preparing the report under subsection 202(a) shall include, to the extent permitted by law:

- (a) using Clean Water Act tools, including strengthening existing permit programs and extending coverage where appropriate;
- (b) establishing new, minimum standards of performance where appropriate, including:
 - (i) establishing a schedule for the implementation of key actions in cooperation with States, local governments, and others;
 - (ii) constructing watershed-based frameworks that assign pollution reduction responsibilities to pollution sources and maximize the reliability and cost-effectiveness of pollution reduction programs; and
 - (iii) implementing a compliance and enforcement strategy.

PART 4 - AGRICULTURAL PRACTICES TO PROTECT THE CHESAPEAKE BAY

Sec. 401. In developing recommendations for focusing resources to protect the Chesapeake Bay in the report required by subsection 202(b) of this order, the Secretary of Agriculture shall, as appropriate, concentrate the USDA's working lands and land retirement programs within priority watersheds in counties in the Chesapeake Bay watershed. These programs should apply priority conservation practices that most efficiently reduce nutrient and sediment loads to the Chesapeake Bay, as identified by USDA and EPA data and scientific analysis. The Secretary of Agriculture shall work with State agriculture and conservation agencies in developing the report.

PART 5 - REDUCE WATER POLLUTION FROM FEDERAL LANDS AND FACILITIES

Sec. 501. Agencies with land, facilities, or installation management responsibilities affecting ten or more acres within the watershed of the Chesapeake Bay shall, as expeditiously as practicable and to the extent permitted by law, implement land management practices to protect the Chesapeake Bay and its

more

(OVER)

tributary waters consistent with the report required by section 202 of this order and as described in guidance published by the EPA under section 502.

Sec. 502. The Administrator of the EPA shall, within 1 year of the date of this order and after consulting with the Committee and providing for public review and comment, publish guidance for Federal land management in the Chesapeake Bay watershed describing proven, cost-effective tools and practices that reduce water pollution, including practices that are available for use by Federal agencies.

PART 6 - PROTECT CHESAPEAKE BAY AS THE CLIMATE CHANGES

Sec. 601. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct research and scientific assessments to support development of the strategy to adapt to climate change impacts on the Chesapeake Bay watershed as required in section 202 of this order and to evaluate the impacts of climate change on the Chesapeake Bay in future years. Such research should include assessment of:

- (a) the impact of sea level rise on the aquatic ecosystem of the Chesapeake Bay, including nutrient and sediment load contributions from stream banks and shorelines;
- (b) the impacts of increasing temperature, acidity, and salinity levels of waters in the Chesapeake Bay;
- (c) the impacts of changing rainfall levels and changes in rainfall intensity on water quality and aquatic life;
- (d) potential impacts of climate change on fish, wildlife, and their habitats in the Chesapeake Bay and its watershed; and
- (e) potential impacts of more severe storms on Chesapeake Bay resources.

PART 7 - EXPAND PUBLIC ACCESS TO THE CHESAPEAKE BAY AND CONSERVE LANDSCAPES AND ECOSYSTEMS

Sec. 701. (a) Agencies participating in the Committee shall assist the Secretary of the Interior in development of the report addressing expanded public access to the waters of the Chesapeake Bay and conservation of landscapes and ecosystems required in subsection 202(e) of this order by providing to the Secretary:

- (i) a list and description of existing sites on agency lands and facilities where public access to the Chesapeake Bay or its tributary waters is offered;
- (ii) a description of options for expanding public access at these agency sites;
- (iii) a description of agency sites where new opportunities for public access might be provided;
- (iv) a description of safety and national security issues related to expanded public access to Department of Defense installations;

- (v) a description of landscapes and ecosystems in the Chesapeake Bay watershed that merit recognition for their historical, cultural, ecological, or scientific values; and
- (vi) options for conserving these landscapes and ecosystems.

(b) In developing the report addressing expanded public access on agency lands to the waters of the Chesapeake Bay and options for conserving landscapes and ecosystems in the Chesapeake Bay, as required in subsection 202(e) of this order, the Secretary of the Interior shall coordinate any recommendations with State and local agencies in the watershed and programs such as the Captain John Smith Chesapeake National Historic Trail, the Chesapeake Bay Gateways and Watertrails Network, and the Star-Spangled Banner National Historic Trail.

PART 8 - MONITORING AND DECISION SUPPORT FOR ECOSYSTEM MANAGEMENT

Sec. 801. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct their monitoring, research, and scientific assessments to support decisionmaking for the Chesapeake Bay ecosystem and to develop the report addressing strengthening environmental monitoring of the Chesapeake Bay and its watershed required in section 202 of this order. This report will assess existing monitoring programs and gaps in data collection, and shall also include the following topics:

- (a) the health of fish and wildlife in the Chesapeake Bay watershed;
- (b) factors affecting changes in water quality and habitat conditions; and
- (c) using adaptive management to plan, monitor, evaluate, and adjust environmental management actions.

PART 9 - LIVING RESOURCES PROTECTION AND RESTORATION

Sec. 901. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, identify and prioritize critical living resources of the Chesapeake Bay and its watershed, conduct collaborative research and habitat protection activities that address expected outcomes for these species, and develop a report addressing these topics as required in section 202 of this order. The Secretaries of Commerce and the Interior shall coordinate agency activities related to living resources in estuarine waters to ensure maximum benefit to the Chesapeake Bay resources.

PART 10 - EXCEPTIONS

Sec. 1001. The heads of agencies may authorize exceptions to this order, in the following circumstances:

- (a) during time of war or national emergency;

more

(OVER)

(b) when necessary for reasons of national security;

(c) during emergencies posing an unacceptable threat to human health or safety or to the marine environment and admitting of no other feasible solution; or

(d) in any case that constitutes a danger to human life or a real threat to vessels, aircraft, platforms, or other man-made structures at sea, such as cases of *force majeure* caused by stress of weather or other act of God.

PART 11 - GENERAL PROVISIONS

Sec. 1101. (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department, agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

BARACK OBAMA

THE WHITE HOUSE,
May 12, 2009.

#



RESOLUTION to Enhance Federal Cooperative Conservation in the Chesapeake Bay Program

WHEREAS, the Chesapeake Bay is a national treasure and historically the most productive estuary in the world, and

WHEREAS, the federal, state, and local governments and citizens of the watershed have worked in partnership to stop the decline and accelerate the restoration of the Chesapeake Bay for over 20 years, and

WHEREAS, the Chesapeake Bay Program is regarded as a national and international model for managing a complex ecosystem, and

WHEREAS, federal agencies have a unique and critical role to play in support of restoration and conservation programs and activities in the watershed, and

WHEREAS, federal agencies have entered into individual agreements in support of the Chesapeake Bay Program, and

WHEREAS, there is a need to enhance federal cooperation for monitoring, management, conservation, and restoration activities in the Chesapeake Bay and its tributaries in order to meet Chesapeake ecosystem protection and restoration goals, and

WHEREAS, in August 2004 the President issued an Executive Order to federal agencies that oversee environmental and natural resource policies and programs to promote cooperative conservation in collaboration with states, local governments, tribes and individuals.



Now, THEREFORE BE IT RESOLVED, that the federal agencies rededicate themselves to cooperative conservation in support of the Chesapeake Bay Program Partnership and will:

- ❖ Strengthen shared goals and performance measures within mutual strategic areas of Bay restoration under the *Chesapeake 2000* Agreement.
- ❖ Cooperate with the “Chesapeake Bay Watershed Assistance Network” to provide resource managers, local governments, watershed associations and landowners with more effective access to appropriate programs of Federal and state agencies, in order to accelerate restoration of the Chesapeake Bay and its tidal tributaries.
- ❖ Convene an annual meeting of federal agency representatives to advise the Chesapeake Executive Council on federal support of the Bay Program, to identify restoration, management or monitoring initiatives of mutual federal interest, and to identify geographic areas of targeted action.
- ❖ Broaden cooperative conservation activities with states, local governments, communities, private for-profit and non-profit organizations, and citizens.
- ❖ Improve communication among agencies and constituencies, and enhance and integrate public and private watershed stewardship.

DATE: October 7, 2005

FOR THE ENVIRONMENTAL PROTECTION AGENCY



[Handwritten signature of Stephen L. Johnson]

Stephen L. Johnson, Administrator

[Handwritten signature of Benjamin H. Grumbles]

Benjamin H. Grumbles, Assistant Administrator for Water

[Handwritten signature of Donald S. Welsh]

Donald S. Welsh, Regional Administrator, Region III

[Handwritten signature of Rebecca W. Hammer]

Rebecca W. Hammer, Director,
Chesapeake Bay Program Office

FOR THE NATIONAL OCEANIC &
ATMOSPHERIC ADMINISTRATION



[Handwritten signature of Timothy R.E. Keeney]

Timothy R.E. Keeney, Deputy Assistant Secretary for
Oceans and Atmosphere, U.S. Department of Commerce

[Handwritten signature of Lowell Bahner]

Lowell Bahner, Director, NOAA Chesapeake Bay Office

FOR THE DEPARTMENT OF AGRICULTURE



[Handwritten signature of Meryn Carlson]

Meryn Carlson, Deputy Under Secretary for
Natural Resources & Environment

FOR THE U.S. FOREST SERVICE



[Handwritten signature of Kent Connaughton]

Kent Connaughton, Associate Deputy Chief, State and
Private Forestry

FOR THE DEPARTMENT OF THE INTERIOR



[Handwritten signature of Paul Hoffman]

Paul Hoffman, Deputy Assistant Secretary for Fish,
Wildlife and Parks

FOR THE U.S. FISH AND WILDLIFE SERVICE



[Handwritten signature of Matt Hogan]

Matt Hogan, Acting Director

FOR THE U.S. GEOLOGICAL SURVEY



[Handwritten signature of Patrick Leahy]

Patrick Leahy, Acting Director

FOR THE NATIONAL PARK SERVICE



Michael A. Soukup

Michael A. Soukup, Associate Director,
Natural Resource Stewardship and Science

FOR THE DEPARTMENT OF DEFENSE



Alex Beehler

Alex Beehler, Assistant Deputy Under Secretary of
Defense (Environment, Safety and Occupational Health)

FOR THE DEPARTMENT OF THE NAVY



Donald R. Schregardus

Donald R. Schregardus, Deputy Assistant Secretary
of the Navy (Environment)

FOR THE DEPARTMENT OF THE ARMY



John Paul Woodley, Jr.

John Paul Woodley, Jr., Assistant Secretary of the Army,
Civil Works

FOR THE DEPARTMENT OF HOMELAND SECURITY



Juan Reyes

Juan Reyes, Director,
Office of Safety and Environmental Programs

FOR THE U.S. COAST GUARD



D. G. Gabel

Rear Admiral D. G. Gabel, Assistant Commandant for
Engineering and Logistics

FOR THE DEPARTMENT OF TRANSPORTATION



Fred Skaer

Fred Skaer, Director, Office of Project Development and
Environmental Review, Federal Highway Administration

FOR THE GENERAL SERVICES ADMINISTRATION



Donald C. Williams

Donald C. Williams, Regional Administrator,
National Capital Region

FOR THE NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION



Olga Dominguez

Olga Dominguez, Deputy Assistant Administrator
for Infrastructure and Administration

FOR THE OFFICE OF THE
FEDERAL ENVIRONMENTAL EXECUTIVE



Edwin Piñero

Edwin Piñero, Federal Environmental Executive

APPENDIX F: WETLANDS JURISDICTIONAL
DETERMINATION, PERMITS, AND MITIGATION
PLAN



DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 27, 2015

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2009-02459 (Little Creek)

Navy MidAtlantic Region
Mr. Mike Jones
Code N-45, Regional Environmental Group
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Mr. Jones:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) for the Joint Expeditionary Base Little Creek (JEBLC) in Virginia Beach, Virginia.

Figures 1, 2 and 3 entitled "Site Location and Aquatic Resource Map Joint Expeditionary Base Little Creek Virginia Beach, Virginia" dated July 2015 by TetraTech provide the locations of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark.

The Norfolk District has relied on the information and data provided by the applicant or agent. If such information and data subsequently prove to be materially false or materially incomplete, this verification may be suspended or revoked, in whole or in part, and/or the Government may institute appropriate legal proceedings.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination. This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application.

The "Preliminary Jurisdictional Determination Form" is enclosed. Please review the document, sign, and return a copy to the Corps Regulatory Office (Melissa Nash, 803 Front St. Norfolk, VA 23510) within 30 days of receipt and keep a copy for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact me at 757-201-7489 or melissa.a.nash@usace.army.mil.

Sincerely,

A handwritten signature in black ink that reads "Melissa A. Nash". The signature is written in a cursive style.

Melissa A. Nash
Project Manager

Enclosure:

Preliminary Jurisdictional Determination Form



DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

February 29, 2016

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2004-02323 (Atlantic Ocean)

Navy MidAtlantic Region
Mr. Mike Jones
Code N-45, Regional Environmental Group
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Mr. Jones:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) for the approximately 1,500 acre Joint Expeditionary Base-Fort Story (JEBFC) in Virginia Beach, Virginia.

The map entitled "JEB Fort Story, USACE Confirmed [sic] Wetland Boundaries" by the Commander Navy Region Mid-Atlantic GeoReadiness Center (copy enclosed) provides the locations of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark. The limit of our authority under Section 10 of the Rivers & Harbors Act in the overall project area extends to the mean high water mark, which was not flagged in the field or located by Global Positioning System units.

The Norfolk District has relied on the information and data provided by the applicant or agent. If such information and data subsequently prove to be materially false or materially incomplete, this verification may be suspended or revoked, in whole or in part, and/or the Government may institute appropriate legal proceedings.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not

authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination. This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application.

The "Preliminary Jurisdictional Determination Form" is enclosed. Please review the document, sign, and return a copy to the Corps Regulatory Office (Melissa Nash, 803 Front St. Norfolk, VA 23510) within 30 days of receipt and keep a copy for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact me at 757-201-7489 or melissa.a.nash@usace.army.mil.

Sincerely,



Melissa A. Nash
Project Manager

Enclosure:

Preliminary Jurisdictional Determination Form

CC:

Pete Crum, NAVFAC MIDLANT
Thad McDonald, Naval Facilities Engineering Command Atlantic

Enclosure 1

U.S. Army Corps of Engineers Norfolk District Wetlands Delineation Letter (2005)



U.S. Army Corps of Engineers
Norfolk District, Southern Virginia Regulatory Section
803 Front Street
Norfolk, Virginia 23510

February 1, 2005

Project Number: 04-R2445

Waterway: Atlantic Ocean / Broad Creek

1. Participant:

U.S. Army, Fort Eustis
U.S. Army Transportation Center
Fort Eustis, VA 23604-5306

2. Authorized Agent:

Mr. Timothy P. Christensen, MS, CHMM
US Army Transportation Center
ATTN: ATZF-PWE
Directorate of Public Works
Fort Eustis, VA 23604-5306

3. Address of Job Site:

The existing Fort Story military installation (approximately 1500 acres overall) at Cape Henry in Virginia Beach, Virginia.

4. Project Description:

Confirmation of wetlands delineation as depicted on the project drawing entitled *Fort Story, Final Wetland Delineation, U.S. Army Corps of Engineers Regulatory Branch*, January 2005 developed by the Norfolk District.

5. Findings

An on-site Jurisdictional Determination (JD) has found waters and wetlands regulated under Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) on the job site listed above. Our basis for this determination is the application of the Corps of Engineers Wetlands Delineation Manual (1987) and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation. A formal JD has only been provided for 3 different portions of Fort Story: an e-mail only JD dated 29 November 2004 for the ~5-acre RADHAZ-SESEF undeveloped property situated east of the intersection of Atlantic Avenue and Captain Henry Road (and shoreward of the high tide line); 27 Oct 2004 JD letter for the ~94-acre Five Forks training area in the southwest corner of Atlantic Avenue and Yung Tau Road; and an 08 Oct 2004 JD letter for the ~176-acre RCI project area near the East Gate. The jurisdictional wetlands in these areas are waters of the United States pursuant to 33 CFR 328.3(a)(7) (wetlands adjacent to other waters of the United States). The limit of our Section 10 authority in the overall project area extends to the mean high water mark, which was not flagged in the field or located by GPS.

Per the Fort Story Wetland Delineation Project Management Plan (PMP) signed by Fort Eustis on 03 June 2004, the Norfolk District Corps of Engineers Regulatory Branch was contracted to delineate all onsite wetlands by applying the Corps of Engineers Wetlands Delineation Manual (1987) and subsequent guidance. As described in the PMP this wetland delineation effort did not distinguish between those wetlands currently regulated by the Corps and isolated waters/wetlands that may not be regulated by the Corps. This wetland delineation includes all jurisdictional waters of the U.S. at Fort Story that may be regulated by the Corps even though the jurisdictional status of each and every wetland area has not been formally done by our office. The decision regarding whether a particular wetland/waterbody is regulated by the Corps will be made on a case-by-case basis by the Norfolk District Corps of Engineers, Regulatory Branch.

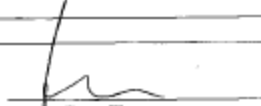
This letter confirms the flagged wetlands delineation performed by Norfolk District Corps of Engineers Regulatory staff for the above-listed property. The approximate limits of the wetland areas have generally been identified on the above-referenced figure which was generated using a Geographical Information System that incorporated the location of wetland delineation flags that had been field-located using a sub-meter Trimble Geographical Positioning System (enclosed CD has digital information). Overall 133 different wetland areas were identified, and designated with a number (W-1 through W-146). Because the fieldwork was done by different teams on different days, there are not 146 consecutively numbered different wetland areas (i.e., there are no Wetland Areas 71, 77-79, 114-119 or 136-139; there are Wetland Areas 3A, 3B & 3C). Some forested upland islands/ridges within larger wetland systems (e.g., W-96 and W-102) that are not currently being used as roads were not delineated or depicted on the above-referenced figure. This delineation figure is only as accurate as the GPS unit used to field-locate the wetland delineation flags.

A condition of this verification is that you maintain the locations of the wetland delineation flags as they now are situated on the site. Once a plan of development is formulated it would be in your best interest to have the actual wetland boundary superimposed on any future proposed plan to determine whether wetlands would be impacted by the proposed development, request that our office provide a formal jurisdictional determination for any wetlands in the project area, and to determine whether a Department of the Army permit would be required. The Corps routinely assesses potential wetland impacts resulting from access roadways, lot fills/grading, proposed stormwater management design, placement of utility lines, and other applicable infrastructure. This wetlands jurisdictional delineation is valid for a period of five (5) years from the date of this letter unless new information warrants revision of the delineation before the expiration date. This is simply a verification of the wetlands delineation for the subject property. Proposed

work on the property which would potentially result in the placement of dredged or fill material into waters or wetlands of the United States would be subject to review by the Corps and any appropriate State and local agencies prior to the start of any such fill activities. The term *discharge of dredged material* is defined as any addition, including sediment other than incidental fall back, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized landclearing; and in some cases, ditching, channelization, or other excavation (40 CFR Part 232.2(1)(ii) as amended and 33 CFR 323.2(d)(1)(iii) as amended).

This delineation/determination was conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work. Please obtain all required permits before starting work in the waters of the United States (including wetlands) on the subject property. Any proposed work in waters of the United States may also require a Virginia Water Protection Permit from the Water Division of the Virginia Department of Environmental Quality - Tidewater Regional Office (DEQ-TRO). The DEQ-TRO can be reached at telephone (757) 518-2000, or at: Virginia Department of Environmental Quality, Tidewater Regional Office, 5636 Southern Blvd., Virginia Beach, Virginia 23462.

6. Corps Contact: David Kaepper at (757) 201-7488.



J. Robert Hume, III
Chief, Regulatory Branch

Enclosure 2
Wetland Permits, Mitigation Plan and Related Reports for the Small Arms Test and Evaluation Compound (2006)



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE
5636 Southern Boulevard, Virginia Beach, Virginia 23462
(757) 518-2000 Fax (757) 518-2103
www.deq.virginia.gov

Patrick Ryan
Secretary of Natural Resources

David K. Taylor
Director

Francis L. Daniel
Regional Director

July 14, 2006

Mr. E. Trent Spencer, P.E.
U.S. Department of the Army
c/o Mr. Tim Christensen
U.S. Army Garrison, Environmental Division
1407 Washington Boulevard
Fort Eustis, Virginia 23604

RE: VWP General Permit Authorization Number WP4-05-2935
Fort Stoen Small Arms Training Facility
Virginia Beach, Virginia

Dear Mr. Spencer:

The Virginia Department of Environmental Quality (DEQ) has reviewed your application received on December 19, 2005 and deemed complete on June 29, 2006. Based on DEQ's review, the proposed project qualifies for the VWP General Permit Number WP4. The enclosed copy of the VWP general permit authorization contains the applicable limits, reporting requirements, and other conditions for authorization.

Please note that the requirements to provide compensation for impacts to 0.85 acres of non-tidal forested wetlands via on-site creation, and to avoid all bluejack oaks (*Quercus incana*) in areas of land disturbance have been included as Authorization Notes on the VWP Permit Authorization Cover Page.

A Compliance Summary Sheet is attached for your convenience. Please note that you are responsible for compliance with all of the conditions of the authorization applicable to your project scope of work, not just the items on the summary sheet.

This authorization expires five years from the Authorization Effective Date. Please note that this authorization may be continued at the State Water Control Board's discretion, as per the VWP permit regulations. If the authorized activity has not been completed and you wish to obtain continuation of coverage authorization, the permittee must request this continuation no less than 60 days prior to the authorization expiration date of the original VWP general permit authorization or the authorization will expire on the original authorization expiration date.

If you have any questions, please contact Ryan Wine at 757-518-2024 or rdwine@deq.virginia.gov.

Sincerely,


Bert W. Parolari, Jr.
Virginia Water Protection Permit Manager

Enclosure: VWP General Permit Authorization; Compliance Summary Sheet

cc: Dave Knepper, U.S. Army Corps of Engineers
VWP file WP4-05-2935

VWP General Permit Authorization No. WP4-05-2935
Compliance Summary Sheet
Page 1 of 3

The following summarizes typical notification, monitoring, and reporting requirements outlined in the authorization. The permittee should review each condition for specific details. Please note that you are responsible for compliance with all conditions of the authorization applicable to the project, not just the items listed below.

Construction Requirements

Flagging of Nonimpacted surface waters. Prior to construction surface waters within 50 feet of any permitted activities and within the project or right-of-way limits shall be clearly flagged or marked for the life of the construction activity at that location. (Part I C 10)

Temporary disturbances and temporarily stockpiled materials. All temporarily disturbed wetland areas shall be restored to pre-construction conditions within 30 days of completing work. All temporarily impacted streams and streambanks shall be restored to their original contours within 30 days following the construction at that stream segment. All materials temporarily stockpiled in wetlands shall be placed on mats or geotextile fabric, immediately stabilized to prevent entry into state waters, managed such that leachate does not enter state waters, and completely removed within 30 days following completion of that construction activity. Disturbed areas shall be returned to original contours, restored within 30 days following removal of the stockpile. Changes in temporary impacts shall require written notification to DEQ. (Parts I A 3, I C 11, and I C 12)

Utility work in surface waters and temporary sidecasting of materials. All utility line work in surface waters shall be performed in a manner that minimizes disturbance, and the area must be returned to its original contours and restored within 30 days of completing work in the area. Material resulting from trench excavation may be temporarily sidecast into wetlands not to exceed a total of 90 days. (Parts I E 1 and I E 2)

Construction Monitoring. Monitoring shall document the pre-construction conditions, activities during construction, and post-construction conditions and shall consist of one of the following options: (1) photographs taken at the end of the first, second and third months of construction, and then semi-annually for the remainder of the construction project; (2) an ortho-rectified photograph taken by a firm specializing in ortho-rectified photography prior to construction, and annually thereafter until all impacts are taken; or (3) submit a written narrative that summarizes site construction activities in impact areas. The narrative shall be submitted at the end of the first, second, and third months of construction in impact areas, and then semi-annually for the remainder of the construction activities in impact areas. (Part II D 1-3)

Notification of Construction. Submit a written notification at least 10 calendar days prior to the start of construction activities at the first permitted site authorized by this VWP general permit authorization. (Part II E 2)

Construction Monitoring Reports. Submit not later than the 10th day of the month following the month in which the monitoring event specified in Part II D takes place. (Part II E 3)

Notification of End Construction. Submit a written notification within 30 calendar days following the completion of construction activities in all permitted impact areas. (Part II E 4)

Notice of Unusual or Potentially Complex Conditions. Notification is required for unusual or potentially complex conditions that require debris removal or involve potentially toxic substances. (Part II E 7)

VWP General Permit Authorization No. WP4-05-2935
Compliance Summary Sheet
Page 2 of 3

Notice of Fish Kills, or Oil or Fuel Spills. Immediate notification is required. (Part II E 8)

Notice of Violation of State Water Quality Standards. Notification is required within 24 hours. (Part II E 9)

Wetland Compensation Requirements

Modification of Compensation Requirements. Modification to compensation requirements may be approved at the request of the permittee when a decrease in the amount of authorized surface waters impacts occurs, provided that the adjusted compensation meets the initial authorization compensation goals. (Part I A 4)

Final Compensatory Mitigation Plan. Submit plan prior to construction activities in permitted impact areas. DEQ has 30-calendar days to review and provide written comments or the plan is automatically approved. Deviations to the approved plan must be submitted and approved by DEQ prior to initiation. (Parts II A 7, II A 8, and II A 11)

Compensatory Mitigation Construction. All work in permitted impact areas shall cease if compensation site construction has not commence within 180 days of commencement of project construction, unless otherwise authorized by the board. (Part II A 12)

Notification of Construction. Submit a written notification at least 10 calendar days prior to the start of construction activities at the compensation site authorized by this VWP general permit authorization. (Part II A 13)

Compensation Site Correction Action Plan. If the wetland compensation area fails to meet the specified success criteria in a monitoring year (with the exception of the final monitoring year), the reasons for this failure shall be determined and a corrective action plan (including proposed actions, a schedule, and monitoring plan) shall be submitted to DEQ for approval with or before that year's monitoring report. (Parts II A 20 and II A 21)

Compensation Site Wetland Boundary. Submit final boundary(ies), broken out by wetland type, by the end of the monitoring cycle. (Part II A 22)

Post-Grading Survey. An as-built ground survey, or an aerial survey provided by a firm specializing in aerial surveys, shall be conducted for the entire compensation site or sites including invert elevations for all water elevation control structures and spot elevations throughout the site or sites. The survey shall be submitted to DEQ within 60 days of completing compensation site construction. Any changes or deviations in the as-built survey or aerial survey shall be shown on the survey and explained in writing. (Part II B 1)

Compensation Site Photographs. Photographs shall be taken at the compensation site or sites after the initial planting and at a time specified in the final compensation plan during every monitoring year. (Part II B 2)

Compensation Mitigation Site Monitoring. Monitoring shall begin on the first day of the first complete growing season (monitoring year 1) after wetland compensation site construction activities, including planting, have been completed. Monitoring is required for years 1, 2, 3, and 5, assuming all success criteria are met in the last year. (Part II B 3)

Compensatory Mitigation Monitoring Reports. Submit by December 31st of each monitoring year. (Parts II B 8 and II E 6)

VWP General Permit Authorization No. WP4-05-2935
Compliance Summary Sheet
Page 3 of 3

Requests for Authorization Changes

Notice of Planned Change. Submit request for additional surface water impacts, less surface water impacts, change in project plans that does not include a change in impacts, change from one mitigation bank to another, or typographical errors, prior to taking impacts. (Parts I A 2 and III I)

Continuation of Coverage. Submit request if all permit conditions cannot be completed by expiration date. The permittee should request the Continuation of Coverage no less than 60 days prior to the expiration date of the VWP general permit authorization to allow for processing. (Part I B)

Termination by Consent. Authorization may be terminated by consent when all permitted activities have been completed, when the authorized impacts will not occur, or when a planned change occurs that involves substituting a specified, approved mitigation bank(s) with another specified, approved mitigation bank. If a termination by consent is desired, the permittee shall submit a request for termination by consent within 30 days of project completion or project cancellation. (Part III K)



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

5636 Southern Boulevard, Virginia Beach, Virginia 23462

(757) 518-2000 Fax (757) 518-2103

www.deq.virginia.gov

Princess Ann
Secretary of Natural Resources

David K. Payler
Director

Francis L. Dowd
Regional Director

VWP General Permit No. WP4

VWP General Permit Authorization No. WP4-05-2935

Authorization Effective Date: July 14, 2005

Authorization Expiration Date: July 13, 2011

VWP GENERAL PERMIT FOR IMPACTS FROM DEVELOPMENT AND CERTAIN MINING ACTIVITIES UNDER THE VIRGINIA WATER PROTECTION PERMIT AND THE VIRGINIA STATE WATER CONTROL LAW

Based upon an examination of the information submitted by the applicant and in compliance with §401 of the Clean Water Act as amended (33 USC 1341) and the State Water Control Law and regulations adopted pursuant thereto, the board has determined that there is a reasonable assurance that the activity authorized by this VWP general permit, if conducted in accordance with the conditions set forth herein, will protect instream beneficial uses and will not violate applicable water quality standards. The board finds that the effect of the impact, together with other existing or proposed impacts to wetlands, will not cause or contribute to a significant impairment of state waters or fish and wildlife resources.

Subject to the provisions of the Clean Water Act, as amended, and pursuant to the State Water Control Law and regulations adopted pursuant to it, the permittee is authorized to impact up to two acres of non-tidal surface waters, including up to 500 linear feet of perennial stream channel and up to 1,500 linear feet of nonperennial stream channel.

Permittee: U.S. Department of the Army, c/o Mr. E. Trent Spencer, P.E.

Address: 1407 Washington Boulevard, Fort Eustis, Virginia 23604

Activity Location: The proposed project is located on a 12-acre parcel within the Five Forks Training Area on the grounds of Fort Story, in the City of Virginia Beach. Atlantic Avenue serves as the eastern boundary of the parcel and Vunj Jay Road serves as the parcel's southern boundary.

Activity Description: The permittee proposes to construct an urban combat training facility to meet research, testing and training requirements for U.S. Military Special Operations Forces. The project will permanently impact 0.85 acres of non-tidal forested wetlands.

Authorization Notes: To compensate for the authorized permanent impacts to wetlands as described in the Activity Description section above, the applicant is required create 1.7 acres of non-tidal forested wetlands on-site. In order to ensure preservation of the compensation site, the applicant will incorporate the boundaries of the compensation site into Fort Story's GIS layer of the Integrated Natural Resources Management Plan (INRMP). As part of the incorporation of the site into the INRMP, the applicant will post signs along its boundaries designating the area as a mitigation site along with notices of site restrictions. Incorporation of the site into the INRMP will alert land managers to its existence and will prevent unauthorized disturbance of the site. A requirement will be incorporated into the INRMP that no alteration of the system will be permitted without coordination and approval of the Department of Environmental Quality. A monitoring program, which ensures a minimum of 90% per acre success rate, will also be incorporated into the INRMP.

VWP General Permit Authorization No. WP4-05-2935

Cover Page 2 of 2

To address concerns raised by the Virginia Department of Conservation and Recreation pertaining to the bluejack oak (Quercus incana), the permittee is required avoid all bluejack oaks in areas of land disturbance associated with this project.

The authorized activity shall be in accordance with this cover page, Part I--Special Conditions, Part II--Compensation, Monitoring, and Reporting, and Part III--Conditions Applicable to All VWP Permits, as set forth herein.

Bert W. Parolari, Jr.
Virginia Water Protection Permit Manager

Date

PART I – SPECIAL CONDITIONS

A. Authorized activities

1. This permit authorizes impacts of up to two acres of nontidal surface waters including up to 500 linear feet of perennial stream channel and up to 1,500 linear feet of nonperennial stream channel according to the information provided in the approved application.
2. Any changes to the authorized permanent impacts to surface waters associated with this project shall require either a notice of planned change in accordance with 9VAC25-690-80, or another VWP permit application.
3. Any changes to the authorized temporary impacts to surface waters associated with this project shall require written notification to DEQ and restoration to pre-existing conditions in accordance with the conditions of this permit authorization.
4. Modification to compensation requirements may be approved at the request of the permittee when a decrease in the amount of authorized surface waters impacts occurs, provided that the adjusted compensation meets the initial authorization compensation goals.
5. The activities authorized for coverage under this VWP general permit must commence and be completed within five years of the date of this authorization.

B. Continuation of Coverage

Reapplication for continuation of coverage under this VWP general permit or a new VWP permit may be necessary if any portion of the authorized activities or any VWP permit requirement (including compensation) has not been completed within five years of the date of authorization. Notwithstanding any other provision, a request for continuation of coverage under a VWP general permit in order to complete monitoring requirements shall not be considered a new application, and no application fee will be charged. The request for continuation of coverage must be made no less than 60 days prior to the expiration date of this VWP general permit authorization, at which time the board will determine if continuation of the VWP general permit authorization is necessary.

C. Overall Project Conditions

1. The activities authorized by this VWP general permit shall be executed in a manner so as to minimize any adverse impact on instream beneficial uses as defined in §62.1-10 (b) of the Code of Virginia.
2. No activity may substantially disrupt the movement of aquatic life indigenous to the water body, including those species which normally migrate through the area, unless the primary purpose of the activity is to impound water. Culverts placed in streams must be installed to maintain low flow conditions. The requirement to countersink does not apply to extensions or maintenance of existing culverts that are not countersunk, to floodplain culverts being placed above ordinary high water, to culverts being placed on bedrock, or to culverts required to be placed on slopes 5% or greater. No activity may cause more than minimal adverse effect on navigation. Furthermore the activity must not impede the passage of normal or expected high flows and the structure or discharge must withstand expected high flows.
3. Wet or uncured concrete shall be prohibited from entry into flowing surface waters. Excess or waste concrete shall not be disposed of in flowing surface waters or washed into flowing surface waters.
4. All fill material shall be clean and free of contaminants in toxic concentrations or amounts in accordance with all applicable laws and regulations.

15. The permittee shall conduct activities in accordance with any time-of-year restrictions recommended by the Department of Game and Inland Fisheries or the Virginia Marine Resources Commission, and shall ensure that all contractors are aware of any time-of-year restrictions imposed.
16. Water quality standards shall not be violated as a result of the construction activities, unless allowed by this permit authorization.
17. Untreated stormwater runoff shall be prohibited from directly discharging into any surface waters, unless allowed by this permit authorization. Appropriate best management practices shall be deemed suitable treatment prior to discharge into state waters.
18. If stream channelization or relocation is required, all work in surface waters shall be done in the dry, unless authorized by this VWP general permit, and all flows shall be diverted around the channelization or relocation area until the new channel is stabilized. This work shall be accomplished by leaving a plug at the inlet and outlet ends of the new channel during excavation. Once the new channel has been stabilized, flow shall be routed into the new channel by first removing the downstream plug and then the upstream plug. The rerouted stream flow must be fully established before construction activities in the old stream channel can begin.

D. Road Crossings

1. Access roads and associated bridges or culverts shall be constructed to minimize the adverse effects on surface waters to the maximum extent practicable. Access roads constructed above preconstruction contours and elevations in surface waters must be bridged or culverted to maintain surface flows.
2. Installation of road crossings shall occur in the dry via the implementation of cofferdams, sheetpiling, stream diversions, or similar structures.

E. Utility Lines

1. All utility line work in surface waters shall be performed in a manner that minimizes disturbance, and the area must be returned to its original contours and restored within 30 days of completing work in the area, unless otherwise authorized by this VWP general permit. Restoration shall be the seeding or planting of the same vegetation cover type originally present, including supplemental erosion control grasses if necessary, except for invasive species identified on DCR's Invasive Alien Plant Species of Virginia list.
2. Material resulting from trench excavation may be temporarily sidecast into wetlands not to exceed a total of 90 days, provided the material is not placed in a manner such that it is dispersed by currents or other forces.
3. The trench for a utility line cannot be constructed in a manner that drains wetlands (e.g., backfilling with extensive gravel layers creating a french drain effect.). For example, utility lines may be backfilled with clay blocks to ensure that the trench does not drain surface waters through which the utility line is installed.

F. Stream Modification and Stream Bank Protection

1. Riprap bank stabilization shall be of an appropriate size and design in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.
2. Riprap apron for all outfalls shall be designed in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.

5. Erosion and sedimentation controls shall be designed in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992, or for mining activities covered by this general permit, the standards issued by the Virginia Department of Mines, Minerals and Energy that are as effective as those in the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992. These controls shall be placed prior to clearing and grading and maintained in good working order to minimize impacts to state waters. These controls shall remain in place until the area is stabilized and shall then be removed.
6. Any exposed slopes and streambanks shall be stabilized immediately upon completion of work in each permitted impact area. All denuded areas shall be properly stabilized in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.
7. All construction, construction access (e.g., cofferdams, sheetpiling, and causeways) and demolition activities associated with this project shall be accomplished in a manner that minimizes construction or waste materials from entering surface waters to the maximum extent practicable, unless authorized by this VWP general permit.
8. No machinery may enter flowing waters, unless authorized by this VWP general permit.
9. Heavy equipment in temporarily-impacted wetland areas shall be placed on mats, geotextile fabric, or other suitable material to minimize soil disturbance to the maximum extent practicable. Equipment and materials shall be removed immediately upon completion of work.
10. All nonimpacted surface waters within 50 feet of any permitted activities and within the project or right-of-way limits shall be clearly flagged or marked for the life of the construction activity at that location to preclude any unauthorized disturbances to these surface waters during construction. The permittee shall notify all contractors that these marked areas are surface waters where no activities are to occur.
11. Temporary disturbances to surface waters during construction shall be avoided and minimized to the maximum extent practicable. All temporarily disturbed wetland areas shall be restored to preconstruction conditions within 30 days of completing work, which shall include re-establishing pre-construction contours, and planting or seeding with appropriate wetland vegetation according to cover type (emergent, scrub/shrub, or forested). The permittee shall take all appropriate measures to promote and maintain revegetation of temporarily disturbed wetland areas with wetland vegetation through the second year post-disturbance. All temporarily impacted streams and streambanks shall be restored to their original contours within 30 days following the construction at that stream segment, and the banks seeded or planted with the same vegetation cover type originally present along the streambanks, including supplemental erosion control grasses if necessary, except for invasive species identified on DCR's Invasive Alien Plant Species of Virginia list.
12. All materials (including fill, construction debris, and excavated and woody materials) temporarily stockpiled in wetlands shall be placed on mats or geotextile fabric, immediately stabilized to prevent entry into state waters, managed such that leachate does not enter state waters, and completely removed within 30 days following completion of that construction activity. Disturbed areas shall be returned to original contours, restored within 30 days following removal of the stockpile, and restored with the same vegetation cover type originally present, including supplemental erosion control grasses if necessary, except for invasive species identified on DCR's Invasive Alien Plant Species of Virginia list.
13. Continuous flow of perennial springs shall be maintained by the installation of spring boxes, french drains, or other similar structures.
14. The permittee shall employ measures to prevent spills of fuels or lubricants into state waters.

15. The permittee shall conduct activities in accordance with any time-of-year restrictions recommended by the Department of Game and Inland Fisheries or the Virginia Marine Resources Commission, and shall ensure that all contractors are aware of any time-of-year restrictions imposed.
16. Water quality standards shall not be violated as a result of the construction activities, unless allowed by this permit authorization.
17. Untreated stormwater runoff shall be prohibited from directly discharging into any surface waters, unless allowed by this permit authorization. Appropriate best management practices shall be deemed suitable treatment prior to discharge into state waters.
18. If stream channelization or relocation is required, all work in surface waters shall be done in the dry, unless authorized by this VWP general permit, and all flows shall be diverted around the channelization or relocation area until the new channel is stabilized. This work shall be accomplished by leaving a plug at the inlet and outlet ends of the new channel during excavation. Once the new channel has been stabilized, flow shall be routed into the new channel by first removing the downstream plug and then the upstream plug. The rerouted stream flow must be fully established before construction activities in the old stream channel can begin.

D. Road Crossings

1. Access roads and associated bridges or culverts shall be constructed to minimize the adverse effects on surface waters to the maximum extent practicable. Access roads constructed above preconstruction contours and elevations in surface waters must be bridged or culverted to maintain surface flows.
2. Installation of road crossings shall occur in the dry via the implementation of cofferdams, sheetpiling, stream diversions, or similar structures.

E. Utility Lines

1. All utility line work in surface waters shall be performed in a manner that minimizes disturbance, and the area must be returned to its original contours and restored within 30 days of completing work in the area, unless otherwise authorized by this VWP general permit. Restoration shall be the seeding or planting of the same vegetation cover type originally present, including supplemental erosion control grasses if necessary, except for invasive species identified on DCR's Invasive Alien Plant Species of Virginia list.
2. Material resulting from trench excavation may be temporarily sidecast into wetlands not to exceed a total of 90 days, provided the material is not placed in a manner such that it is dispersed by currents or other forces.
3. The trench for a utility line cannot be constructed in a manner that drains wetlands (e.g., backfilling with extensive gravel layers creating a french drain effect.). For example, utility lines may be backfilled with clay blocks to ensure that the trench does not drain surface waters through which the utility line is installed.

F. Stream Modification and Stream Bank Protection

1. Riprap bank stabilization shall be of an appropriate size and design in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.
2. Riprap apron for all outfalls shall be designed in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.

3. For stream bank protection activities, the structure and backfill shall be placed as close to the stream bank as practicable. No material shall be placed in excess of the minimum necessary for erosion protection.
4. All stream bank protection structures shall be located to eliminate or minimize impacts to vegetated wetlands to the maximum extent practicable.
5. Asphalt and materials containing asphalt or other toxic substances shall not be used in the construction of submerged sills or breakwaters.
6. Redistribution of existing stream substrate for the purpose of erosion control is prohibited.
7. No material removed from the stream bottom shall be disposed of in surface waters, unless authorized by this permit.

G. Dredging

1. Dredging depths shall be determined and authorized according to the proposed use and controlling depths outside the area to be dredged.
2. Dredging shall be accomplished in a manner that minimizes disturbance of the bottom and minimizes turbidity levels in the water column.
3. If evidence of impaired water quality, such as a fish kill, is observed during the dredging, dredging operations shall cease and the DEQ shall be notified immediately.
4. Barges used for the transportation of dredge material shall be filled in such a manner to prevent any overflow of dredged materials.
5. Double handling of dredged material in state waters shall not be permitted.
6. For navigation channels the following shall apply:
 - a. A buffer of four times the depth of the dredge cut shall be maintained between the bottom edge of the design channel and the channelward limit of wetlands or mean low water, or a buffer of 15 feet shall be maintained from the dredged cut and the channelward edge of wetlands or mean low water, whichever is greater. This landward limit of buffer shall be flagged and inspected prior to construction.
 - b. Side slope cuts of the dredging area shall not exceed a two-horizontal-to-one-vertical slope to prevent slumping of material into the dredged area.
7. A dredged material management plan for the designated upland disposal site shall be submitted and approved 30 days prior to initial dredging activity.
8. Pipeline outfalls and spillways shall be located at opposite ends of the dewatering area to allow for maximum retention and settling time. Filter fabric shall be used to line the dewatering area and to cover the outfall pipe to further reduce sedimentation to state waters.
9. The dredge material dewatering area shall be of adequate size to contain the dredge material and to allow for adequate dewatering and settling out of sediment prior to discharge back into state waters.
10. The dredge material dewatering area shall utilize an earthen berm or straw bales covered with filter fabric along the edge of the area to contain the dredged material, and shall be properly stabilized prior to placing the dredged material within the containment area.

11. Overtopping of the dredge material containment berms with dredge materials shall be strictly prohibited.

H. Stormwater Management Facilities

1. Stormwater management facilities shall be installed in accordance with best management practices and watershed protection techniques (i.e., vegetated buffers, siting considerations to minimize adverse effects to aquatic resources, bioengineering methods incorporated into the facility design to benefit water quality and minimize adverse effects to aquatic resources) that provide for long-term aquatic resources protection and enhancement, to the maximum extent practicable.
2. Compensation for unavoidable impacts shall not be allowed within maintenance areas of stormwater management facilities.
3. Maintenance activities within stormwater management facilities shall not require additional permit authorization or compensation, provided that the maintenance activities do not exceed the original contours of the facility, as approved and constructed, and is accomplished in designated maintenance areas as indicated in the facility maintenance or design plan.

PART II – COMPENSATION, MONITORING, AND REPORTING

A. Compensation

1. The permittee shall provide appropriate and practicable compensation for all impacts meeting the conditions outlined in this VWP general permit.
2. The types of compensation options that may be considered under this VWP general permit include wetland or stream creation or restoration, the purchase or use of mitigation bank credits, or a contribution to an approved in-lieu fee fund.
3. For wetlands, compensation may incorporate preservation of wetlands or preservation or restoration of upland buffers adjacent to state waters when utilized in conjunction with creation, restoration, or mitigation bank credits. For other surface waters, compensation may incorporate preservation, restoration, or enhancement of stream channels, or preservation, restoration, or enhancement of adjacent riparian buffers.
4. The site or sites depicted in the conceptual compensation plan submitted with the application shall constitute the compensation site for the approved project. A site change will require a modification to the authorization.
5. For compensation involving the purchase or use of mitigation bank credits, the permittee shall not initiate work in permitted impact areas until documentation of the mitigation bank credit purchase or usage has been submitted to and received by DEQ.
6. For projects proposing a contribution to an in-lieu fee fund, the permittee shall not initiate work in permitted impact areas until documentation of the in-lieu fee fund contribution has been submitted to and received by DEQ.
7. All aspects of the compensation plan shall be finalized, submitted and approved by the board prior to any construction activity in permitted impact areas. The board shall review and provide written comments on the plan within 30 days of receipt or it shall be deemed approved. The final compensation plan as approved by the board shall be an enforceable requirement of this VWP general permit authorization. Any deviations from the approved plan must be submitted and approved in advance by the board.
8. The final wetlands compensation plan shall include:
 - a. the goals and objectives of the plan in terms of replacement of wetland acreage and functions, by wetland type;
 - b. location map, including latitude and longitude (to the nearest second) at the center of the site;
 - c. summary of the type and acreage of existing wetland impacts anticipated during the construction of the compensation site and proposed compensation for these impacts;
 - d. grading plan with existing and proposed elevations at one-foot or less contours;
 - e. schedule for compensation site construction, including sequence of events with estimated dates;
 - f. hydrologic analysis, including a water budget based on expected monthly inputs and outputs which will project water level elevations for a typical year, a wet year, and a dry year;
 - g. groundwater elevation data for the site, or the proposed location of groundwater monitoring wells to collect these data, and groundwater data for reference wetlands, if applicable;
 - h. design of water control structures;

- i. planting scheme and schedule, indicating plant species, zonation, and acreage of each vegetation type proposed;
 - j. an abatement and control plan covering all undesirable plant species, as listed on DCR's Invasive Alien Plant Species of Virginia list, that includes the proposed procedures for notifying DEQ of their presence, methods of removal, and the control of any such species;
 - k. erosion and sedimentation control plan;
 - l. a soil preparation and amendment plan addressing both topsoil and subsoil conditions;
 - m. a discussion of any structures and features considered necessary for the success of the site;
 - n. a monitoring plan, including success criteria, monitoring goals and methodologies, monitoring and reporting schedule, and the locations of photographic stations and monitoring wells, any sampling points, and if applicable, reference wetlands;
 - o. site access plan;
 - p. the location and composition of any buffers; and
 - q. the mechanism for protection of the compensation area(s).
9. The final stream compensation plan shall include:
- a. the goals and objectives of the compensation plan in terms of replacement of stream functions and values;
 - b. a location map, including latitude and longitude (to the nearest second) at the center of the site;
 - c. an evaluation, discussion, and plan sketches of existing conditions on the proposed compensation stream, including the identification of functional and physical deficiencies for which the measures are proposed, and summary of geomorphologic measurements (e.g., stream width, entrenchment ratio, width-depth ratio, sinuosity, slope, substrate, etc.);
 - d. the identification of existing geomorphological stream type being impacted and proposed geomorphological stream type for compensation purposes;
 - e. detailed design information for the proposed restorative measures, including geomorphological measurements and reference reach information as appropriate;
 - f. riparian buffer plantings, including planting scheme, species, buffer width;
 - g. livestock access limiting measures, to the greatest extent possible;
 - h. a site access plan;
 - i. an erosion and sedimentation control plan, if appropriate;
 - j. an abatement and control plan covering all undesirable plant species, as listed on DCR's Invasive Alien Plant Species of Virginia list, that includes the proposed procedures for notifying DEQ of their presence, methods for removal, and the control of any such species;
 - k. a schedule for compensation site construction including projected start date, sequence of events with projected dates, and projected completion date;

- l. a monitoring plan, including a monitoring and reporting schedule; monitoring design and methodologies to evaluate the success of the proposed compensation measures, allowing comparison from year to year; proposed success criteria for appropriate compensation measures; location of all monitoring stations including photo stations, vegetation sampling points, survey points, bank pins, scour chains, and reference streams;
 - m. the mechanism for protection of the compensation area; and
 - n. plan view sketch depicting the pattern and all compensation measures being employed, a profile sketch, and cross-section sketches of the proposed compensation stream.
10. For final wetland or stream compensation plans, any vegetation used shall be native species common to the area, shall be suitable for growth in local wetland conditions, and shall be from areas within the same or adjacent, USDA Plant Hardiness Zone/NRCS Land Resource Region as that of the project site.
 11. The final wetland or stream compensation plan(s) shall include a mechanism for protection in perpetuity of the compensation site(s) to include all state waters within the compensation site boundary or boundaries. Such protections shall be in place within 120 days of final plan approval. The restrictions, protections, or preservations, or similar instrument, shall state that no activity will be performed on the property in any area designated as a compensation area with the exception of maintenance or corrective action measures authorized by the board. Unless specifically authorized by the board through the issuance of a VWP individual or general permit, or waiver thereof, this restriction applies to ditching, land clearing, or the discharge of dredge or fill material. Such instrument shall contain the specific phrase "ditching, land clearing or discharge of dredge or fill material" in the limitations placed on the use of these areas. The protective instrument shall be recorded in the chain of title to the property, or an equivalent instrument for government-owned lands. Proof of recordation shall be submitted within 120 days of plat approval.
 12. All work in impact areas shall cease if compensation site construction has not commence within 180 days of commencement of project construction, unless otherwise authorized by the board.
 13. DEQ shall be notified in writing at least ten days prior to the initiation of construction activities at the compensation site(s).
 14. Planting of woody plants shall occur when vegetation is normally dormant unless otherwise approved in the final wetlands or stream compensation plan(s).
 15. Point sources of stormwater runoff shall be prohibited from entering any wetland compensation site prior to treatment by appropriate best management practices. Appropriate best management practices may include sediment traps, grassed waterways, vegetated filter strips, debris screens, oil and grease separators, or forebays.
 16. The success of the compensation shall be based on meeting the success criteria established in the approved final compensation plan.
 17. Wetland hydrology shall be considered established if depths to the seasonal high water table are equal to or less than 12 inches below ground surface for at least 12.5% of the region's killing frost free growing season, as defined in the soil survey for the locality of the compensation site or the NRCS WETS table, measured in consecutive days under typical precipitation conditions, and as defined in the water budget of the final compensation plan. For the purpose of this regulation, the growing season is defined as the period in which temperatures are expected to be above 28 degrees Fahrenheit in five out of ten years, or the period during which the soil temperature in a wetland compensation site is greater than biological zero (five degrees Celsius) at a depth of 30 centimeters (19.6 inches), if such data is available.
 18. The wetland plant community shall be considered established according to the performance criteria

specified in the final compensation plan and approved by the board. The proposed vegetation success criteria in the final compensation plan shall include the following:

- a. Species composition shall reflect the desired plant community types stated in the final wetland compensation plan by the end of the first growing season and shall be maintained through the last monitoring year.
 - b. Species composition shall consist of greater than 50 percent facultative (FAC) or wetter (FACW or OBL) vegetation, as expressed by plant stem density or areal cover, by the end of the first growing season and shall be maintained through the last monitoring year.
19. Undesirable plant species shall be identified and controlled as described in the undesirable plant species control plan, such that they are not dominant species or do not change the desired community structure. The control plan shall include procedures to notify DEQ when undesirable plant species comprise greater than 5 percent of the vegetation by areal coverage on wetland or stream compensation sites. The notification shall include the methods of removal and control, and whether the methods are successful.
 20. If the wetland or stream compensation area(s) fails or fail to meet the specified success criteria in a monitoring year (with the exception of the final monitoring year), the reasons for this failure shall be determined and a corrective action plan (including proposed actions, a schedule, and a monitoring plan) shall be submitted to DEQ for approval with or before that year's monitoring report. The approved corrective action plan shall be implemented by the permittee in accordance with the approved schedule. Should significant changes be necessary to ensure success, the required monitoring cycle shall begin again, with monitoring year one being the year that the changes are complete, as confirmed by DEQ.
 21. If all success criteria have not been met in the final monitoring year, or if the wetland or stream compensation site has not met the stated restoration goals, monitoring shall be required for each consecutive year until two sequential, annual reports indicate that all criteria have been successfully satisfied and the site has met the overall restoration goals (i.e., that corrective actions were successful). The reasons for this failure shall be determined and a corrective action plan (including proposed actions, a schedule, and a monitoring plan) shall be submitted with the monitoring report to DEQ for approval and implemented by the permittee in accordance with the approved schedule.
 22. The surveyed wetland boundary for the wetlands compensation site shall be based on the results of the hydrology, soils, and vegetation monitoring data and shall be shown on the site plan. Calculation of total wetland acreage shall be based on that boundary at the end of the monitoring cycle. Data shall be submitted by December 31st of the final monitoring year.
 23. Herbicides or algacides shall not be used in or immediately adjacent to the wetlands or stream compensation site or sites without prior authorization by the board. All vegetation removal shall be done by manual means, unless authorized by DEQ in advance.

B. Wetland Compensation Site Monitoring

1. An as-built ground survey, or an aerial survey provided by a firm specializing in aerial surveys, shall be conducted for the entire compensation site or sites including invert elevations for all water elevation control structures and spot elevations throughout the site or sites. Aerial surveys shall include the variation from actual ground conditions, such as +/- 0.2 feet. Either type of survey shall be certified by a licensed surveyor or by a registered professional engineer to conform to the design plans. The survey shall be submitted within 60 days of completing compensation site construction. Any changes or deviations in the as-built survey or aerial survey shall be shown on the survey and explained in writing.
2. Photographs shall be taken at the compensation site or sites from the permanent markers identified in the final compensation plan, and established to ensure that the same locations and view directions at the site or

sites are monitored in each monitoring period. These photographs shall be taken after the initial planting and at a time specified in the final compensation plan during every monitoring year.

3. Compensation site monitoring shall begin on day one of the first complete growing season (monitoring year 1) after wetland compensation site construction activities, including planting, have been completed. Monitoring shall be required for monitoring years 1, 2, 3, and 5, unless otherwise approved by DEQ. In all cases, if all success criteria have not been met in the final monitoring year, then monitoring shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied.
4. The establishment of wetland hydrology shall be measured during the growing season, with the location and number of monitoring wells, and frequency of monitoring for each site, set forth in the final monitoring plan. All hydrology monitoring well data shall be accompanied by precipitation data, including rainfall amounts either from on site or from the closest weather station. Once the wetland hydrology success criteria have been satisfied for a particular monitoring year, monitoring may be discontinued for the remainder of that monitoring year following DEQ approval. After a period of three monitoring years, the permittee may request that hydrology monitoring be discontinued, providing that adequate hydrology has been established and maintained. Hydrology monitoring shall not be discontinued without written approval from DEQ.
5. The presence of hydric soils or soils under hydric conditions shall be evaluated in accordance with the final compensation plan.
6. The establishment of wetland vegetation shall be in accordance with the final compensation plan. Monitoring shall take place in August, September, or October during the growing season of each monitoring year, unless otherwise authorized in the monitoring plan.
7. The presence of undesirable plant species shall be documented.
8. All wetland compensation monitoring reports shall be submitted by December 31st of the monitoring year. The reports shall include, as applicable, the following:
 - a. General description of the site including a site location map identifying photo stations, vegetative and soil monitoring stations, monitoring wells, and wetland zones.
 - b. Summary of activities completed during the monitoring year.
 - c. Description of monitoring methods.
 - d. Analysis of all hydrology information, including monitoring well data, precipitation data, and gauging data from streams or other open water areas, as set forth in the final compensation plan.
 - e. Evaluation of hydric soils or soils under hydric conditions, as appropriate.
 - f. Analysis of all vegetative community information, including woody and herbaceous species, both planted and volunteers, as set forth in the final compensation plan.
 - g. Photographs labeled with the permit number, the name of the compensation site, the photo station number, the photograph orientation, the date and time of the photograph, the name of the person taking the photograph, and a brief description of the photograph subject. This information shall be provided as a separate attachment to each photograph, if necessary. Photographs taken after the initial planting shall be included in the first monitoring report after planting is complete.
 - h. Discussion of wildlife or signs of wildlife observed at the compensation site.

- i. Comparison of site conditions from the previous monitoring year and reference site, if applicable.
- j. Discussion of corrective measures or maintenance activities to control undesirable species, to repair any damaged water control device, or to replace any damaged planted vegetation.
- k. Corrective action plan, which includes proposed actions, a schedule, and monitoring plan.

C. Stream Compensation, Restoration, and Monitoring

1. Any riparian buffer restoration activities shall be detailed in the final compensation plan and shall include, as appropriate, the planting of a variety of native species currently growing in the site area, including appropriate seed mixtures and woody species that are bare root, balled, or burlapped. A minimum buffer width of 50 feet, measured from the top of the stream bank at bankfull elevation landward on both sides of the stream, shall be required where practical.
2. The installation of root wads, vanes, and other instream structures, shaping of the stream banks, and channel relocation, shall be completed in the dry whenever practicable.
3. Livestock access to the stream and designated riparian buffer shall be limited to the greatest extent practicable.
4. Stream channel restoration activities shall be conducted in the dry or during low flow conditions. When site conditions prohibit access from the streambank, heavy equipment shall be authorized for use within the stream channel.
5. Photographs shall be taken at the compensation site from the vicinity of the permanent photo stations identified in the final compensation plan. The photograph orientation shall remain constant during all monitoring events. At a minimum, photographs shall be taken from the center of the stream, facing downstream, with a sufficient number of photographs to view the entire length of the restoration site. Photographs shall document the completed restoration conditions. Photographs shall be taken prior to site activities, during instream and riparian compensation construction activities, within one week of completion of activities, and during at least one day of each monitoring year to depict restored conditions.
6. An as-built ground survey, or an aerial survey provided by a firm specializing in aerial surveys, shall be conducted for the entire compensation site or sites. Aerial surveys shall include the variation from actual ground conditions, such as +/- 0.2 feet. The survey shall be certified by the licensed surveyor or by a registered, professional engineer to conform to the design plans. The survey shall be submitted within 60 days of completing compensation site construction. Any changes or deviations from the final compensation plans in the as-built survey or aerial survey shall be shown on the survey and explained in writing.
7. Compensation site monitoring shall begin on day one of the first complete growing season (monitoring year 1) after stream compensation site construction activities, including planting, have been completed. Monitoring shall be required for monitoring years 1 and 2, unless otherwise determined by DEQ. In all cases, if all success criteria have not been met in the final monitoring year, then monitoring shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied.
8. All stream compensation monitoring reports shall be submitted by December 31st of the monitoring year. The reports shall include, as applicable, the following:
 - a. General description of the site including a site location map identifying photo stations and monitoring stations.
 - b. Summary of activities completed during the monitoring year.

- c. Description of monitoring methods.
- d. An evaluation and discussion of the monitoring results in relation to the success criteria and overall goals of compensation.
- e. Photographs labeled with the permit number, the name of the compensation site, the photo station number, the photograph orientation, the date and time of the photograph, the name of the person taking the photograph, and a brief description of the photograph subject. Photographs taken prior to compensation site construction activities, during instream and riparian restoration activities, and within one week of completion of activities shall be included in the first monitoring report.
- f. A discussion of alterations, maintenance, or major storm events resulting in significant change in stream profile or cross section, and corrective actions conducted at the stream compensation site.
- g. Documentation of undesirable plant species and summary of abatement and control measures.
- h. A summary of wildlife or signs of wildlife observed at the compensation site.
- i. Comparison of site conditions from the previous monitoring year and reference site, and as-built survey, if applicable.
- j. A corrective action plan, which includes proposed actions, a schedule and monitoring plan.
- k. Any additional submittals that were approved by DEQ in the final compensation plan.

D. Impact Site Construction Monitoring

1. Construction activities authorized by this permit that are within impact areas shall be monitored and documented. The monitoring shall document the pre-construction conditions, activities during construction, and post-construction conditions. Monitoring shall consist of one of the following options:
 - a. Photographs shall be taken during construction at the end of the first, second, and third months of construction, and then semi-annually for the remainder of the construction project, except during periods of no activity within impact areas; or
 - b. An ortho-rectified photograph shall be taken by a firm specializing in ortho-rectified photography prior to construction, and annually thereafter until all impacts are taken, and shall clearly show the delineated surface waters and authorized impact areas.
 - c. In lieu of photographs, and with prior approval from DEQ, the permittee may submit a written narrative that summarizes site construction activities in impact areas. The narrative shall be submitted at the end of the first, second, and third months of construction in impact areas, and then semi-annually for the remainder of the construction activities in impact areas, except during periods of no activity within the impact areas.
2. As part of construction monitoring, photographs taken at the photo stations or the narrative shall document site activities and conditions, which may include installation and maintenance of erosion and sediment controls; condition of adjacent non-impact surface waters; flagged non-impact surface waters; construction access and staging areas; filling, excavation, and dredging activities; culvert installation; dredge disposal; and site stabilization, grading, and associated restoration activities. With the exception of the pre-construction photographs, photographs at an individual impact site shall not be required until construction activities are initiated at that site. With the exception of the post-construction photographs, photographs at an individual impact site shall not be required once the site is stabilized following completion of construction at that site.

3. Each photograph shall be labeled to include the following information: permit number, impact area and photo station number, date and time of the photograph, name of the person taking the photograph, photograph orientation, and photograph subject description. Monitoring of water quality parameters shall be conducted during permanent relocation of perennial streams through new channels in the following manner:
 - a. A sampling station shall be located upstream and immediately downstream of the relocated channel.
 - b. Temperature, pH and dissolved oxygen (D.O.) measurements shall be taken every 30 minutes for at least two hours at each station prior to opening the new channels and immediately before opening new channels.
 - c. Temperature, pH and D.O. readings shall be taken after opening the channels and every 30 minutes for at least three hours at each station.
 - d. The permittee shall report violations of water quality standards to DEQ in accordance with the procedures in Part II E. Corrective measures and additional monitoring may be required if water quality standards are not met. Reporting shall not be required if water quality standards are not violated.

E. Reporting

1. Written communications required by this VWP general permit shall be submitted to the appropriate DEQ office. The VWP general permit authorization number shall be included on all correspondence.
2. DEQ shall be notified in writing at least 10 days prior to the start of construction activities at the first permitted site authorized by this VWP general permit authorization so that inspections of the project can be planned, if deemed necessary by DEQ. The notification shall include a projected schedule for initiation and completion of work at each permitted impact area.
3. Construction monitoring reports shall be submitted to DEQ not later than the 10th day of the month following the month in which the monitoring event specified in Part II D takes place, unless otherwise specified below. The reports shall include the following, as appropriate:
 - a. For each permitted impact area, a written narrative stating whether work was performed during the monitoring period, and if work was performed, a description of the work performed, when the work was initiated, and expected date of completion.
 - b. Properly labeled photographs (to include date and time, name of the person taking the photograph, a brief description and VWP permit number) showing representative construction activities (including, but not limited to, flagging nonimpact wetland areas, site grading and excavation, installation and maintenance of erosion and sediment controls, culvert installation, bridge and ramp construction, dredging, dredge disposal, etc.). The post-construction photographs shall be submitted within 30 days of documenting post-construction conditions. The first construction monitoring report shall include the photographs taken at each impact site prior to initiation of construction in any permitted impact area. Written notification and photographs demonstrating that all temporarily disturbed wetland and stream areas have been restored in compliance with the permit conditions shall be submitted within 30 days of restoration.
 - c. Summary of activities conducted to comply with the permit conditions.
 - d. Summary of permit non-compliance events or problems encountered, subsequent notifications, and corrective actions.
 - e. Summary of anticipated work to be completed during the next monitoring period and an estimated date

- of construction completion at all impact areas.
- f. Labeled site map depicting all impact areas and photo stations.
4. DEQ shall be notified in writing within 30 days following the completion of all activities in all permitted impact areas authorized under this permit.
 5. DEQ shall be notified in writing at least ten days prior to the initiation of activities at the compensation site. The notification shall include a projected schedule of activities and construction completion.
 6. All compensation monitoring reports shall be submitted annually by December 31st, with the exception of the last year of authorization, in which case the report shall be submitted at least 60 days prior to expiration of authorization under the general permit. Any alterations and maintenance conducted on the compensation sites shall be reported. Undesirable plant species occurrences and control of these occurrences shall also be reported to DEQ.
 7. The permittee shall notify DEQ in writing when unusual or potentially complex conditions are encountered which require debris removal or involve potentially toxic substance. Measures to remove the obstruction, material, or toxic substance or to change the location of any structure are prohibited until approved by DEQ.
 8. The permittee shall report any fish kills or spills of oil or fuel immediately upon discovery. If spills or fish kills occur between the hours of 8:15 a.m. to 5 p.m., Monday through Friday, the appropriate DEQ regional office shall be notified; otherwise, the Department of Emergency Management shall be notified at 1-800-468-8892.
 9. Violations of state water quality standards shall be reported within 24 hours to the appropriate DEQ office.
 10. All submittals required by this VWP general permit shall contain the following signed certification statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation."

PART III – CONDITIONS APPLICABLE TO ALL VWP GENERAL PERMITS

A. Duty to Comply

The permittee shall comply with all conditions of the VWP general permit. Nothing in this VWP general permit shall be construed to relieve the permittee of the duty to comply with all applicable federal and state statutes, regulations, and toxic standards and prohibitions. Any VWP general permit noncompliance is a violation of the Clean Water Act and State Water Control Law, and is grounds for enforcement action, VWP general permit authorization termination for cause, VWP general permit authorization revocation, or denial of a continuation of coverage request.

B. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any impacts in violation of the VWP general permit which may have a reasonable likelihood of adversely affecting human health or the environment.

C. Reopener

This VWP general permit authorization may be reopened to modify its conditions when the circumstances on which the previous VWP general permit authorization was based have materially and substantially changed, or special studies conducted by the board or the permittee show material and substantial change since the time the VWP general permit authorization was issued and thereby constitute cause for VWP general permit authorization revocation and reissuance.

D. Compliance with State and Federal Law

Compliance with this VWP general permit constitutes compliance with the VWP permit requirements of the State Water Control Law. Nothing in this VWP general permit shall be construed to preclude the institution of any legal action under or relieve the permittee from any responsibilities, liabilities, or other penalties established pursuant to any other state law or regulation or under the authority preserved by §510 of the Clean Water Act.

E. Property Rights

The issuance of this VWP general permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal property rights, nor any infringement of federal, state or local laws or regulations.

F. Severability

The provisions of this VWP general permit authorization are severable.

G. Right of Entry

The permittee shall allow the board or its agents, upon the presentation of credentials, at reasonable times and under reasonable circumstances:

1. To enter the permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the VWP general permit conditions;
2. To inspect any facilities, operations or practices (including monitoring and control equipment) regulated or required under the VWP general permit;
3. To sample or monitor any substance, parameter or activity for the purpose of assuring compliance with the

conditions of the VWP general permit or as otherwise authorized by law.

For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency.

H. Transferability of VWP general permit authorization

This VWP general permit authorization may be transferred to another person by a permittee if:

1. The current permittee notifies the board of the transfer of the title to the facility or property;
2. The notice to the board includes a written agreement between the existing and new permittee containing a specific date of transfer of VWP general permit authorization responsibility, coverage and liability to the new permittee, or that the existing permittee will retain such responsibility, coverage or liability, including liability for compliance with the requirements of any enforcement activities related to the permitted activity; and
3. The board does not notify the existing and new permittee of its intent to modify or revoke and reissue the VWP general permit authorization within 15 days.

On the date of the VWP general permit authorization transfer, the transferred VWP general permit authorization shall be as fully effective as if it had been issued directly to the new permittee.

I. Notice of Planned Change

Authorization under the VWP general permit may be modified subsequent to issuance if: (i) the permittee determines that additional permanent wetland or stream impacts are necessary, provided that the cumulative increase in acreage of wetland impacts is not greater than 1/4 acre and the cumulative increase in stream impacts is not greater than 50 linear feet, and provided that the additional impacts are fully compensated; (ii) the project results in less wetland or stream impacts, in which case, compensation requirements may be modified in relation to the adjusted impacts at the request of the permittee, provided that the adjusted compensation meets the initial authorization compensation goals; (iii) there is a change in the project plans that does not result in a change in project impacts; (iv) there is a change in the mitigation bank at which credits are purchased or used, provided that the same amount of credits are purchased or used and all criteria for use are met, as detailed in 9 VAC 25-210-115; or (v) typographical errors need to be corrected. A notice of planned change is not required if the project results in additional temporary impacts to surface waters, provided that DEQ is notified in writing, the additional temporary impacts are restored to pre-existing conditions in accordance with Part 1.C.11 of this general permit, and the additional temporary impacts do not exceed the general permit threshold for use. The permittee shall notify the board in advance of the planned change, and the planned change request will be reviewed according to all provisions of this regulation.

J. VWP General Permit Authorization Termination for Cause

This VWP general permit authorization is subject to termination for cause by the board after public notice and opportunity for a hearing. Reasons for termination for cause are as follows:

1. Noncompliance by the permittee with any condition of the VWP general permit authorization;
2. The permittee's failure in the application or during the VWP general permit authorization issuance process to disclose fully all relevant facts or the permittee's misrepresentation of any relevant facts at any time;
3. The permittee's violation of a special or judicial order; and

4. A determination that the permitted activity endangers human health or the environment and can be regulated to acceptable levels by a VWP general permit authorization planned change or termination for cause.

K. VWP General Permit Authorization Termination by Consent

This VWP general permit authorization may be terminated by consent when all permitted activities requiring notification under 9VAC25-690-50 A 1 have been completed, when the authorized impacts will not occur, or when a planned change occurs that involves substituting a specified, approved mitigation bank(s) with another specified, approved mitigation bank. The permittee shall submit a request for termination by consent within 30 days of project completion or project cancellation. The director may accept this termination of authorization on behalf of the board. The request for termination by consent shall contain the following information:

1. Name, mailing address and telephone number of the permittee;
2. Name and location of the activity;
3. The VWP permit authorization number; and
4. One of the following certifications:

- a. For project completion:

"I certify under penalty of law that all activities authorized by a VWP general permit have been completed. I understand that by submitting this notice of termination, that I am no longer authorized to perform activities in surface waters in accordance with the VWP general permit, and that performing activities in surface waters is unlawful where the activity is not authorized by a VWP permit. I also understand that the submittal of this notice does not release me from liability for any violations of this VWP general permit authorization."

- b. For project cancellation:

"I certify under penalty of law that the activities authorized by this VWP general permit will not occur. I understand that by submitting this notice of termination, that I am no longer authorized to perform activities in surface waters in accordance with the VWP general permit, and that performing activities in surface waters is unlawful where the activity is not authorized by a VWP permit. I also understand that the submittal of this notice does not release me from liability for any violations of this VWP general permit authorization, nor does it allow me to resume the permitted activities without reapplication and reauthorization."

- c. For Events Beyond Permittee Control, the Permittee shall provide a detailed explanation of the events, to be approved by DEQ, and the following certification statement:

"I certify under penalty of law that all activities authorized by a VWP general permit have changed as the result of events beyond my control (see attached). I understand that by submitting this notice of termination I am no longer authorized to perform activities in surface waters in accordance with the VWP general permit, and that performing activities in surface waters is unlawful where the activity is not authorized by a VWP permit. I also understand that the submittal of this notice does not release me from liability for any violations of this VWP general permit authorization, nor does it allow me to resume the permitted activities without reapplication and reauthorization."

L. Civil and Criminal Liability

Nothing in this VWP general permit shall be construed to relieve the permittee from civil and criminal penalties

for noncompliance.

M. Oil and Hazardous Substance Liability

Nothing in this VWP general permit shall be construed to preclude the institution of legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under §311 of the Clean Water Act or §§62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

N. Duty to Cease or Confine Activity

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a VWP permit has been granted in order to maintain compliance with the conditions of the VWP permit.

O. Duty to Provide Information

1. The permittee shall furnish to the board any information which the board may request to determine whether cause exists for modifying, revoking, reissuing and terminating the VWP permit, or to determine compliance with the VWP permit. The permittee shall also furnish to the board, upon request, copies of records required to be kept by the permittee.
2. Plans, maps, conceptual reports and other relevant information shall be submitted as required by the board prior to commencing construction.

P. Monitoring and Records Requirements

1. Monitoring of parameters, other than pollutants, shall be conducted according to approved analytical methods as specified in the VWP permit. Analysis of pollutants will be conducted according to 40 CFR Part 136 (2000), Guidelines Establishing Test Procedures for the Analysis of Pollutants.
2. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
3. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the VWP permit, and records of all data used to complete the application for the VWP permit, for a period of at least three years from the date of the expiration of a granted VWP permit. This period may be extended by request of the board at any time.
4. Records of monitoring information shall include, as appropriate:
 - a. The date, exact place and time of sampling or measurements;
 - b. The name of the individuals who performed the sampling or measurements;
 - c. The date and time the analyses were performed;
 - d. The name of the individuals who performed the analyses;
 - e. The analytical techniques or methods supporting the information such as observations, readings, calculations and bench data used;
 - f. The results of such analyses; and
 - g. Chain of custody documentation.

Q. Unauthorized Discharge of Pollutants

Except in compliance with this VWP general permit, it shall be unlawful for the permittee to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances;
2. Excavate in a wetland;
3. Otherwise alter the physical, chemical, or biological properties of state waters and make them detrimental to the public health, to animal or aquatic life, to the uses of such waters for domestic or industrial consumption, for recreation, or for other uses; or
4. On and after October 1, 2001, conduct the following activities in a wetland:
 - a. New activities to cause draining that significantly alters or degrades existing wetland acreage or functions;
 - b. Filling or dumping;
 - c. Permanent flooding or impounding; or
 - d. New activities that cause significant alteration or degradation of existing wetland acreage or functions.

VWP General Permit Authorization No. WP4-05-2935
Compliance Summary Sheet
Page 1 of 3

The following summarizes typical notification, monitoring, and reporting requirements outlined in the authorization. The permittee should review each condition for specific details. Please note that you are responsible for compliance with all conditions of the authorization applicable to the project, not just the items listed below.

Construction Requirements

Flagging of Nonimpacted surface waters. Prior to construction surface waters within 50 feet of any permitted activities and within the project or right-of-way limits shall be clearly flagged or marked for the life of the construction activity at that location. (Part I C 10)

Temporary disturbances and temporarily stockpiled materials. All temporarily disturbed wetland areas shall be restored to pre-construction conditions within 30 days of completing work. All temporarily impacted streams and streambanks shall be restored to their original contours within 30 days following the construction at that stream segment. All materials temporarily stockpiled in wetlands shall be placed on mats or geotextile fabric, immediately stabilized to prevent entry into state waters, managed such that leachate does not enter state waters, and completely removed within 30 days following completion of that construction activity. Disturbed areas shall be returned to original contours, restored within 30 days following removal of the stockpile. Changes in temporary impacts shall require written notification to DEQ. (Parts I A 3, I C 11, and I C 12)

Utility work in surface waters and temporary sidelaying of materials. All utility line work in surface waters shall be performed in a manner that minimizes disturbance, and the area must be returned to its original contours and restored within 30 days of completing work in the area. Material resulting from trench excavation may be temporarily sidelayed into wetlands not to exceed a total of 90 days. (Parts I E 1 and I E 2)

Construction Monitoring. Monitoring shall document the pre-construction conditions, activities during construction, and post-construction conditions and shall consist of one of the following options: (1) photographs taken at the end of the first, second and third months of construction, and then semi-annually for the remainder of the construction project; (2) an ortho-rectified photograph taken by a firm specializing in ortho-rectified photography prior to construction, and annually thereafter until all impacts are taken; or (3) submit a written narrative that summarizes site construction activities in impact areas. The narrative shall be submitted at the end of the first, second, and third months of construction in impact areas, and then semi-annually for the remainder of the construction activities in impact areas. (Part II D 1-3)

Notification of Construction. Submit a written notification at least 10 calendar days prior to the start of construction activities at the first permitted site authorized by this VWP general permit authorization. (Part II E 2)

Construction Monitoring Reports. Submit not later than the 10th day of the month following the month in which the monitoring event specified in Part II D takes place. (Part II E 3)

Notification of End Construction. Submit a written notification within 30 calendar days following the completion of construction activities in all permitted impact areas. (Part II E 4)

Notice of Unusual or Potentially Complex Conditions. Notification is required for unusual or potentially complex conditions that require debris removal or involve potentially toxic substances. (Part II E 7)



DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

mepper

IN REPLY REFER TO:

5090
BV22/22/363
JUN 11 2009

Ms. Lynette R. Rhodes
Chief, Southern Regulatory Section
Department of the Army
Norfolk District Corps of Engineers
803 Front Street
Norfolk, VA 23510-1096

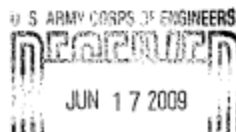
SUBJECT: TRANSFER OF ACTIVE VWPP PERMITS FROM U.S. ARMY
FORT STORY TO U.S. NAVY COMMANDER NAVY REGION
MID-ATLANTIC

In accordance with the mandates outlined by the 2005 Base Realignment and Closure (BRAC) Federal action, ownership of Fort Story will be reassigned from the U.S. Army to the U.S. Navy. As such, the U.S. Navy requests the transfer of Permit #04-V0072, Permit #05-V2935 and any other active permits from the current U.S. Army permittee to the following U.S. Navy permittee:

Ms. Cheryl Barnett
c/o Commander, Navy Region Mid-Atlantic
Code N45, Regional Environmental Program
1510 Gilbert Street
Norfolk, VA 23511-2737

Please make the effective date of the transfer October 1, 2009. Should you have any questions or require additional information, please contact Ms. Traycie West, Natural Resources Specialist, at (757) 444-1569 or e-mail traycie.west@navy.mil.

Sincerely,



Cheryl F. Barnett
CHERYL F. BARNETT
Environmental Program Manager
By direction of the Commander



Reply to
Attention of

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1096

August 7, 2014

Southern Virginia Regulatory Section
NAO-2004-03127/14-V0857 (Chesapeake Bay)

Ms. Elizabeth Nashold
Commander Navy Region Mid-Atlantic
Code N-45, Regional Environmental Group
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Ms. Nashold:

This letter is in reference to your request for a modification and extension of Department of Army Permit Number NAO-2004-03127/14-V0857 for the temporary construction of the Duckpond and Floating Causeway as part of the Logistics over the Shore Training at Utah and Omaha Beaches located at JEB Fort Story in Virginia Beach, Virginia.


In accordance with your request for modification on June 16, 2014 your Department of the Army Permit, issued on March 29, 2004 and extended on January 9, 2009, is hereby modified to allow for the change from 1,200 linear feet to 1,500 as shown on the enclosed drawings for the 331st Transportation Company (MCS) 7th Transportation Brigade's temporary Duckpond and Floating Causeway, received by the Corps on July 2, 2014 and July 22, 2014. Your June 16, 2014 request for extension of the original permit has been granted and the permit is valid until August 7, 2019. All other conditions of the original permit remain unchanged. Please be advised that all conditions of the original and modified Virginia Water Protection Permit become conditions of this authorization.

Please see the attached letter from the Coast Guard, requesting notification two weeks prior to the placement of the temporary causeway system, so the pertinent information may be included in the Local Notice to Mariners and Broadcast Notice to Mariners.

Enclosed is a "compliance certification" form, which must be signed and returned within 30 days of completion of the project. Your signature on this form certifies that you have completed the work in accordance with the terms and conditions of this permit.

Please obtain all necessary State and Local authorizations for the proposed work. Should you need further assistance or have any questions, please contact Melissa Nash at (757) 201-7489 or melissa.a.nash@usace.army.mil.

Sincerely,


for Paul B. Olsen, P.E.
Colonel, U.S. Army
Commanding

Copies Furnished:

Jessica Bassi, NAVFAC MIDLANT
Virginia Department of Environmental Quality, Virginia Beach
Justin Worrell, VMRC
David Compton, City of Virginia Beach



U.S. Army Corps
Of Engineers
Norfolk District

**CERTIFICATE OF COMPLIANCE
WITH
ARMY CORPS OF ENGINEERS PERMIT**

Permit Number: NAO-2004-03127/14-V0857

Name of Permittee: Joint Expeditionary Base (JEB) Fort Story; Ms. Elizabeth A. Nashold

Date of Issuance: August 7, 2014

Permit Type: Individual Permit Modification and Extension for Duckpond and Floating Causeway

Within 30 days of completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Melissa Nash
c/o Regulatory Branch
Norfolk District Corps of Engineers
803 Front Street
Norfolk, VA 23510-1096

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation has been completed in accordance with the permit conditions.

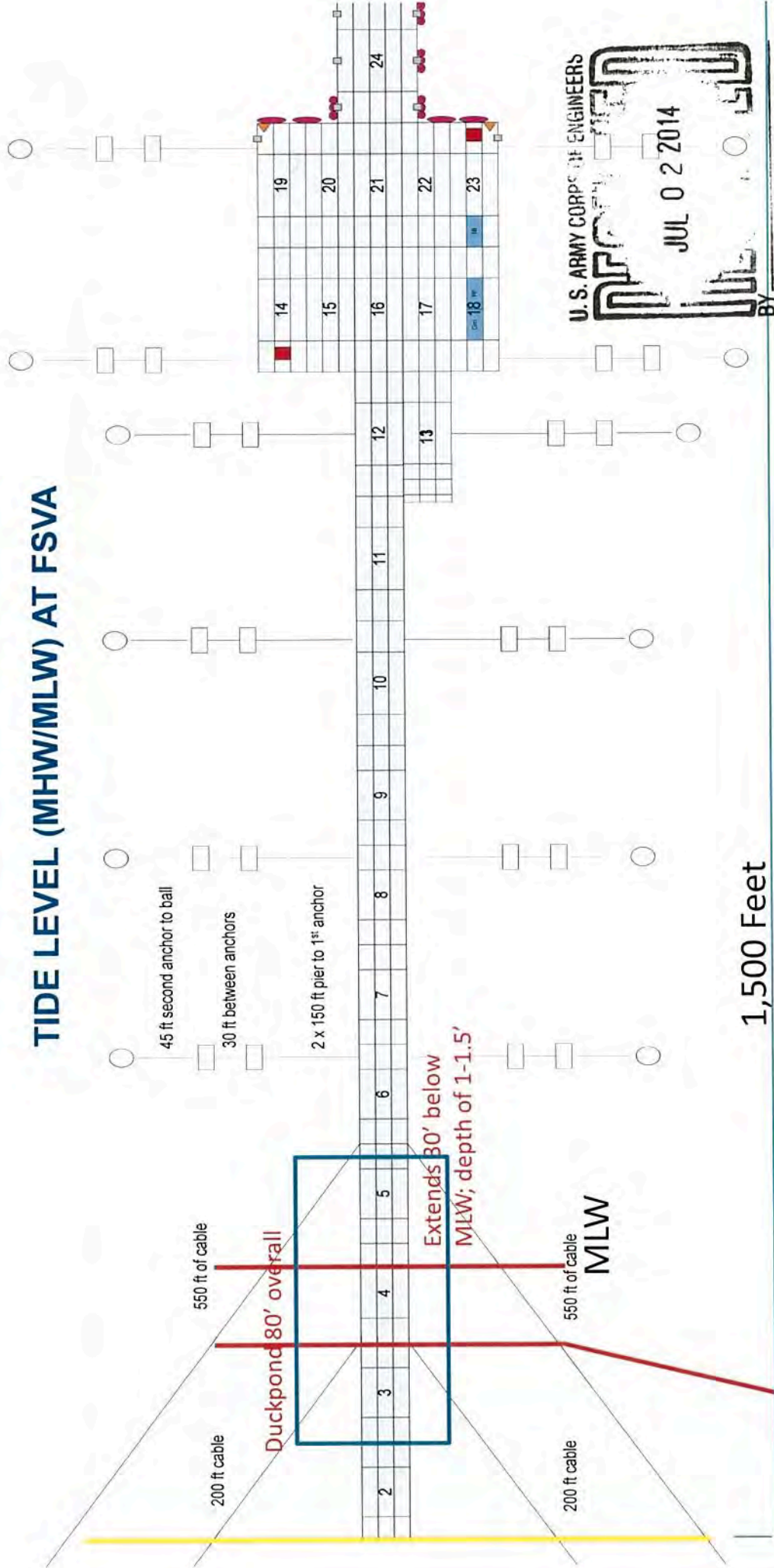
Signature of Permittee

Date



331st Transportation Company (MCS)

7th Transportation Brigade



MHW

1,500 Feet

RECEIVED

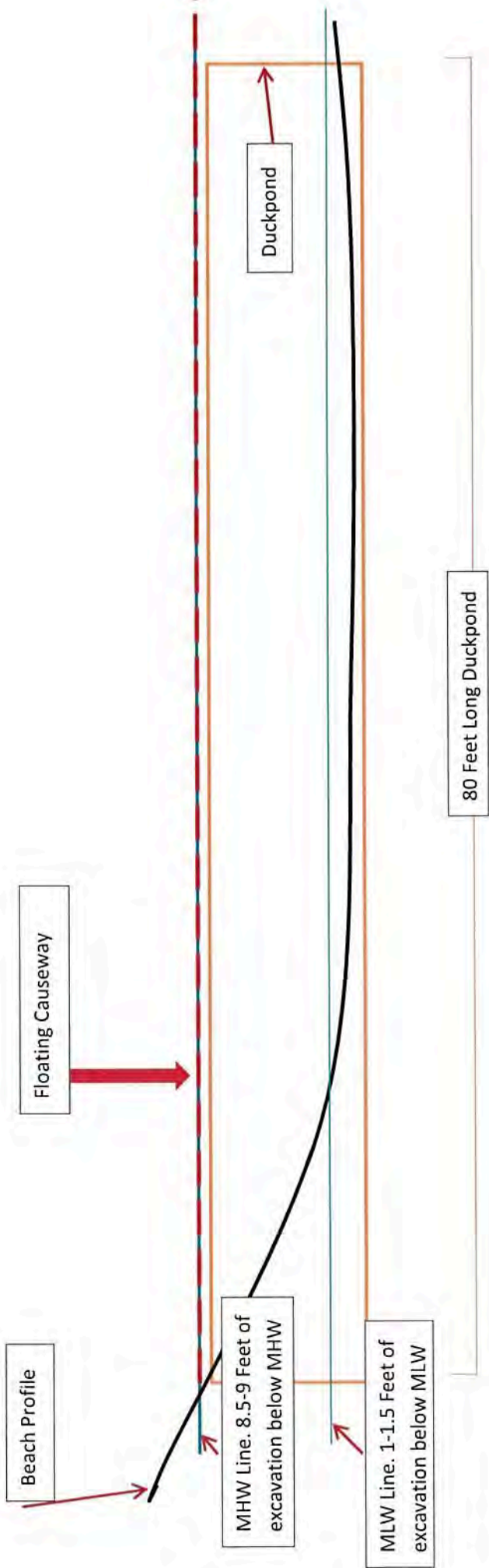
By Virginia Marine Resources Commission at 12:40 pm, Jul 02, 2014

Add'l Info/Revisions

U.S. ARMY CODE OF ENGINEERS

JUL 02 2014

BY _____



The floating causeway will be pushed into the beach and sand will fill in immediately underneath of the causeway as a result of wave action. The causeway will rise and fall with the tides in the water but should be fairly secure and immobile on the beach. There will be cables from the beach end of the pier that are attached to bulldozers on the beach. These bulldozers will remain in place for the duration of the exercise in order to secure the pier and prevent it from being pulled out with the tides.



Add'l Info/Revisions

RECEIVED

By Virginia Marine Resources Commission at 10:41 am, Jul 22, 2014

Howell, Beth (MRC)

From: Worrell, Justin (MRC)
Sent: Tuesday, July 22, 2014 10:26 AM
To: Howell, Beth (MRC)
Subject: FW: Revised Cross Section VMRC 14-0857
Attachments: Duckpond Cross Section.docx

Please process as add. info.

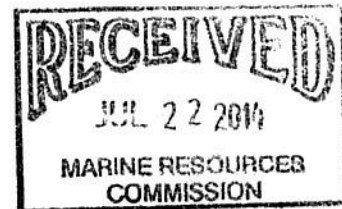
-----Original Message-----

From: Bassi, Jessica CIV NAVFAC MIDLANT, EV [<mailto:jessica.bassi@navy.mil>]
Sent: Tuesday, July 22, 2014 9:31 AM
To: Worrell, Justin (MRC)
Subject: RE: Revised Cross Section VMRC 14-0857

Latest revision.

V/R,

Jessica Bassi
Natural Resources Specialist
Environmental Planning and Conservation
NAVFAC MIDLANT
Building Z-144, 2nd Floor
Phone: 757-341-0493
Fax: 757-341-2095
Email: jessica.bassi@navy.mil



-----Original Message-----

From: Bassi, Jessica CIV NAVFAC MIDLANT, EV
Sent: Tuesday, July 22, 2014 9:13 AM
To: 'Worrell, Justin (MRC)'
Subject: Revised Cross Section VMRC 14-0857

ADDITIONAL INFO
REVISION

Justin,

Does this revision work any better for your records?

V/R,

Jessica Bassi
Natural Resources Specialist
Environmental Planning and Conservation
NAVFAC MIDLANT
Building Z-144, 2nd Floor
Phone: 757-341-0493
Fax: 757-341-2095
Email: jessica.bassi@navy.mil



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

CENAO-REG

January 09, 2009

Southern Virginia Regulatory Section
NAO-2004-03127 (04-V0072) (Chesapeake Bay)

Timothy P. Christensen, MS, CHMM
Chief, Conservation Branch
Environmental & Natural Resources Division
US Army Garrison
IMNE-EUS-PW-E
1407 Washington Blvd
Fort Eustis, VA 23604

Dear Mr. Christensen:

This is regarding your request for a time extension for "pier stabbing" exercises at Fort Story (Corps permit NAO-2004-03127 (04-V0072) in Virginia Beach, Virginia. A copy of the original permit and original expiration letter are attached. Corps Permit NAO-2004-03127 (04-V0072) is hereby modified to expire on 30 July 2014. Please note that in a letter dated 06 April 2004 (copy attached), the U.S. Coast Guard requested that Fort Story notify them two weeks prior to the placement of the temporary causeway system so they could provide this information in a Local Notice to Mariners. All other conditions of the permit remain unchanged.

If you have any questions, please contact Mr. David Knepper at (757) 201-7488 or david.a.knepper@usace.army.mil.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

FOR AND ON BEHALF OF THE DISTRICT ENGINEER,
COLONEL DIONYSIOS ANNINOS:

Sincerely,

for
Lynette R. Rhodes
Chief, Southern Virginia
Regulatory Section



**U.S. Army Corps
Of Engineers**
Norfolk District

Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096

DEPARTMENT OF THE ARMY PERMIT

Permittee: US Army Transportation Center, 7th Transportation Group (c/o Colonel Jeff L. Miser,
Commander)

Permit No.: 04-V0072

Issuing Office: Norfolk District, Corps of Engineers

Note: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below pursuant to:

- (X) Section 10 of the Rivers and Harbors Act of 1899
(33 U.S.C. 403).
- (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
- () Section 103 of the Marine Protection, Research and
Sanctuaries Act of 1972 (33 U.S.C. 1413).

Project Description: Conduct military beach training. The training involves the excavation of a "duck pond" within sub-aqueous lands at the shoreline of the Chesapeake Bay/Atlantic Ocean. The "duck pond" is used to install temporary causeway systems (maximum length of 1,200 feet) that are used to move equipment, military vehicles, and packaged cargo from military vessels to the shore. Once the training is completed, the causeway systems are removed and the excavated sand is moved back into its original beach configuration. The proposed "duck pond" dimensions are 80' length x 40' width x 10' depth; and the feature would extend from above the MHW line to below the MLW line. The estimated quantity of sand excavated for the "duck pond" is 1,185 cubic yards. After the exercise is over the excavated sand would be returned to the excavation point, and pre-disturbance contours re-established. The applicant estimates the number of training events involving "duck pond" construction and causeway installation is twelve (12) per year.

Project Location: Two possible locations that would extend northward into the Chesapeake Bay/Atlantic Ocean. The project areas are linear and both are situated north of Atlantic Avenue, just east and north of the intersection of Atlantic Avenue and Kwajalein Road at Fort Story in Virginia Beach, Virginia.

Project Specific Conditions:

1. After the exercise is over the excavated sand shall be returned to the excavation point, and pre-disturbance contours re-established.

Special Conditions:

All project specific conditions listed above are special conditions of this permit.

1. No discharge of dredged or fill material may consist of unsuitable material (e.g.: trash, debris, car bodies, asphalt etc.) and material discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).
2. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.
3. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date.
4. The construction or work authorized by this permit will be conducted in a manner so as to minimize any degradation of water quality and/or damage to aquatic life. Also, you will employ measures to prevent or control spills of fuels or lubricants from entering the waterway.
5. Any heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.
6. Failure to comply with the terms and conditions of this permit can result in enforcement actions against the permittee and/or contractor.
7. In granting an authorization pursuant to this permit, the Norfolk District has relied on the information and data provided by the permittee. If, subsequent to notification by the Corps that a project qualifies for this permit, such information and data prove to be materially false or materially incomplete, the authorization may be suspended or revoked, in whole or in part, and/or the Government may institute appropriate legal proceedings.
8. All dredging and/or filling will be done so as to minimize disturbance of the bottom or turbidity increases in the water which tend to degrade water quality and damage aquatic life.
9. Your use of the permitted activity must not interfere with the public's right to reasonable navigation on all navigable waters of the United States.

General Conditions:

1. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Conditions 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
2. If you discover any previously unknown historic or archaeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

3. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
4. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit.
5. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.
6. The permittee understands and agrees that if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army of his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required upon due notice from the Corps of Engineers to remove, relocate, or alter the structural work or obstructions caused thereby without expense to the United States. No claim shall be made against the United States on account of any such removal or alternation.

Further Information:

1. Limits of this authorization:
 - a. This permit does not obviate the need to obtain other Federal, state or local authorizations required by law.
 - b. This permit does not grant any property rights or exclusive privileges.
 - c. This permit does not authorize any injury to the property or rights of others.
 - d. This permit does not authorize interference with any existing or proposed Federal projects.
2. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:
 - a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
 - b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
 - c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
 - d. Design or construction deficiencies associated with the permitted work.
 - e. Damage claims associated with any future modification, suspension, or revocation of this permit.
3. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.
4. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
 - a. You fail to comply with the terms and conditions of this permit.
 - b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 3 above).
 - c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

5. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as a permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

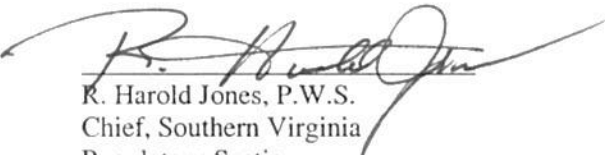


(Permittee)

29 MAR 04

(Date)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.



R. Harold Jones, P.W.S.
Chief, Southern Virginia
Regulatory Section

3-29-04

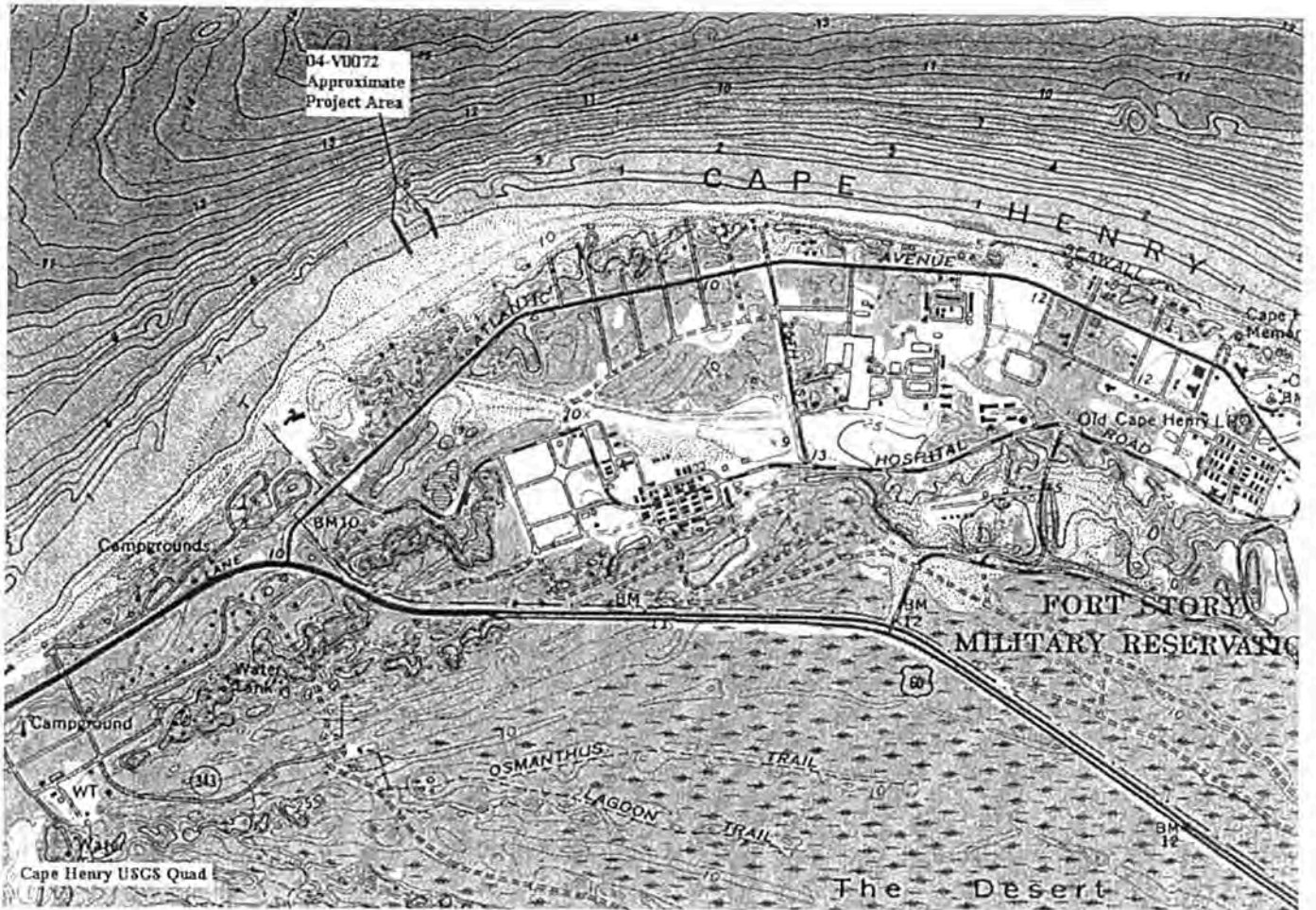
(Date)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

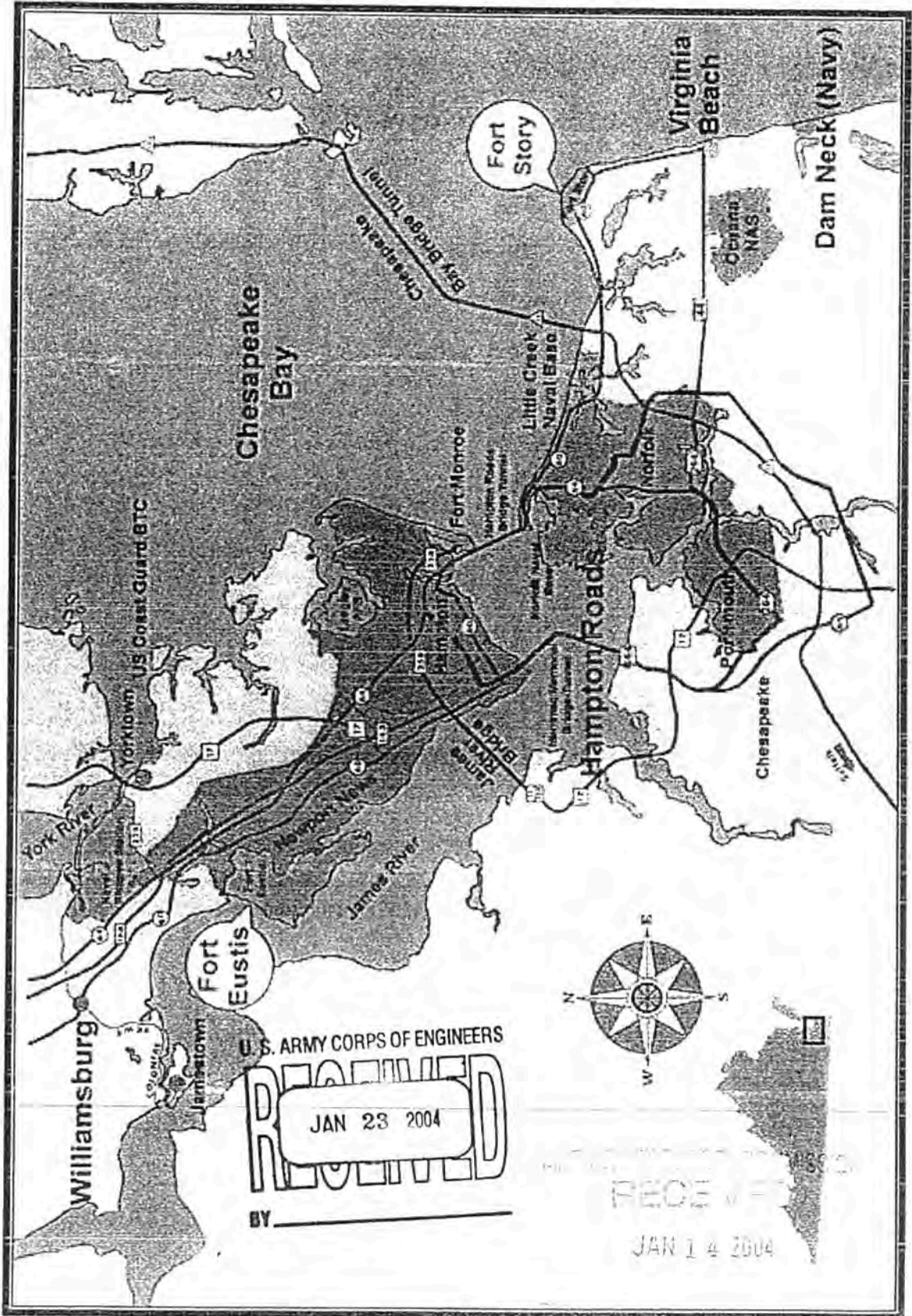
(Transferee)

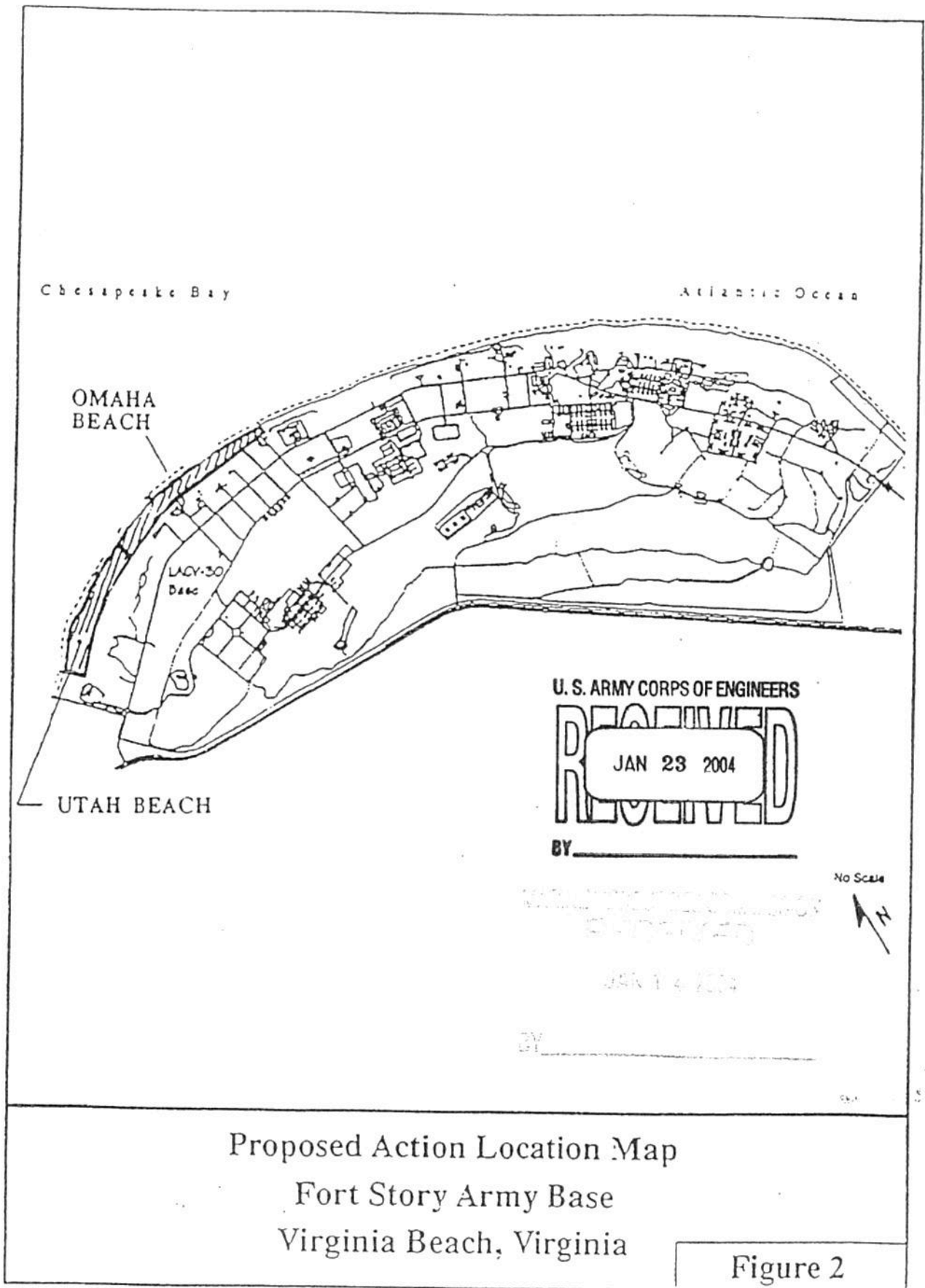
(Date)

Corps Project: 04-V0072
Applicant: Fort Story
Project: Proposed pier stabbing



Forts Eustis & Story Locations



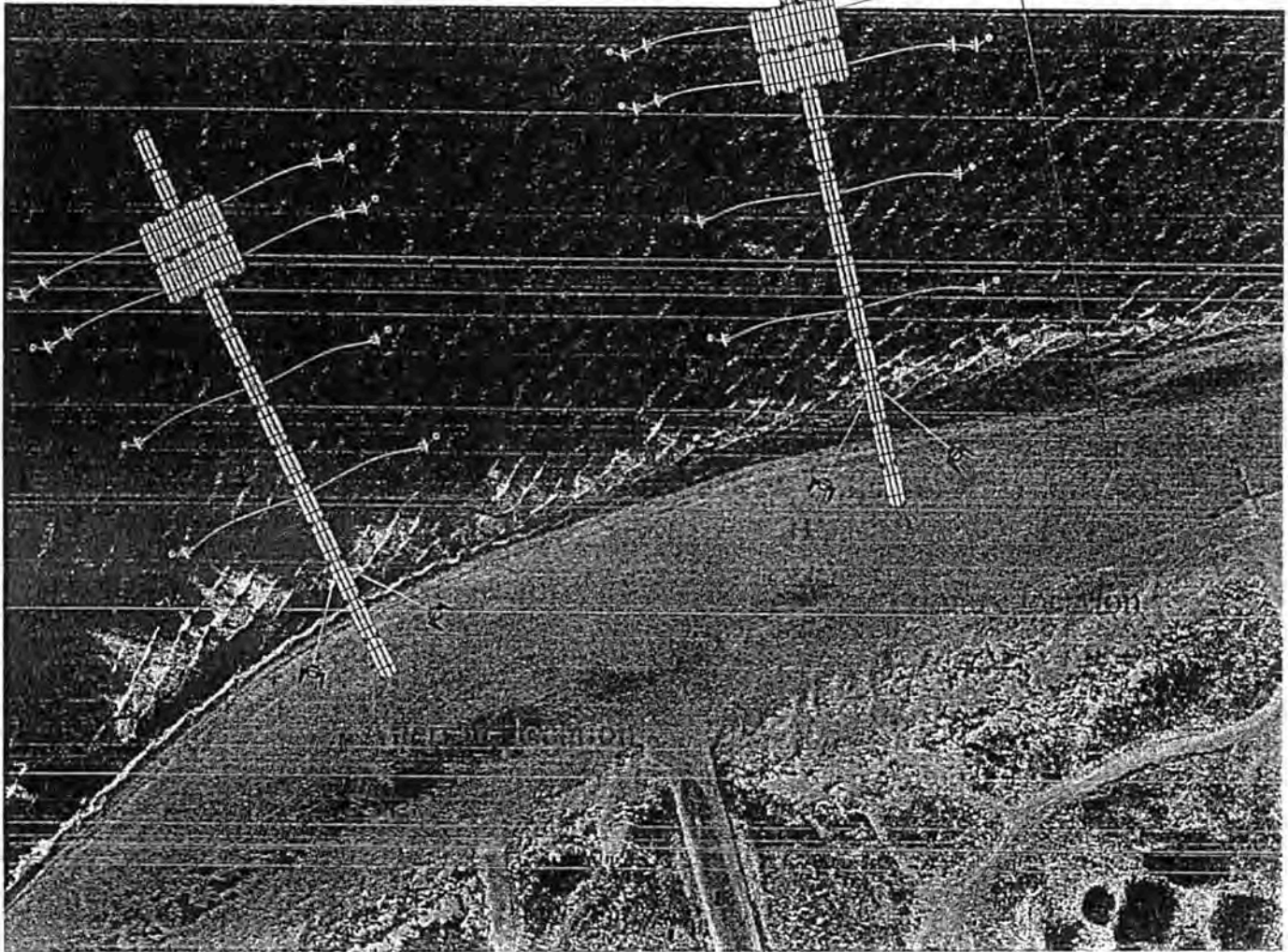


**Utah Beach Training Area
Fort Story, VA
Primary & Alternate Locations
&
Maximum 1,200 feet causeway length**

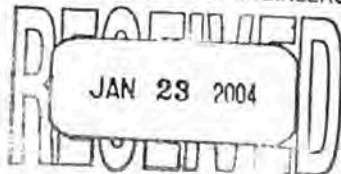
A = Duck Pond

B = anchors

1,200 feet

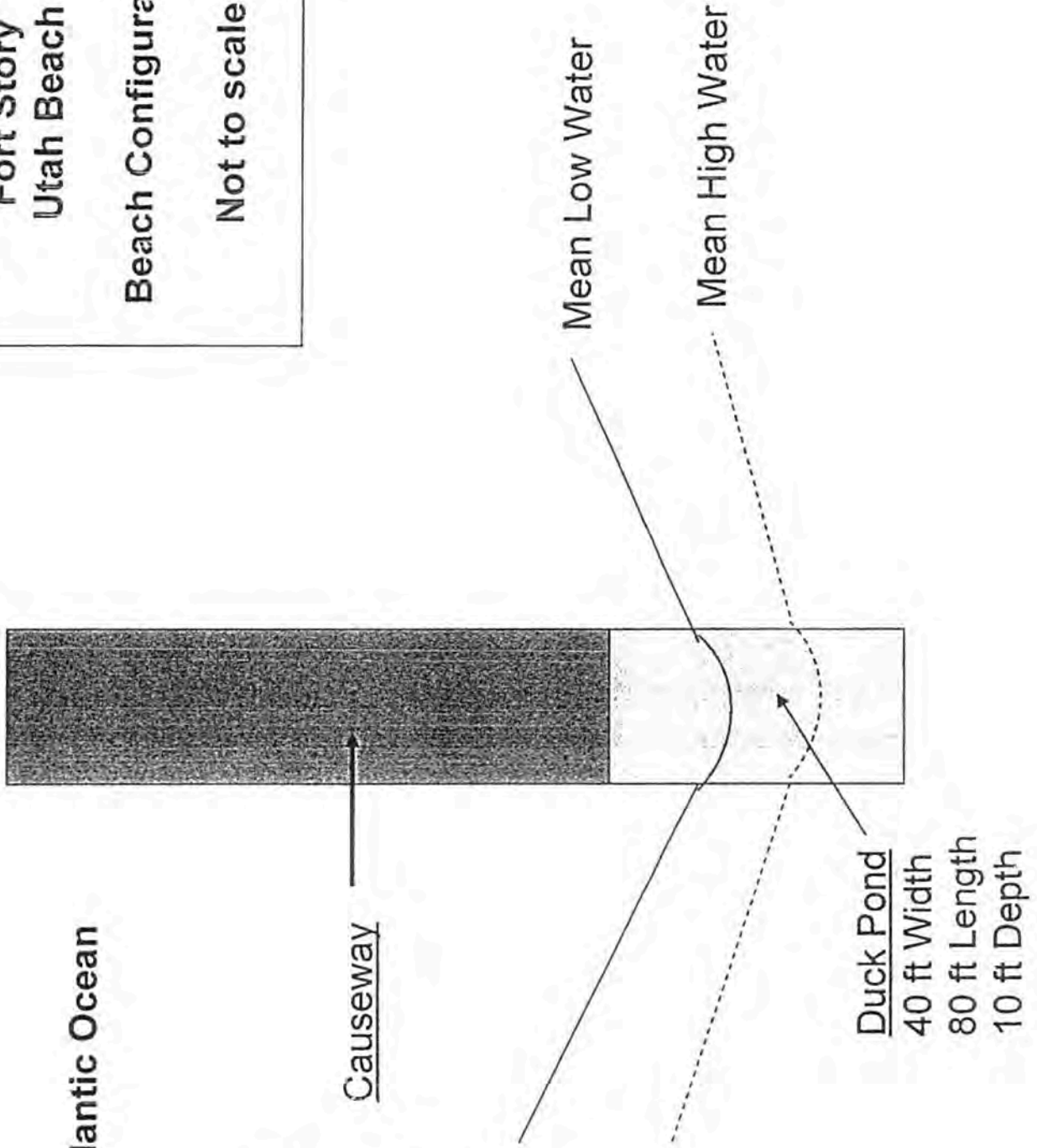


U. S. ARMY CORPS OF ENGINEERS



Flyway

Fort Story
Utah Beach
Beach Configuration
Not to scale

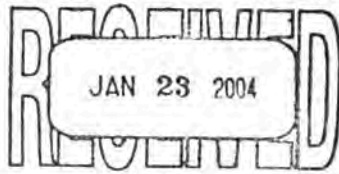


Atlantic Ocean

Causeway

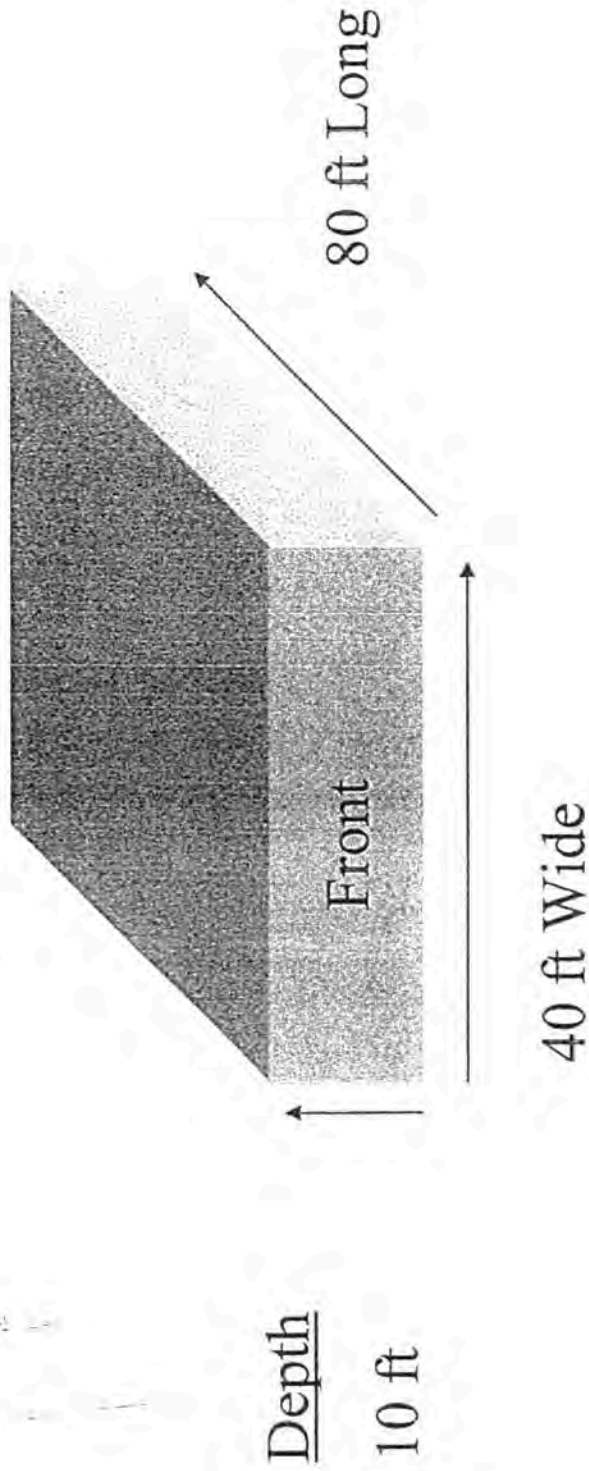
Duck Pond
40 ft Width
80 ft Length
10 ft Depth

U. S. ARMY CORPS OF ENGINEERS

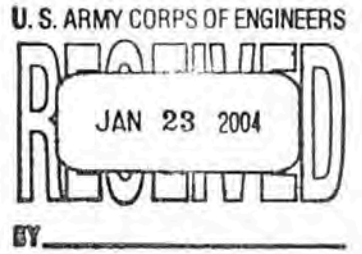


BY _____

Duck Pond Dimensions
Not Drawn to Scale

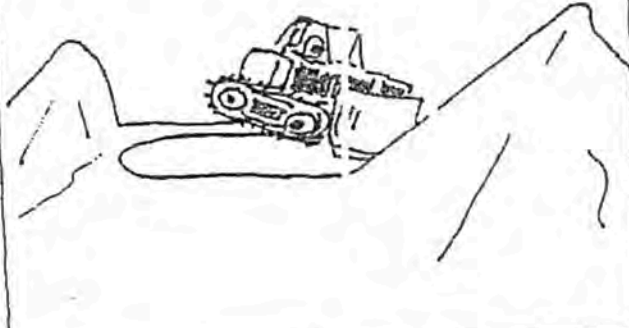


$$80 \times 40 \times 10 = 32,000 \text{ ft}^3 / 27 \text{ ft}^3 = 1,185 \text{ yd}^3 \text{ (Ft. Story estimated)}$$

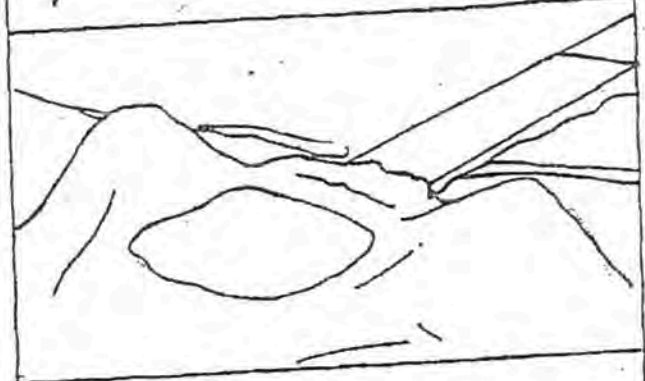


Procedure System

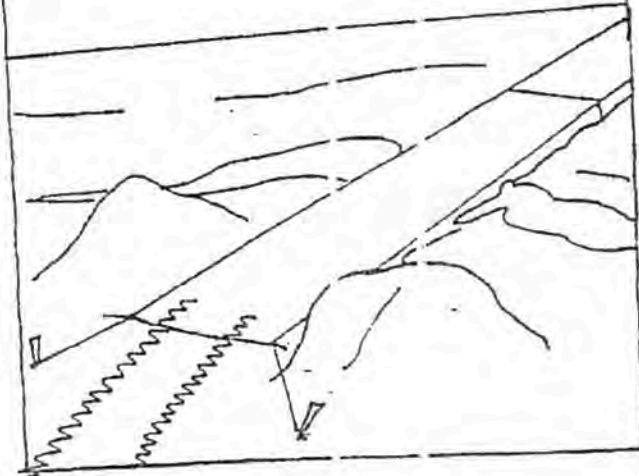
1. CREATE POND WITH DOZER.



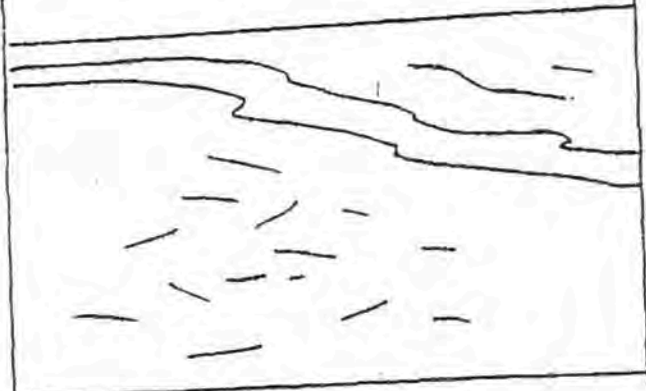
2. PUSH CAUSEWAYS INTO POND.



3. SECURE CAUSEWAYS AND DRIVE VEHICLES ONTO BEACH.



4. END STATE DOZERS BACKFILL POND AND SMOOTH SAND BACK TO ITS ORIGINAL STATE. NO SAND/EARTH IS REMOVED FROM THE SITE.



U. S. ARMY CORPS OF ENGINEERS

RECEIVED
JAN 23 2004

BY _____

JAN 14 2004

U.S. Department of
Homeland Security

United States
Coast Guard

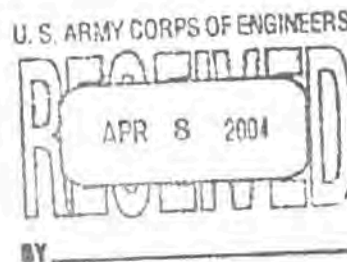


Commander
United States Coast Guard
Fifth Coast Guard District

431 Crawford Street
Portsmouth, Va. 23704-5004
Staff Symbol: oan
Phone: 757-398-6360
Fax: 757-398-6334
Email: Agrimes@lantd5.uscg.mil

16500
April 6, 2004

U.S. Army Corps of Engineers
Norfolk District
803 Front Street
Norfolk, VA. 23510-1096
Attn.: David Knepper



Dear Mr. Knepper:

After reviewing Public Notice: CENAO-TS-G-04-V0072, the Coast Guard has no objections to the proposal.

The Coast Guard will request that two weeks prior to placement of the "temporary causeway system", the owner of the temporary causeway notify this office so the pertinent information can be included in the Local Notice to Mariners (LNM) and Broadcast Notice to Mariners (BNM). This notification can be made by email, mail and/or phone.

If you have any question please contact me, at 757-398-6360

Sincerely,

A handwritten signature in cursive script that reads "Albert L. Grimes III".

ALBERT L. GRIMES III
Marine Information Specialist
U.S. Coast Guard
By direction



DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

REPLY TO
ATTENTION OF:

CENAO-TS-G

30 July 2004

Southern Virginia Regulatory Section
04-V0072 (Chesapeake Bay)

Mr. Timothy P. Christensen, MS, CHMM
Environmental & Natural Resources Specialist
US Army Transportation Center
ATTN: ATZF-PWE
Directorate of Public Works
Fort Eustis, VA 23604-5306

Dear Mr. Christensen:

This is regarding the individual permit for the pier stabbing exercises at Fort Story that our office issued in March of this year. As you had pointed out, General Condition 1 of the permit did not specify an expiration date. Therefore, Corps Permit 04-V0072 is hereby modified to include an expiration date of 30 July 2009. All other conditions of the permit remain unchanged.

If you have any questions, please contact Mr. David Knepper at (757) 441-7488 or david.a.knepper@usace.army.mil.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

FOR AND ON BEHALF OF THE DISTRICT ENGINEER,
COLONEL YVONNE J. PRETTYMAN-BECK:

Sincerely,

A handwritten signature in black ink, appearing to read "R. Harold Jones", with a large, sweeping flourish extending to the left.

R. Harold Jones, P.W.S.
Chief, Southern Virginia
Regulatory Section

Copies Furnished:
Virginia Department of Environmental Quality, Richmond



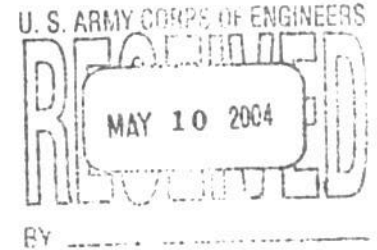
United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, VA 23061



May 5, 2004

Colonel Yvonne J. Prettyman-Beck
District Engineer
Norfolk District, Corps of Engineers
Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096



Attn: David Knepper
Regulatory Branch

Re: Military Beach Training, Project No. 04-
V0072, Fort Story, City of Virginia
Beach, Virginia

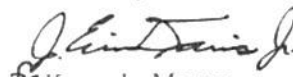
Dear Colonel Prettyman-Beck:

The U.S. Fish and Wildlife Service (Service) conducted a site visit with the Virginia Department of Game and Inland Fisheries (VDGIF), and Fort Story/Fort Eustis personnel on May 4, 2004 concerning the referenced project. The proposed project is to conduct monthly military exercises on the beach at Fort Story, Virginia Beach, Virginia. This letter is submitted in accordance with provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

VDGIF will provide educational material to Fort Story personnel so that the exercise participants are aware of the possibility of nesting loggerhead sea turtles, *Caretta caretta*, federally listed threatened. They will be provided electronic photographs of crawls. They will further be provided preliminary instructions and contact information should a nesting sea turtle be encountered. The Service believes the possibility of an adverse effect to loggerhead sea turtles is negligible and that the proposed action is not likely to adversely affect federally listed species.

The point of contact at VDGIF is Ms. Ruth Boettcher at (757) 442-2429 or boettcherr@dgif.state.va.us. The point of contact for the Service is Mr. Eric Davis at (804) 693-6694, extension 104 or eric_davis@fws.gov.

Sincerely,


Karen L. Mayne
Supervisor
Virginia Field Office

cc: Ft. Eustis, Newport News, VA (COL Miser)
VDGIF, Richmond, VA (Andy Zadnik)
VDGIF, Painter, VA (Ruth Boettcher)



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

5636 Southern Boulevard, Virginia Beach, Virginia 23462

(757) 518-2000 Fax (757) 518-2009

www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Maria R. Nold
Regional Director

September 12, 2014

Commander, Navy Region Mid-Atlantic
Attn: Ms. Elizabeth A. Nashold
Code N45, Regional Environmental Group
1510 Gilbert Street
Norfolk, VA 23511-2737

RE: **Notification of No Permit Required**
Joint Permit Application Number 14-0857
Logistics over the Shore
Virginia Beach

Dear Ms. Nashold:

The Department of Environmental Quality (DEQ) received your Joint Permit Application (JPA) regarding the above referenced project on June 16, 2014. As described within the JPA, you propose to temporarily excavate the beach and install a pier for a training exercise on Omaha and Utah beaches at the Joint Expeditionary Base Fort Story in Virginia Beach.

Provided you receive a Nationwide or Regional Permit from the U.S. Army Corps of Engineers (Corps) on which DEQ has provided §401 Certification, a Virginia Water Protection (VWP) permit will **not** be required by the DEQ for this project. Should the size and scope of the project change, a permit from DEQ may be required. You are advised that this does not give you the authority to violate the State's Water Quality Standards.

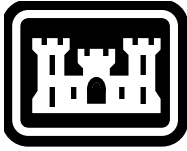
If I can be of additional assistance, please contact me at me at (757) 518-2132 or by email at Allison.Hill@deq.virginia.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Allison Hill".

Allison Hill
Project Manager

cc: Justin Worrell, VMRC
U.S. Army Corps of Engineers



**U.S. Army Corps
Of Engineers**
Norfolk District

Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096

**CENAO-REG
13-RP-18**

REGIONAL PERMIT

Effective Date: August 14, 2013

Expiration Date: August 14, 2018

I. AUTHORITIES:

13-RP-18, Regional Permit 18 (RP), authorizes the installation and/or construction of open-pile piers, mooring structures/devices, fender piles, covered boathouses/boat slips, boat lifts, osprey pilings/platforms, accessory pier structures, and devices associated with shellfish gardening, for private, commercial, community, and government use.

The intent of this Regional Permit is to provide a streamlined permitting process for those activities listed in paragraph 1 that do not adversely affect general navigation and the aquatic environment.

The people of the Commonwealth of Virginia are hereby authorized by the Secretary of the Army and the Chief of Engineers pursuant to Section 10 of the River and Harbors Act of 1899 (33 U.S.C. § 403) to install and/or construct open-pile piers, mooring structures/devices, fender piles, covered boathouses/boat slips, boat lifts, osprey pilings/platforms, accessory pier structures, and devices associated with shellfish gardening, for private or certain public uses within navigable waters of the United States within the Commonwealth of Virginia.

Activities receiving written authorization under this RP do not require further authorization unless the District Engineer determines that overriding national factors of the public interest would require an individual permit (in accordance with 33 CFR Part 325) for a particular project that might generally qualify for this RP. This RP covers only those activities that strictly comply with all of the descriptions, general and special conditions set out below. Any work that does not comply with the following terms, conditions, standards and limitations does not qualify for this RP and will require a separate Department of the Army authorization.

II. PROCEDURES:

Prospective permittees/applicants must notify the Corps' District Engineer, via the submission of a Joint Permit Application (JPA), and must receive written notification from the Corps acknowledging that the project satisfies the criteria of this RP. **No work is authorized until the Corps issues a written permit verification.** A JPA can be obtained by writing to the District at the above address or telephoning (757) 201-7652. With internet access, an application may also

be obtained by downloading a copy at the following link:
<http://www.nao.usace.army.mil/Missions/Regulatory/JPA.aspx> .

For an application to be considered complete:

1. The applicant **MUST** provide written justification as to the purpose if the proposed work would extend a pier greater than one-fourth of the distance across the open water measured from mean high water (MHW) or the channelward edge of the wetlands.
2. The applicant **MUST** provide written justification if the proposed work would involve the construction of a pier greater than five feet wide or less than four feet above any wetland substrate.
3. The Corps **MAY** require depth soundings across the waterway at increments designated by the Corps project manager. Inclusion of depth sounding data in the original JPA submittal is highly recommended in order to expedite permit evaluation. Depth soundings are typically taken at 10-foot increments for waterways less than 200 feet wide and 20-foot increments for waterways greater than 200 feet wide. Please include the date and time the measurements were taken, whether the data was collected at mean low water (MLW) or MHW, and how the soundings were taken (e.g., tape, range finder, etc.).

III. STATE AND LOCAL APPROVALS:

1. A permit from the Virginia Marine Resources Commission (VMRC) to encroach upon State bottom and/or a local wetlands board permit may also be required for work authorized by this RP.
2. The State Water Control Board provided unconditional §401 Water Quality Certification for the 13-RP-18. Therefore, the activities that qualify for this RP meet the requirements of Department of Environmental Quality's (DEQ) Virginia Water Protection Permit Regulation, provided that the permittee abides by the terms and conditions of 13-RP-18.
3. Those activities on the Potomac River extending beyond the mean low water line may require authorization by the Virginia Marine Resources Commission (VMRC) and/or the Maryland Department of Natural Resources. Authorization may also be needed from the Tennessee Valley Authority for projects constructed on the Clinch and Holston Rivers.
4. Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the Virginia Department of Environmental Quality Virginia Coastal Zone Management Program (VCP) completed its review of the Federal Consistency Determination (FCD) for this RP on May 10, 2013 and provided concurrence that this RP is consistent with the VCP.

5. Permittees should ensure that projects are designed and constructed in a manner consistent with all state and local requirements pursuant to the Chesapeake Bay Preservation Act (CBPA) (Virginia Code 10.1-2100 *et seq.*) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 10-20-10 *et seq.*).
6. Authorizations under this RP do not supersede state or local government authority or responsibilities pursuant to the Chesapeake Bay Preservation Act or to any State or local laws or regulations.

IV. SPECIAL CONDITIONS:

1. For the construction or expansion of any private piers and structures:
 - a. If the Corps determines that the proposed activity does not adversely affect general navigation and/or the environment, the Corps may authorize the proposed activity under this RP if it exceeds the limitation of one-fourth of the width of the waterway specified in the Norfolk District's Regional Permit 17 (13-RP-17).
 - b. The Corps may determine that piers constructed over wetlands can exceed the five feet width restriction and/or that the work can be less than the four-feet-above the wetland substrate restrictions of 13-RP-17 (which requires that such piers be no more than a maximum of five feet wide and that the decking be at least four feet above any wetland substrate), if the applicant submits a demonstrated need for the increase width or lowered height, and if the Corps determines that the pier as proposed will have minimal environmental impacts.
2. For the construction or expansion of community, commercial, and/or government piers and structures:
 - a. This authorization covers all open-pile piers, docks, wharfs associated with the construction or expansion of any community, commercial, or government facility whose primary use is commercial, governmental, and/or recreational. This would include, but not be limited to, community fishing piers, piers at seafood processing facilities, piers at boat repair facilities, piers at marine terminals, recreational piers located on military installations, piers for military associated operational facilities utilized for training, aggregate handling facilities, and other non-recreational facilities. (Marine railways are excluded from this regional permit.)
 - b. If the original purpose of the structure or facility changes, the permittee must submit a request for a permit modification (i.e. a recreational marina to a grain loading facility or coal handling facility).
3. For mooring structures/devices, pilings, and fender piles: This authorization includes all such structures, either isolated or part of large facilities, whose primary purpose is private, commercial, governmental, and/or recreational. This would include, but not be limited to, mooring buoys, mooring balls, mooring piles, mooring dolphins, mooring

camels, fender piles, and osprey pilings/platforms at private piers, community piers, seafood processing facilities, boat repair facilities, marine terminals, military installations and other commercial and/or recreational facilities. Should primary use of the permitted structure change, a permit modification must be requested.

4. This permit authorizes private, public, commercial and/or governmental mooring structures/devices. Private mooring buoys can also be authorized under Nationwide Permit 10. The location and maximum radius of swing including the moored vessel's length must be included on the drawings as part of the Joint Permit Application. The US Coast Guard may also have to issue approval and it is up to the applicant to obtain the Coast Guard's approval.
5. A pier may be constructed in and over wetland areas to allow access. Such piers shall be attached to the upland at a point landward of mean high water.
6. Mooring piles and/or mooring structures/devices will be permitted in wetland areas for the purpose of boat mooring only if sufficient water depths exist to float the vessel during periods of low water without alteration of the wetland.
7. Floatation units must be made of materials that will not become waterlogged or sink if punctured. Floating sections must be braced so they will not rest on the bottom during periods of low water.
8. Work in areas with submerged aquatic vegetation (SAV) should be avoided. However, if work is proposed in areas that contain (SAV), additional avoidance and minimization measures, such as relocating a structure, time of year restrictions, compensatory mitigation, etc. may be required to reduce impacts to SAV. Conditions relating to SAV impacts will be determined on a case-by-case basis after consultation with the NOAA Fisheries Service (NOAA).
9. A proponent (permittee or applicant) of work proposed in portions of the following waterways may require an easement to be obtained from the Corps Real Estate Branch to cross government property before any construction can take place:
 - a. James River
 - b. Lynnhaven Inlet and Long Creek
 - c. All Local Cooperation Agreement areas
 - d. Dismal Swamp Canal
 - e. Albemarle and Chesapeake Canal
 - f. Appomattox River
 - g. Atlantic Intracoastal Waterway.
 - h. Craney Island
 - i. Gathright Dam

For further information regarding the government easements, please contact the Norfolk District's Real Estate Office at the address on the first page of this RP or at (757) 201-7735.

10. The permittee recognizes the possibility that the structures permitted herein may be subject to damage by waves caused by passing vessels. This RP does not relieve the permittee from taking all proper steps to ensure the integrity of the structures permitted herein and the safety of boats moored thereto from damage from wave wash, and the permittee hereby acknowledges and admits that the United States is not liable for any such damage and that it shall not seek to involve the U.S. in any actions or claims regarding such damages.
11. All structures must be of suitable materials and practical design so as to reasonably ensure a safe and sound structure.
12. This permit does not authorize any dredging and filling of waters of the United States, including wetlands. If dredging is proposed, it must be authorized under a separate Department of the Army permit. However, a permit for a certain structure or activity does not imply that future dredging proposals will be approved.
13. The proposed structure(s) (including any moored vessels) should be located on the property in accordance with the local zoning requirements.
14. If the display of lights and signals on the structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained at the expense of the permittee. The USCG may be reached at the following address and telephone number: Commander (oan), Fifth Coast Guard District, Federal Building, 431 Crawford Street, Portsmouth, Virginia 23704-5004, telephone number (757) 398-6230.
15. If and when the permittee desires to abandon the authorized activity he or she must restore the area to a condition satisfactory to the District Engineer unless the permittee is transferring his or her interest to a third party. See general condition number 43.
16. The Secretary of the Army or his/her authorized representative may direct the permittee to restore the waterway to its former condition, with no expense to the United States. If the permittee fails to comply with the directive, the Secretary or his/her representative may restore the area to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.
17. No activity is authorized pursuant to this RP if it causes more than a minimal adverse effect on an adjacent property owner's right of access to navigable waters.
18. Any structure authorized shall be properly maintained, including maintenance to ensure public safety.

V. GENERAL CONDITIONS:

The following conditions apply to all activities authorized under Regional General Permits (RP).

1. **Geographic jurisdiction.** This regional permit will authorize work undertaken within the geographical limits of the Commonwealth of Virginia under the regulatory jurisdiction of the U.S. Army Corps of Engineers (Corps).
2. **Compliance Certification.** A Certificate of Compliance must be completed and a copy retained for your records. The original Certificate of Compliance shall be mailed to, U. S. Army Corps of Engineers, Regulatory Branch, 803 Front Street, Norfolk, Virginia 23510-1096 within 30 days of completion of the project.
3. **Other permits.** Authorization does not obviate the need to obtain other Federal, state, or local authorizations required by law or to comply with all Federal, state, or local laws.
4. **Minimal effects.** Projects authorized shall have no more than minimal individual or cumulative adverse environmental impacts, as determined by the Corps.
5. **Discretionary authority.** The Norfolk District Corps of Engineers District Engineer retains discretionary authority to require processing of an individual permit based on concerns for the aquatic environment or for any other factor of the public interest (33 CFR Part 320.4(a)). This authority is exercised on a case-by-case basis.
6. **Single and complete projects.** This RP shall only be applied to single and complete projects. A single and complete project means the total project proposed or accomplished by one owner/developer or partnership and which has independent utility. For linear transportation projects with multiple crossings or encroachments a determination of "single and complete" will typically apply to each crossing of waters that occurs (i.e., single waterbody and/or wetlands) at separate and distinct locations and with independent utility. However, in cases where there are many crossings in close proximity, numerous crossings of the same waterbody, multiple crossings, or multiple encroachments that otherwise may have more than minimal individual or cumulative impacts; the Corps has the discretion to consider all the crossings cumulatively as one single and complete project.
7. **Independent Utility** A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as single and complete projects with independent utility.
8. **Multiple general permit authorizations.** This Regional Permit may be combined with any Corps general permits (including Nationwide (NWP) or Regional Permits (RP) for a single and complete project, as long as the impacts are considered cumulatively and do not exceed the acreage limit or linear foot limits of the RP/ NWP.
9. **Permit on-site.** The permittee shall ensure that a copy of the RP and the accompanying authorization letter are at the work site at all times. These copies must be made available to any regulatory representative upon request. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be expected to comply with all conditions of any general permit authorization.

General Conditions Related to National Concerns:

10. **Historic properties.** (a) In cases where it is determined that the activity may affect properties listed, or eligible for listing on the National Register of Historic Places, the activity is not authorized until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. (b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the Corps with the appropriate documentation to demonstrate compliance with those requirements. The Corps will review the documentation and determine whether it is sufficient to address Section 106 compliance for the RP activity, or whether additional Section 106 consultation is necessary. (c) Non-federal permittees must submit a statement to the Corps regarding the authorized activity's potential to cause effects to any historic properties listed, or determined to be eligible for listing on the National Register of Historic Places, including previously unidentified properties. The statement must say which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location or potential for the presence of historic resources can be sought from the Virginia Department of Historic Resources (VDHR) (<http://www.dhr.virginia.gov/>) or Tribal Historic Preservation Officer (THPO), as appropriate, and the National Register of Historic Places. Where an applicant has identified historic properties which the proposed activity may have the potential to affect, the applicant shall not begin the activity until notified by the Corps that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed. (d) Prospective permittees should be aware that Section 110(k) of the NHPA (16 U.S.C. § 470(h)-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effects created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/ THPO, appropriate Indian tribes if the undertaking occurs on or affect historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have legitimate interest in the impacts to the permitted activity on historic properties.
11. **Discovery of Previously Unknown Remains and Artifacts.** If you discover any previously unknown historic, cultural, or archaeological remains and artifacts while accomplishing activity authorized by this permit, you must immediately stop work and notify the Corps of what has been found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The Corps will initiate Federal, Tribal, and state

coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

12. **Tribal rights.** No activity authorized may impair reserved tribal rights, including, but not limited to, reserved water rights, treaty fishing, and hunting rights.
13. **Federal Lands.** Authorized activities shall not impinge upon the value of any National Wildlife Refuge, National Forest, National Park, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service, or National Park Service unless approval from the applicable land management agency is provided with the permit application.
14. **Endangered species.** (a) No activity is authorized under any RP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any RP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed; (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the District Engineer with the appropriate documentation to demonstrate compliance with those requirements. (c) Non-federal permittees shall notify the District Engineer if any proposed or listed species or proposed or designated critical habitat may be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized. Information on the location proposed/listed species and proposed/designated critical habitat can be obtained directly from the U.S. Fish and Wildlife (USFWS) online project review process at http://www.fws.gov/northeast/virginiafield/endspecies/Project_Reviews.html and/or the NOAA Fisheries Service Protected Resources Division (NOAA PRD), at 55 Great Republic Drive, Gloucester, MA 01930 or via telephone at (978) 281-9328, email: <http://www.nero.noaa.gov/protected/index.html>. Notification must include the name(s) of the proposed or listed species and/or proposed or designated critical habitat that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The District Engineer will determine whether the proposed activity "may affect" or will have "no effect" to proposed or listed species or proposed or designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete notification. In cases where the non-Federal applicant has identified proposed or listed species or proposed or designated critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activities will have "no effect" on proposed or listed species or proposed or designated critical habitat, or until Section 7 consultation has been completed. (d) As a result of formal or informal consultation with the USFWS or NOAA PRD the District Engineer may add species-specific regional endangered species conditions to the RP. (e) Authorization of an activity by a RP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with

“incidental take” provisions, etc.) from the USFWS or NOAA PRD, both lethal and non-lethal “take” of protected species are in violation of the ESA.

15. **Essential Fish Habitat.** The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297; 11 October 1996), requires all Federal agencies to consult with the NOAA Fisheries Service Habitat Conservation Division (NOAA HCD) on all actions, or proposed actions, authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). The EFH Designations within the Northeast Region (Maine to Virginia), dated March 1, 1999, has identified EFH for a number of species and their life stages within Virginia waters. If EFH consultation is required with NOAA HCD, the applicant shall not begin work until the Corps has provided notification that the EFH consultation has concluded.
16. **Migratory Birds and Bald and Golden Eagle Protection Act.** The bald eagle (*Haliaeetus leucocephalus*) is no longer a federally listed threatened or endangered species; therefore, the Endangered Species Act provisions are not applicable to this species. The Bald and Golden Eagle Protection Act (BGEPA) does not require that a federal agency involved in permitting the proposed action conduct coordination. The permittee is responsible for obtaining any “take” permits required under the U.S. Fish and Wildlife Service’s regulations governing compliance with the Migratory Bird Treaty Act or the BGEPA. The applicant should either obtain “take” permit or a letter of concurrence from USFWS indicating that a permit is not necessary prior to initiating construction activities. You should contact USFWS concerning this matter at U.S. Fish and Wildlife Service, Virginia Field Office, ATTN: Kim Smith, 6669 Short Lane, Gloucester, VA 23061. Information on active bald eagle nests and concentration areas can be obtained in Step 6 of the U.S. Fish and Wildlife Service’s online project review system available at: http://www.fws.gov/northeast/virginiafield/endspecies/Project_Reviews_Introduction.html.
17. **Wild and Scenic Rivers.** Currently, there are no designated Wild and Scenic Rivers in the Commonwealth of Virginia; however, the portion of the Upper New River from Glen Lyn, Virginia to the West Virginia/Virginia state line was designated a “study river” by Congress on October 26, 1992. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system, while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river has determined, in writing, that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Impacts that occur in these resource areas will require coordination with the appropriate Federal agency.
18. **Federal navigation project.** Authorized activities may not interfere with any existing or proposed Federal navigation projects.
19. **Navigation.** (a) No authorized activity may cause more than a minimal adverse effect on navigation. (b) The permittee understands and agrees that if future operations by the United States require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his/her authorized

representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

20. **Floodplains.** All practicable efforts shall be made to conduct the work authorized by this RP in a manner so as to avoid any adverse impact on the Federal Emergency Management Agency (FEMA) designated 100-year floodplain.
21. **Real estate.** Activities authorized under this RP do not grant any Corps or Federal real estate rights. If real estate rights are needed from the Corps, you must contact the Corps Real Estate Office at (757) 201-7735 or at the address listed on the front page of this permit.
22. **Environmental Justice.** Activities authorized under this RP must comply with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations".
23. **Federal liability.** In issuing this RP, the Federal government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest; (c) damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this RP; (d) design or construction deficiencies associated with the permitted work; (e) damage claims associated with any future modification, suspension, or revocation of this permit.

General Conditions Related to Minimizing Environmental Impacts:

24. **Avoidance and minimization.** Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. (40 CFR Part 230.10(a) Section 404 (b)(1) Guidelines).
25. **Mitigation.** Mitigation in all its forms (avoiding, minimizing, or compensating for resource losses) may be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal. The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site)."
26. **Heavy equipment in wetlands.** Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.
27. **Temporary fills.** All temporarily disturbed waters and wetlands must be restored to preconstruction contours within 6 months of commencing the temporary impact's construction. Impacts that will not be restored within 6 months (calculated from the start of the temporary impacts construction) will be considered permanent unless otherwise approved by the RP. Following restoration of contours, the soil in wetlands must be mechanically loosened to a depth of 12 inches, and the wetlands must then be seeded or sprigged with appropriate native wetland vegetation.

28. **Sedimentation and erosion control.** Appropriate erosion and sediment controls must be employed and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark, must be permanently stabilized at the earliest practicable date.
29. **Aquatic life movements.** No authorized activities may substantially disrupt the necessary life cycle movements of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water. The Corps has determined that fish and wildlife are most often present in any stream being crossed, in the absence of evidence to the contrary. All permanent and temporary crossings of water bodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. This includes providing invert elevations of culverts at or below the streambed to ensure unrestricted passage of aquatic organisms, where possible.
30. **Discharge of pollutants.** All authorized activities involving any discharge of pollutants into waters of the United States shall be consistent with applicable water quality standards, effluent limitations, standards of performance, prohibitions, and pretreatment standards and management practices established pursuant to the CWA (33 U.S.C. § 1251 *et seq.*) and applicable state and local laws. No discharge of dredged or fill material in association with this authorization may consist of unsuitable material such as trash, debris, car bodies, asphalt, etc.
31. **Obstruction of high flows.** Discharges of dredged or fill material must not permanently restrict or impede the passage of normal or expected high flows.
32. **Waterbird breeding areas.** Discharges of dredged or fill material into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.
33. **Native trout and anadromous fishes.** Authorizations for discharges of dredged or fill material into native trout waters or anadromous fish use areas will be conditioned to limit in-stream work within timeframes recommended by the DGIF and/or NOAA Fisheries Service. Coordination with DGIF and/or NOAA Fisheries Service will be conducted by the Corps. The applicant shall not begin work until notification is received that all coordination has been completed and/or the Corps has provided the applicant with the appropriate time of year restrictions regarding work in native trout waters or anadromous fish use areas.
34. **Water supply intakes.** No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for adjacent bank stabilization and/or the Corps has provided specific authorization under this permit.

General Procedural Conditions:

35. **Inspections.** A copy of this permit and any verification letter must be provided to the contractor and made available at the project site to any regulatory representative. The permittee understands and agrees that the Corps are permitted and allowed to make periodic inspections at any time the Corps deems necessary in order to assure that the activities being performed under authority of this permit are in accordance with the terms and conditions prescribed herein. The Corps reserves the right to require post-construction engineering drawings and/or surveys of any work authorized under this RP, as deemed necessary on a case-by-case basis.

36. **Maintenance.** The permittee shall maintain the work authorized herein in good condition and in conformance with all terms and conditions of this permit. All fills shall be properly maintained to ensure public safety.
37. **Property rights.** This General Permit does not convey any property rights, either in real estate or material, or convey any exclusive privileges, nor does it authorize any injury to property or invasion of rights or any infringement of Federal, state, or local laws or regulations.
38. **Modification, suspension, and revocation.** This RP may be either modified, suspended, or revoked in whole or in part pursuant to the policies and procedures of 33 CFR Part 325.7. Any such action shall not be the basis for any claim for damages against the United States.
39. **Restoration directive.** The permittee, upon receipt of a restoration directive, shall restore the waters of the United States to their former conditions without expense to the United States and as directed by the Secretary of the Army or his/her authorized representative. If the permittee fails to comply with such a directive, the Secretary or his/her designee, may restore the waters of the United States to their former conditions, by contract or otherwise, and recover the cost from the permittee.
40. **Special conditions.** The Corps may impose other special conditions on a project authorized pursuant to this RP that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all general conditions of the authorization, including special conditions, constitutes a permit violation and may subject the permittee, or his/her contractor, to criminal, civil, or administrative penalties and/or restoration.
41. **False or incomplete information.** In granting authorization pursuant to this permit, the Corps has relied upon information and data provided by the permittee. If, subsequent to notification by the Corps that a project qualifies for this permit, such information and data prove to be materially false or materially incomplete, the authorization may be suspended or revoked, in whole or in part, and/or the United States may institute appropriate legal proceedings.
42. **Abandonment.** If the permittee decides to abandon the activity authorized under this RP, unless such abandonment is merely the transfer of property to a third party, he/she may be required to restore the area to the satisfaction of the Corps.
43. **Transfer of authorization.** In order to transfer authorization under this RP, the transferee or permittee must supply the Corps with a written and signed, by all appropriate parties, request to make such a transfer. Such transfer is not effective until written approval has been granted by the Corps.
44. **Binding effect.** The provisions of the permit authorization shall be binding on any assignee or successor in interest of the original permittee.

General Conditions Regarding Duration of Authorizations, Time Extensions for Authorizations, and Permit Expiration:

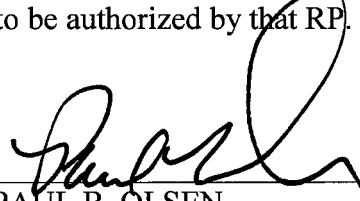
45. **Duration of Activity's Authorization.** Activities authorized under 13-RP-18 must be completed by August 14, 2018. If this RP is reissued at that time, and if this work has not been started or completed, but the project continues to meet the terms and conditions of the revalidated RP, then the project will continue to be authorized. The Corps will issue a

special public notice announcing any changes to the Regional Permits when they occur; however, it is incumbent upon you to remain informed of changes to the RPs. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon this RP that do not meet the terms and conditions of the revalidated RP will remain authorized provided the activity is completed within twelve months of the date of this RP's expiration (i.e. August 14, 2019), unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR Part 325.7(a-e). If work cannot be completed by August 14, 2019, you must reapply for separate permit authorization in order to meet current permit criteria.

46. **Expiration of 13-RGP-18.** Unless further modified, suspended, or revoked, this general permit will be in effect until August 14, 2018. Upon expiration, it may be considered for revalidation. Activities completed under the authorization of a RP which was in effect at the time the activity was completed continue to be authorized by that RP.

AUG 13 2013

Date



PAUL B. OLSEN
Colonel, Corps of Engineers
Commanding

Nationwide Permit (33) Temporary Construction, Access, and Dewatering (3/19/2012)

Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites, provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard. This NWP also authorizes temporary structures, work, and discharges, including cofferdams, necessary for construction activities not otherwise subject to the Corps or U.S. Coast Guard permit requirements. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if the district engineer determines that it will not cause more than minimal adverse effects on aquatic resources. Following completion of construction, temporary fill must be entirely removed to an area that has no waters of the United States, dredged material must be returned to its original location, and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate. This permit does not authorize the use of cofferdams to dewater wetlands or other aquatic areas to change their use. Structures left in place after construction is completed require a separate Section 10 permit if located in navigable waters of the United States. (See 33 CFR part 322.)

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 31). The pre-construction notification must include a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions. (Sections 10 and 404)

REGIONAL CONDITIONS:

1. Conditions for Waters Containing Submerged Aquatic Vegetation (SAV) Beds: A pre-construction notification (PCN) is required if work will occur in areas that contain submerged aquatic vegetation (SAVs). Information about SAVs can be found at the Virginia Institute of Marine Science's website: <http://www.vims.edu/bio/sav/>. Additional avoidance and minimization measures, such as relocating a structure or time-of-year (TOYR) restrictions may be required to reduce impacts to SAVs.
2. Conditions for Anadromous Fish Use Areas: To ensure that activities authorized by this Nationwide Permit (NWP) do not impact waterways documented to provide spawning habitat or a migratory pathway for anadromous fish, a check for anadromous fish use areas must be conducted via the Norfolk District's Regulatory GIS (for reporting permits) and/or the Virginia Department of Game and Inland Fisheries (VDGIF) Information System (by applicant for non-reporting permits) at <http://vafwis.org/fwis/>. If the project is located in an area documented as an anadromous fish use area (confirmed or potential), a time-of-year restriction (TOYR) prohibiting all in-water work will be required from February 15 to June 30 of any given year or any TOYR specified by VDGIF and/or Virginia Marine Resources Commission (VMRC). For permits requiring a PCN, if the Norfolk District determines that the work is minimal and the TOYR is unnecessary, informal consultation will be conducted with NOAA Fisheries Service (NOAA) to obtain concurrence that the TOYR would not be required for the proposed activity.
3. Conditions for Designated Critical Resource Waters, which include National Estuarine Research Reserves: Notification is required for work under this NWP in the Chesapeake Bay National Estuarine Research Reserve in Virginia. This multi-site system along a salinity gradient of the York River includes Sweet Hall Marsh, Taskinas Creek, Catlett Island, and Goodwin Islands. More information can be found at: <http://www.vims.edu/cbnerri/>.

4. Conditions for Federally Listed Species and Designated Critical Habitat: Notification for this NWP will be required for any project that may affect a federally listed threatened or endangered species or designated critical habitat. The U.S. Fish and Wildlife Service (Service) has developed an online system that allows users to find information about sensitive resources that may occur within the vicinity of a proposed project. This system is named "Information, Planning and Conservation System," (IPaC), and is located at: <http://ecos.fws.gov/ipac/>. This system provides information regarding federally listed and proposed candidate, threatened, and endangered species, designated critical habitats, and Service refuges that may occur in the identified areas, or may be affected by the proposed activities. The applicant may use this system to determine if any federally listed species or designated critical habitat may be affected by their proposed project, ensuring compliance with the Endangered Species Act.
5. Conditions for Waters with Federally Listed Endangered or Threatened Species, Waters Federally Designated as Critical Habitat, and One-mile Upstream (including tributaries) of Any Such Waters: A pre-construction notification (PCN) is required for work in the areas listed below for the Counties of Lee, Russell, Scott, Tazewell, Wise, and Washington in Southwestern Virginia within the following specific waters and reaches:
 - 1) Powell River - from the Tennessee-Virginia state line upstream to the Route 58 Bridge in Big Stone Gap and one mile upstream of the mouth of any tributary adjacent to this portion of the River.
 - 2) Clinch River - from the Tennessee-Virginia state line upstream to Route 632 at Pisgah in Tazewell County and one mile upstream of the mouth of any tributary adjacent to this portion of the River, the Little River to its confluence with Maiden Spring Creek, and one mile upstream of the mouth of any tributary adjacent to this portion of Little River.
 - 3) North Fork Holston River - from the Tennessee-Virginia state line upstream to the Smyth County/Bland County line and one mile upstream of any tributary adjacent to this portion of the River.
 - 4) Copper Creek - from its junction with the Clinch River upstream to the Route 58 bridge at Dickensonville in Russell County and one mile upstream of any tributary adjacent to this portion of the Creek.
 - 5) Indian Creek - from its junction with the Clinch River upstream to the fourth Norfolk and Western Railroad bridge at Van Dyke in Tazewell County and one mile upstream of the mouth of any tributary adjacent to this portion of the Creek.
 - 6) Middle Fork Holston River - from the Tennessee-Virginia state line to its junction with Walker Creek in Smyth County near Marion, Virginia.
 - 7) South Fork Holston River - from its junction with Middle Fork Holston River upstream to its junction with Beech Creek in Washington County.

For activities requiring a PCN to work in specific waters and reaches, as described above, in the counties of Lee, Russell, Scott, Smyth, Tazewell, Wise, and Washington in southwestern Virginia, it is recommended that the prospective permittee first contact the applicable Norfolk District Field Office, found at this web link: http://www.nao.usace.army.mil/Regulatory_Branch/contact_geo_southwest.asp, to determine if the PCN procedures would apply. If required, the PCN must be submitted in writing and include the following information (the Joint Permit Application may also be used – be sure to mark it with the letters PCN at the top of the first page):

- Name, address, and telephone number of the prospective permittee.
- Location of the proposed project.
- Vicinity map and project drawings on 8.5-inch by 11-inch paper (including a plan view, profile, & cross-sectional view).
- Brief description of the proposed project and the project purpose.

- Where required by the terms of the NWP, a delineation of affected special aquatic sites, including wetlands.

When all required information is received by the appropriate field office, the Corps will notify the prospective permittee within 45 days whether the project may proceed under the NWP permit or whether an individual permit is required. If, after reviewing the notification, the District Commander determines that the proposed activity would have more than a minimal individual or cumulative adverse impact on the aquatic environment or otherwise may be contrary to the public interest, then he/she will either condition the nationwide permit authorization to reduce or eliminate the adverse impacts, or notify the prospective permittee that the activity is not authorized by the nationwide permit and provide the prospective permittee with instructions on how to seek authorization under an individual permit.

Non-federal applicants shall notify the District Commander if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the District Commander that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the PCN must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The District Commander will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps’ determination within 45 days of receipt of a complete PCN. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have “no effect” on listed species or critical habitat, or until Section 7 consultation has been completed.

6. **Conditions for Designated Trout Waters:** Notification is required for work in the areas listed below for this NWP. This condition applies to activities occurring in two categories of waters: Class V (Put and Take Trout Waters) and Class VI (Natural Trout Waters), as defined by the Virginia State Water Control Board Regulations, Water Quality Standards (VR-680-21-00), dated January 1, 1991, or the most recently updated publication. The Virginia Department of Game and Inland Fisheries (VDGIF) designated these same trout streams into six classes. Classes I-IV are considered wild trout streams. Classes V and VI are considered stockable trout streams. Information on designated trout streams can be obtained via their Virginia Fish and Wildlife Information Service’s (VAFWIS’s) Cold Water Stream Survey database. Basic access to the VAFWIS is available via <http://vafwis.org/fwis/>.

The waters, occurring specifically within the mountains of Virginia, are within the following river basins:

- 1) Potomac-Shenandoah River Basins
- 2) James River Basin
- 3) Roanoke River Basin
- 4) New River Basin
- 5) Tennessee and Big Sandy River Basins
- 6) Rappahannock River Basin

VDGIF recommends the following time-of-year restrictions (TOYR) for any in-stream work within streams identified as wild trout waters in its Cold Water Stream Survey database. The recommended TOYR for trout species are:

- Brook Trout: October 1 through March 31
- Brown Trout: October 1 through March 31

- Rainbow Trout: March 15 through May 15

This condition applies to the following counties and cities: Albemarle, Allegheny, Amherst, Augusta, Bath, Bedford, Bland, Botetourt, Bristol, Buchanan, Buena Vista, Carroll, Clarke, Covington, Craig, Dickenson, Floyd, Franklin, Frederick, Giles, Grayson, Greene, Henry, Highland, Lee, Loudoun, Madison, Montgomery, Nelson, Page, Patrick, Pulaski, Rappahannock, Roanoke City, Roanoke Co., Rockbridge, Rockingham, Russell, Scott, Shenandoah, Smyth, Staunton, Tazewell, Warren, Washington, Waynesboro, Wise, and Wythe.

Any discharge of dredged and/or fill material authorized by this NWP, which would occur in the designated waterways or adjacent wetlands of the specified counties, requires notification to the appropriate Corps of Engineers field office, and written approval from that office prior to performing the work. The Norfolk District recommends that prospective permittees first contact the appropriate field office by telephone to determine if the notification procedures would apply. The notification must be in writing and include the following information (the standard Joint Permit Application may also be used):

- Name, address, and telephone number of the prospective permittee.
- Location of the proposed project.
- Vicinity map and project drawings on 8.5-inch by 11-inch paper (plan view, profile, & cross-sectional view).
- Brief description of the proposed project and the project purpose.
- Where required by the terms of the nationwide permit, a delineation of affected special aquatic sites, including wetlands.

When all required information is received by the appropriate field office, the Corps will notify the prospective permittee within 45 days whether the project can proceed under the NWP or whether an individual permit is required. If, after reviewing the notification, the District Commander determines that the proposed activity would have more than minimal individual or cumulative adverse impacts on the aquatic environment or otherwise may be contrary to the public interest, then he/she will either condition the nationwide permit authorization to reduce or eliminate the adverse impacts, or notify the prospective permittee that the activity is not authorized by the NWP and provide instructions on how to seek authorization under an individual permit. If the prospective permittee is not notified otherwise within the 45-day period the prospective permittee may assume that the project can proceed under the NWP.

7. **Conditions Regarding Invasive Species:** Plant species listed by the most current *Virginia Department of Conservation and Recreation’s Invasive Alien Plant List* shall not be used for re-vegetation for activities authorized by any NWP. The list of invasive plants in Virginia may be found at: http://www.dcr.virginia.gov/natural_heritage/documents/invlist.pdf.
8. **Conditions Pertaining to Countersinking of Pipes and Culverts in Nontidal Waters:**

NOTE: COUNTERSINKING IS NOT REQUIRED IN TIDAL WATERS. However, replacement pipes/culverts in tidal waters must be installed with invert elevations no higher than the existing pipe/culvert invert elevation, and a new pipe/culvert must be installed with the invert no higher than the stream bottom elevation.

- a. Following consultation with the Virginia Department of Game and Inland Fisheries (DGIF), the Norfolk District has determined that fish and other aquatic organisms are most likely present in any stream being crossed, in the absence of site-specific evidence to the contrary. Although prospective permittees have the option of providing such evidence, extensive efforts to collect such

information is not encouraged, since countersinking will in most cases be required except as outlined in the conditions below.

- b. **All pipes:** All pipes and culverts placed in streams will be countersunk at both the inlet and outlet ends, unless indicated otherwise by the Norfolk District on a case-by-case basis (see below). Pipes that are 24" or less in diameter shall be countersunk 3" below the natural stream bottom. Pipes that are greater than 24" in diameter shall be countersunk 6" below the natural stream bottom. The countersinking requirement does not apply to bottomless pipes/culverts or pipe arches. All single pipes or culverts (with bottoms) shall be depressed (countersunk) below the natural streambed at both the inlet and outlet of the structure. In sets of multiple pipes or culverts (with bottoms) at least one pipe or culvert shall be depressed (countersunk) at both the inlet and outlet to convey low flows.
- c. **Exemption for extensions and certain maintenance:** The requirement to countersink does not apply to extensions of existing pipes or culverts that are not countersunk, or to maintenance to pipes/culverts that does not involve replacing the pipe/culvert (such as repairing cracks, adding material to prevent/correct scour, etc.).
- d. **Floodplain pipes:** The requirement to countersink does not apply to pipes or culverts that are being placed above ordinary high water, such as those placed to allow for floodplain flows. The placement of pipes above ordinary high water is not jurisdictional (provided no fill is discharged into wetlands).
- e. **Hydraulic opening:** Pipes should be adequately sized to allow for the passage of ordinary high water with the countersinking and invert restrictions taken into account.
- f. **Pipes on bedrock or above existing utility lines:** Different procedures will be followed for pipes or culverts to be placed on bedrock or above existing buried utility lines where it is not practicable to relocate the lines, depending on whether the work is for replacement of an existing pipe/culvert or a new pipe/culvert:
 - i. **Replacement of an existing pipe/culvert:** Countersinking is not required provided the elevations of the inlet and outlet ends of the replacement pipe/culvert are no higher above the stream bottom than those of the existing pipe/culvert. Documentation (photographic or other evidence) must be maintained in the permittee's records showing the bedrock condition and the existing inlet and outlet elevations. That documentation will be available to the Norfolk District upon request, but notification or coordination with the Norfolk District is not otherwise required.
 - ii. **A pipe/culvert is being placed in a new location:** If the prospective permittee determines that bedrock or an existing buried utility line that is not practicable to relocate prevents countersinking, he/she should evaluate the use of a bottomless pipe/culvert, bottomless utility vault, span (bridge) or other bottomless structure to cross the waterway, and also evaluate alternative locations for the new pipe/culvert that will allow for countersinking. If the prospective permittee determines that neither a bottomless structure nor an alternative location is practicable, then he/she must submit a pre-construction notification (PCN) to the Norfolk District in accordance with General Condition 31 of the NWPs. In addition to the information required by General Condition 31, the prospective permittee must provide documentation of measures evaluated to minimize disruption of the movement of aquatic life as well as documentation of the cost, engineering factors, and site conditions that prohibit countersinking the pipe/culvert. Options that must be considered include partial countersinking (such as less than 3" of countersinking, or countersinking of one end of the pipe), and constructing stone step pools, low rock weirs downstream, or other measures to provide for the movement of aquatic organisms. The PCN must also include photographs documenting site conditions. The prospective permittee may find it helpful to contact his/her regional fishery biologist for the Virginia Department of Game and Inland Fisheries (VDGIF), for recommendations about the measures to be taken to allow for fish movements. When seeking advice from VDGIF, the prospective permittee should provide the VDGIF biologist with all available information such as location, flow rates, stream bottom features, description of proposed pipe(s), slopes, etc. Any recommendations from VDGIF should be included in the PCN. The Norfolk District will notify the prospective permittee whether the proposed work qualifies for the nationwide permit within 45 days of receipt of a complete PCN. NOTE: Blasting of stream bottoms through the use of explosives is not acceptable as a means of providing for countersinking of pipes on bedrock.
- g. **Pipes on steep terrain:** Pipes being placed on steep terrain (slope of 5% or greater) must be countersunk in accordance with the conditions above and will in most cases be non-reporting. It is recommended that on slopes greater than 5%, a larger pipe than required be installed to allow for the passage of ordinary high water in order to increase the likelihood that natural velocities can be maintained. There may be situations where countersinking both the inlet and outlet may result in a slope in the pipe that results in flow velocities that cause excessive scour at the outlet and/or prohibit some fish movement. This type of situation could occur on the side of a mountain where falls and drop pools occur along a stream. Should this be the case, or should the prospective permittee not want to countersink the pipe/culvert for other reasons, he/she must submit a Pre-Construction Notification to the Norfolk District in accordance with General Condition 31 of the Nationwide Permits. In addition to the information required by General Condition 31, the prospective permittee must provide documentation of measures evaluated to minimize disruption of the movement of aquatic life as well as documentation of the cost, engineering factors, and site conditions that prohibit countersinking the pipe/culvert. The prospective permittee should design the pipe to be placed at a slope as steep as stream characteristics allow, countersink the inlet 3-6", and implement measures to minimize any disruption of fish movement. These measures can include constructing a stone step/pool structure, preferably using river rock/native stone rather than riprap, constructing low rock weirs to create a pool or pools, or other structures to allow for fish movements in both directions. Stone structures should be designed with sufficient-sized stone to prevent erosion or washout and should include keying-in as appropriate. These structures should be designed both to allow for fish passage and to minimize scour at the outlet. The quantities of fill discharged below ordinary high water necessary to comply with these requirements (i.e., the cubic yards of stone, riprap or other fill placed below the plane of ordinary high water) must be included in project totals. The prospective permittee may find it helpful to contact his/her regional fishery biologist for the Virginia Department of Game and Inland Fisheries (DGIF), for recommendations about the measures to be taken to allow for fish movements. When seeking advice from DGIF, the prospective permittee should provide the DGIF biologist with all available information such as location, flow rates, stream bottom features, description of proposed pipe(s), slopes, etc. Any recommendations from DGIF should be included in the PCN. The Norfolk District will notify the prospective permittee whether the proposed work qualifies for the nationwide permit within 45 days of receipt of a complete PCN.
- h. **Problems encountered during construction:** When a pipe/culvert is being replaced, and the design calls for countersinking at both ends of the pipe/culvert, and during construction it is found that the streambed/banks are on bedrock, then the permittee must stop work and contact the Norfolk District (contact by telephone and/or email is acceptable). The permittee must provide the Norfolk District with specific information concerning site conditions and limitations on countersinking. The Norfolk District will work with the permittee to determine an acceptable plan, taking into consideration the information

provided by the permittee, but the permittee should recognize that the Norfolk District could determine that the work will not qualify for a nationwide permit.

- i. **Emergency pipe replacements:** In the case of an emergency situation, such as when a pipe/culvert washes out during a flood, a permittee is encouraged to countersink the replacement pipe at the time of replacement, in accordance with the conditions above. However, if conditions or timeframes do not allow for countersinking, then the pipe can be replaced as it was before the washout, but the permittee will have to come back and replace the pipe/culvert and countersink it in accordance with the guidance above. In other words, the replacement of the washed out pipe is viewed as a temporary repair, and a countersunk replacement should be made at the earliest possible date. The Norfolk District must be notified of all pipes/culverts that are replaced without countersinking at the time that it occurs, even if it is an otherwise non-reporting activity, and must provide the permittee's planned schedule for installing a countersunk replacement (it is acceptable to submit such notification by email). The permittee should anticipate whether bedrock or steep terrain will limit countersinking, and if so, should follow the procedures outlined in (f) and/or (g) above.

9. **Conditions for the Repair of Pipes:**

NOTE: COUNTERSINKING IS NOT REQUIRED IN TIDAL WATERS. However, replacement pipes/culverts in tidal waters must be installed with invert elevations no higher than the existing pipe/culvert invert elevation, and a new pipe/culvert must be installed with the invert no higher than the stream bottom elevation.

If any discharge of fill material will occur in conjunction with pipe maintenance, such as concrete being pumped over rebar into an existing deteriorated pipe for stabilization, then:

- A. **If the existing pipe or line of pipes are NOT currently countersunk:**
- As long as the inlet and outlet invert elevations of at least one pipe located in the low flow channel are not being altered, and provided that no concrete apron is being constructed, then the work may proceed under the NWP for the other pipes, provided it complies with all other NWP General Conditions, including Condition 9 for Management of Water Flows. In such cases, notification to the Norfolk District Commander is not required, unless specified in the NWP Conditions for other reasons, and the permittee may proceed with the work.
 - Otherwise, the prospective permittee must submit a pre-construction notification (PCN) to the Norfolk District Commander prior to commencing the activity. For all such projects, the following information should be provided:
 - Photographs of the existing inlet and outlet;
 - A measurement of the degree to which the work will raise the invert elevations of both the inlet and outlet of the existing pipe;
 - The reasons why other methods of pipe maintenance are not practicable (such as metal sleeves or a countersunk pipe replacement);
 - Depending on the specific case, the Norfolk District may discuss potential fish usage of the waterway with the Virginia Department of Game and Inland Fisheries.

The Norfolk District will assess all such pipe repair proposals in accordance with guidelines that can be found under "Pipe Repair Guidelines" at:

http://www.nao.usace.army.mil/technical%20services/Regulatory%20branch/Guidance/guidance_documents.asp

- c. If the Norfolk District determines that the work qualifies for the NWP, additional conditions will be placed on the verification. Those conditions can be found at the web link above (in item ii).

- If the Norfolk District determines that the work does NOT qualify for the NWP, the applicant will be directed to apply for either an LOP-I permit (applicable only for Virginia Department of Transportation projects) or an individual permit. However, it is anticipated that the applicant will still be required to perform the work such that the waterway is not blocked or restricted to a greater degree than its current conditions.
- B. **If the existing pipe or at least one pipe in the line of pipes IS countersunk and at least one pipe located in the low flow channel will continue to be countersunk, and no concrete aprons are proposed:** No PCN to the Norfolk District is required, unless specified in the NWP Conditions for other reasons, and the permittee may proceed with the work.
- C. **If the existing pipe or at least one pipe in the line of pipes IS countersunk and no pipe will continue to be countersunk in the low flow channel:** This work cannot be performed under the NWPs. The prospective permittee must apply for either a Letter of Permission 1 (LOP-I) permit (applicable only for VDOT projects) or an individual permit. However, it is anticipated that the prospective permittee will still be required to perform the work such that the waterway is not blocked or restricted more so than its current conditions.
- D. **Emergency situations:** In the case of an emergency situation, a prospective permittee is encouraged to follow the above guidelines at the time of repair. However, if conditions or timeframes do not allow for compliance with the procedure outlined herein, then the pipe can be repaired as it was before the washout, but the prospective permittee will have to come back and replace or reconstruct the pipe/culvert in accordance with these guidelines. In other words, the repair of the pipe is viewed as a temporary fix, and an appropriate repair should be made at the earliest possible date. The Norfolk District must be notified of all pipes/culverts that are repaired without compliance with these guidelines at the time that the repair occurs, even if it is an otherwise non-reporting activity, and that notification must provide the prospective permittee's planned schedule for following these procedures and constructing an appropriate repair (it is acceptable to submit such notification by email).

GENERAL CONDITIONS:

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

- Navigation.**
 - No activity may cause more than a minimal adverse effect on navigation.
 - Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
 - The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions

caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.
3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.
4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP's 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.
6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).
7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.
8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.
9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).
10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.
11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.
12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.
13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.
14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.
15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.
16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).
17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.
18. Endangered Species.
 - a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.
 - b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.
 - c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

- d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWP.
- e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.
- f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at <http://www.fws.gov/> or <http://www.fws.gov/ipac> and <http://www.noaa.gov/fisheries.html> respectively.
19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.
20. Historic Properties.
- a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
- b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.
- c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.
- d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.
- e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.
21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.
- a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
- b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.
23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal.
- a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
- b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

- c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.
- (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.
 - (2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.
 - (3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).
 - (4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.
 - (5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.
- d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.
- e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.
- f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.
- g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.
- h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.
24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.
 25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.
 26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.
 27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.
 28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.
 29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

“When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the

property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

- a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions.
- b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and
- c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification.

a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

- (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or
- (2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the

NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

- (1) Name, address and telephone numbers of the prospective permittee;
- (2) Location of the proposed project;
- (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);
- (4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;
- (5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.
- (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and
- (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

d) Agency Coordination:

- (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

- (2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.
- (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.
- (4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

DISTRICT ENGINEER'S DECISION:

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to

2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.
3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

FURTHER INFORMATION:

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

SECTION 401 WATER QUALITY CERTIFICATION (4/18/12):

The State Water Control Board has provided unconditional §401 Water Quality Certification for all of the Norfolk District Regional Conditions and for the following Nationwide Permits, as meeting the requirements of the Virginia Water Protection Permit Regulation, which serves as the Commonwealth's §401 Water Quality Certification: Nationwide Permits 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 15, 20, 22, 23, 28, 30, 31, 33, 34, 35, 36, 37, 38, 45, 46, 49, and 50.

COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION (4/19/12):

Based on the comments submitted by the agencies administering the enforceable policies of the Virginia Coastal Zone Management Program (VCP), the Virginia Department of Environmental Quality (DEQ) concurs that the reissuance of the 2012 NWP's and Virginia Regional Conditions, as proposed, is consistent with the VCP provided that the following conditions, discussed below, are satisfied:

1. Prior to construction, applicants shall obtain all required permits and approvals not yet secured for the activities to be performed that are applicable to the VCP's enforceable policies and that applicants also adhere to all the conditions contained therein.
 - The Virginia Marine Resources Commission's (VMRC) concurrence of consistency with the subaqueous lands management enforceable policy is based on the recognition that prospective permittees may be required to obtain additional state and/or local approvals prior to commencement of work in waters of the United States from the VMRC and/or the local wetlands board. Such approvals must precede implementation of the projects.
 - Similarly, the Department of Conservation and Recreation, Division of Stormwater Management, Local Implementation (formerly the Division of Chesapeake Bay Local Assistance) concurs that the proposed action is consistent with the coastal lands management enforceable policy provided projects are designed and constructed in a manner consistent with all state and local requirements pursuant to the Chesapeake Bay Preservation Act ("the Act") (Virginia Code §10.1-2100 et seq.) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 10-20 et seq.). Applicable projects must receive local approval to be consistent with the coastal lands management enforceable policy.
2. The State Water Control Board has provided §401 Clean Water Act Water Quality Certification for the NWP's and Virginia Regional Conditions. Therefore, the activities that qualify for the NWP's meet the requirements of DEQ's Virginia Water Protection Permit Regulation, provided that the permittee abides by the conditions of the NWP. As to the exceptions for activities that would otherwise qualify for one of these Nationwide Permits, the State will continue to process applications for individual §401 Certification through a Virginia Water Protection General or Individual Permit pursuant to 9 VAC 25-210-10 *et seq.* The Commonwealth requests that the Corps forward to DEQ pre-construction notifications for any activities that fall into an excepted category for individual review of certain activities.

In accordance with the *Federal Consistency Regulations* at 15 CFR Part 930, section 930.4, this conditional concurrence is based on the applicants demonstrating to the Corps that they have obtained, or will obtain, all necessary authorizations prior to implementing a project which qualifies for a NWP. If the requirements of section 930.4, sub-paragraphs (a)(1) through (a)(3) are not met, this conditional concurrence becomes an objection under 15 CFR Part 930, section 940.43.



Reply to
Attention of

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1096

September 10, 2014

Southern Virginia Regulatory Section
NAO-2004-04504 / VMRC#14-V0939 (Chesapeake Bay)

Ms. Elizabeth Nashold
Commander Navy Region Mid-Atlantic
Code N-45, Regional Environmental Group
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Ms. Nashold:

This is in reference to the Department of the Army application NAO-2004-04504 / VMRC#14-V0939 you have submitted the temporary construction of the Duckpond and the 1,520 foot long elevated causeway (ELCAS) training exercise on Anzio Beach at JEB Little Creek or on Omaha Beach at JEB Fort Story or at the mudflats training center on JEB Little Creek in Virginia Beach, Virginia. Your proposed project as described above and depicted on the enclosed drawings for the 331st Transportation Company (MCS) 7th Transportation Brigade's temporary Duckpond and Floating Causeway, received by the Corps on July 22, 2014 and the ELCAS Overhead View and Side Elevation received by the Corps on June 30, 2014 satisfies the terms and conditions of Norfolk District's Regional Permit 18 (13-RP-18) and the Corps Nationwide Permit 33 (NWP-33), enclosed. Provided you follow all of the general and specific terms and conditions of 13-RP-18 and NWP-33, as well as, any additional special conditions included below, no further authorization will be required from the Corps.

This nationwide permit verification is contingent upon the following project specific conditions:

1. All disturbed areas below the plan of Mean High Water shall be reestablished after the training exercises are complete.
2. The U.S. Coast Guard has requested notification two weeks prior to the placement of the temporary causeway system, so the pertinent information may be included in the Local Notice to Mariners and Broadcast Notice to Mariners.
3. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or

alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

4. Enclosed is a "compliance certification" form, which must be signed and returned within 30 days of completion of the project, including any required mitigation. Your signature on this form certifies that you have completed the work in accordance with the nationwide permit terms and conditions.

Activities authorized under this RP must be completed by August 14, 2018. If this RP is reissued at that time, and if this work has not been started or completed, but the project continues to meet the terms and conditions of the revalidated RP, then the project will continue to be authorized. The Corps will issue a special public notice announcing any changes to the Regional Permits when they occur; however, it is incumbent upon you to remain informed of changes to the RPs. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon this RP that do not meet the terms and conditions of the revalidated RPs will remain authorized provided the activity is completed within twelve months of the date of these RP's expiration (i.e. August 14, 2019), unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR Part 325.7(a-e). If work cannot be completed by August 14, 2019, you must reapply for separate permit authorization in order to meet current permit criteria.

The Corps Nationwide Permits were published in the February 21, 2012 Federal Register notice (77 FR 10184) and the regulations governing their use can be found in 33 CFR 330 published in Volume 56, Number 226 of the Federal Register dated November 22, 1991. This verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2017. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 330.4(e) and 33 CFR 330.5 (c) or (d). Project specific conditions listed in this letter continue to remain in effect after the NWP verification expires, unless the district engineer removes those conditions. Activities completed under the authorization of an NWP which was in effect at the time the activity was completed continue to be authorized by that NWP.

The State Water Control Board provided unconditional §401 Water Quality Certification for this RP and unconditional §401 Water Quality Certification for these NWP. Therefore, the activities that qualify for this RP and NWP meet the requirements of Department of Environmental Quality's (DEQ) Virginia Water Protection Permit Regulation, provided that the permittee abides by the conditions of this RP and NWP. You will not be required to obtain a separate §401 Water Quality Certification from DEQ. However, a permit may be required from the Virginia Marine Resources Commission and/or your local wetlands board. Please note that you should obtain all required State and local authorizations before you proceed with the project. This authorization does not relieve your responsibility to comply with local requirements pursuant to the Chesapeake Bay Preservation Act (CBPA), nor does it supersede local government authority and responsibilities pursuant to the Act. You should contact your local government before you begin work to find out how the CBPA applies to your project. Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the Virginia Department of Environmental Quality Virginia Coastal Zone Management Program (VCP) completed its review of the Federal Consistency Determination (FCD) for this RP on May 10, 2013 and for this NWP on April 19, 2012 and provided concurrence that this RP and NWP are consistent with the VCP. Therefore, no further coordination with the VCP is required. Authorizations under this RP and NWP do not supersede state or local government authority or responsibilities pursuant to any State or local laws or regulations.

If you have any questions and/or concerns about this permit authorization, please contact me via telephone at (757) 201-7489 or via email at melissa.a.nash@usace.army.mil.

Sincerely,



Melissa Nash
Environmental Scientist

Enclosure(s)

Cc:

Jessica Bassi, NAVFAC MIDLANT
Virginia Department of Environmental Quality, Virginia Beach
Justin Worrell, VMRC
David Compton, City of Virginia Beach



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

5636 Southern Boulevard, Virginia Beach, Virginia 23462

(757) 518-2000 Fax (757) 518-2009

www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Maria R. Nold
Regional Director

September 11, 2014

Ms. Elizabeth Nashold
c/o Commander Navy Region Mid-Atlantic
Code N-45, Regional Environmental Group
1510 Gilbert Street
Norfolk VA 23511-2737

RE: **Notification of No Permit Required**
Joint Permit Application Number 14-0939
Elevated Causeway (ELCAS) Training Exercise
JEB Little Creek/Fort Story

Dear Ms. Nashold:

The Department of Environmental Quality (DEQ) has reviewed your above-referenced application to renew the permits for the Elevated Causeway (ELCAS) training exercise at JEB Little Creek/Fort Story. The project was previously permitted under VMRC number 04-1740.

We understand that the project has qualified for a Regional Permit 18 (13-RP-18) and Nationwide Permit 33 (NWP-33) from the U.S. Army Corps of Engineers, on which DEQ has provided § 401 Certification. Therefore, a Virginia Water Protection (VWP) permit will not be required by the DEQ for this project. Should the size and scope of the project change, a permit from DEQ may be required. You are advised that this does not give you the authority to violate the State's Water Quality Standards.

If you have any questions, please do not hesitate to contact me at (757) 518-2146 or jeffrey.hannah@deq.virginia.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Hannah".

Jeffrey Hannah
Project Manager

cc: Jessica Bassi, NAVFAC Midlant
Melissa Nash, U.S. Army Corps of Engineers
Justin Worrell, Virginia Marine Resources Commission
David Compton, City of Virginia Beach

APPENDIX G: FLORA AND FAUNA LISTS

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Acanthospermum australe</i>	Paraguayan starburr		Non-Specific Disturbed
<i>Acer palmatum</i>	Japanese maple		Developed-Low Density; Developed-Medium Density; Developed-Open Space
<i>Acer platanoides</i>	Norway maple		Developed-Low Density; Developed-Medium Density; Developed-Open Space
<i>Acer rubrum</i>	red maple	Maritime Swamp Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Acer saccharinum</i>	Silver maple	Maritime Swamp Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Acer saccharum</i>	Sugar maple	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest
<i>Achillea millefolium</i>	Common yarrow		Developed Open Space; Non-Specific Disturbed
<i>Agalinis purpurea</i>	Purple false foxglove		Developed Open Space; Non-Specific Disturbed
<i>Agrostis hyemalis</i>	winter bentgrass	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Agrostis capillaris (Agrostis tenuis)</i>	Colonial bentgrass		Developed-Open Space; Non-Specific Disturbed
<i>Agrostis gigantea (Agrostis alba)</i>	Redtop		Developed-Open Space; Non-Specific Disturbed
<i>Ailanthus altissima</i>	Tree of Heaven		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Aira caryophylla</i>	Silver hair grass		Non-Specific Disturbed
<i>Albizia julibrissin</i>	Mimosa; Silktree		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Alisma subcordatum</i>	American water plantain	Coastal Plain Depression Wetlands; Tidal Oligohaline Marsh	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Allium canadense</i>	Meadow garlic	Maritime Swamp Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Non-Specific Disturbed
<i>Allium vineale</i>	Field garlic		Developed-Open Space; Non-Specific Disturbed
<i>Alnus incana rugosa (Alnus rugosa)</i>	Speckled alder	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Alnus serrulata</i>	Common alder	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Ambrosia bidentata</i>	Lanceleaf ragweed	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Amelanchier canadensis</i>	Canadian serviceberry	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Amelanchier laevis</i>	Allegheny serviceberry	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Amelanchier spicata (Amelanchier stolonifera)</i>	Running serviceberry	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ammophila breviligulata</i>	American beachgrass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Amphicarpaea bracteata</i> var. <i>bracteata</i> (<i>Amphicarpa bracteata</i>)	American hogpeanut	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Lysimachia arvensis</i> (<i>Anagallis arvensis</i>)	Scarlet pimpernel		Developed-Open Space; Non-Specific Disturbed
<i>Anaphalis margaritacea</i>	Western pearly everlasting	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Developed-Open Space; Non-Specific Disturbed
<i>Andropogon virginicus</i>	broomsedge	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Successional Shrub/Scrub (Clear Cut)
<i>Aristida tuberculosa</i>	seabeach threeawn	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Anthoxanthum odoratum</i>	Sweet vernalgrass		Developed-Open Space; Non-Specific Disturbed
<i>Apios americana</i>	Groundnut	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Apocynum cannabinum</i>	Indianhemp	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Apocynum sibiricum</i>	Clasping dogbane	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Developed-Open Space; Non-Specific Disturbed
<i>Aquilegia canadensis</i>	Red columbine	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Arabidopsis thaliana</i>	Mouseear cress		Developed-Open Space; Non-Specific Disturbed
<i>Aralia spinosa</i>	Hercules' club	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Arceuthobium pusillum</i>	American mistletoe	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Arisaema triphyllum</i>	Jack in the pulpit	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Artemisia stelleriana</i>	dusty miller	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Asclepias incarnata</i>	Swamp milkweed	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Asclepias lanceolata</i>	Smooth orange milkweed	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Asclepias syriaca</i>	Common milkweed		Developed-Open Space; Non-Specific Disturbed
<i>Asimina triloba</i>	pawpaw	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Asparagus officinalis</i>	Garden asparagus		Developed-Open Space; Non-Specific Disturbed
<i>Asplenium platyneuron</i>	Ebony spleenwort	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Symphotrichum pilosum</i> (<i>Aster pilosus</i>)	Heath aster		Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Athyrium filix-femina</i>	common ladyfern	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Atriplex cristata</i>	crested saltbush	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Atriplex patula</i>	Spearscale		Developed-Open Space; Non-Specific Disturbed

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Avena fatua</i>	Wild oats		Developed-Open Space; Non-Specific Disturbed
<i>Baccharis halimifolia</i>	eastern baccharis	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Betula nigra</i>	River birch	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Betula populifolia</i>	Gray birch	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Successional Shrub/Scrub (Clear Cut)
<i>Bidens bipinnata</i>	Spanish needles		Non-Specific Disturbed
<i>Bidens frondosa</i>	Sticktight		Non-Specific Disturbed
<i>Bidens polylepis</i>	Beggar ticks		Non-Specific Disturbed
<i>Bignonia capreolata</i>	Cross-vine	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Boehmeria cylindrica</i>	False nettle	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Boltonia caroliniana</i>	Carolina doll's daisy	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Borrhchia frutescens</i>	Sea oxeye	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Sceptridium dissectum (Botrychium dissectum var. obliquum)</i>	Common grape fern	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Brassica juncea</i>	Indian mustard		Non-Specific Disturbed
<i>Bromus sp.</i>	Brome grass		Non-Specific Disturbed
<i>Bulbostylis capillaris</i>	Densetuft hairsedge		Developed-Open Land
<i>Cakile edentula</i>	American sea rocket		not classified - Beaches
<i>Callicarpa americana</i>	American beautyberry	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Calystegia sepium</i>	Hedge false bindweed		Non-Specific Disturbed
<i>Campsis radicans</i>	Trumpet creeper	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Dune and Swale; Successional Shrub/Scrub (Clear Cut)
<i>Carex alata</i>	Broadwing sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex albolutescens</i>	Greenwhite sedge	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Carex folliculata</i>	Northern long sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex kobomugi</i>	Asiatic sand sedge	Maritime Swamp Forest	Northern Atlantic Coastal Plain Dune and Swale (on dunes)
<i>Carex longii</i>	Long's sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex lupulina</i>	Hop sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex lurida</i>	Sallow sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex striata</i>	Sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carex striata var. brevis</i>	Walter's sedge	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Carpinus caroliniana</i>	Ironwood	Mesic Mixed Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Carya spp.</i>	Hickories	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Carya tomentosa (Carya alba)</i>	Mockemut hickory	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Carya cordiformis</i>	Bitternut hickory	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Carya glabra</i>	Pignut hickory	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Carya illinoensis</i>	Pecan	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Carya ovata</i>	Shagbark hickory	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Cassia fasciculata</i>	Partridge pea		Developed Open Space; Non-Specific Disturbed
<i>Castanea pumila</i>	Chinkapin	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Cedrus deodara</i>	Deodar cedar		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Celtis laevigata</i>	Sugarberry	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Celtis occidentalis</i>	Hackberry	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Cenchrus tribuloides</i>	Sanddune sandbur	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Centella asiatica</i>	Centella		Developed Open Space; Non-Specific Disturbed
<i>Cephalanthus occidentalis</i>	Buttonbush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Cerastium viscosum</i>	Clammy chickweed		Developed Open Space; Non-Specific Disturbed
<i>Cercis canadensis</i>	Eastern redbud	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Chaerophyllum tainturieri</i>	Wild chervil		Developed Open Space; Non-Specific Disturbed
<i>Chamaecyparis pisifera</i>	Sarawa false cypress		Developed-Low Density; Developed-Medium Density; Developed-Open Space
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Chamaesyce bombensis</i>	Southern beach spurge	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Chamaesyce polygonifolia</i>	Seaside sandmat	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Chasmanthium laxum</i>	Slender woodcoats	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Dysphania ambrosioides (Chenopodium ambrosioides)</i>	Mexican tea		Non-specific Disturbed
<i>Chimaphila maculata</i>	Striped princess pine	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Pityopsis falcata (Chrysopsis falcata)</i>	Northern golden aster	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Chrysopsis gossypina</i> spp. <i>cruseana</i>	cottony goldenaster	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Cirsium horridulum</i>	yellow thistle	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Cirsium repandum</i>	Coastal-plain thistle	Maritime Swamp Forest	Northern Atlantic Coastal Plain Dune and Swale
<i>Clematis terniflora</i> (<i>Clematis dioscoreifolia</i>)	Clematis		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Clethra alnifolia</i>	sweet pepper bush	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Clitoria mariana</i>	Butterfly pea	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Cnidioscolus stimulosus</i>	Spurge-nettle	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Commelina communis</i>	Asiatic dayflower	Coastal Plain Depression Wetlands; Interdune Swales and Ponds; Maritime Dune Grassland; Maritime Dune Woodland	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Southeastern Coastal Plain Interdunal Wetland
<i>Conopholis americana</i>	American squawroot	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Conyza canadensis</i>	Horseweed		Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Conyza canadensis</i> var. <i>pusilla</i>	Canada horseweed		Non-Specific Disturbed
<i>Cornus amomum</i>	Silky dogwood	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Cornus florida</i>	flowering dogwood	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Cornus kousa</i>	Kousa dogwood		Developed-Low Density; Developed-Medium Density; Developed-Open Space
<i>Cortaderia selloana</i>	Uruguayan Pampus Grass	Invasive Species	Invasive Species
<i>Crataegus nitida</i>	Glossy hawthorn		Developed-Low Density; Developed-Medium Density
<i>Croton glandulosus</i>	Croton		Developed-Open Space; Non-specific Disturbed
<i>Cryptotaenia canadensis</i>	Canada honewort	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Cuscuta gronovii</i>	Common dodder	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland; Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Cuscuta pentagona</i>	Five Angled dodder		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Cynodon dactylon</i>	Bermudagrass		Developed-Medium Intensity
<i>Cynoglossum virginianum</i>	Wild comfrey		Developed-Open Space; Non-specific Disturbed
<i>Cyperus esculentus</i>	Chufa flatsedge		Developed-Open Space; Non-specific Disturbed
<i>Cyperus filicinus</i>	Fern flatsedge	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Cyperus grayi</i>	Gray's flatsedge	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Cyperus plukenetii</i>	Plukenet's flatsedge	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Cyperus polystachyos</i>	Flatsedge	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Cyperus pseudovegetus</i>	Marsh flatsedge	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Cyperus retrorsus</i>	Pine barren flatsedge	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Cyperus strigosus</i>	Strawcolored flatsedge	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Cytisus scoparius</i>	Scotch broom		Developed Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Dactylis glomerata</i>	Orchard grass		Developed Open Space; Non-Specific Disturbed
<i>Daucus carota</i>	Queen Anne's lace		Developed Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Decodon verticillatus</i>	swamp loosestrife	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Cardamine spp. (Dentaria sp.)</i>	Rockcress	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Desmanthus illinoensis</i>	Prairie bundleflower	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Desmodium strictum</i>	Pine barren ticktrefoil	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Dianthus armeria</i>	Deptford pink		Developed-Open Space; Non-specific Disturbed
<i>Digitaria sanguinalis</i>	Northern crab grass		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-Specific Disturbed
<i>Dichanthelium or Panicum spp.</i>	panicgrasses	variety of habitats	variety of habitats
<i>Dichanthelium clandestinum</i>	Deer tongue	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Dichanthelium dichotomum</i>	Cypress panicgrass	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Dichanthelium ovale</i>	Eggleaf rosette grass	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Dichanthelium scoparium</i>	Panic broom grass	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Diodella teres (Diodia teres)</i>	poorjoe	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Developed-Open Space
<i>Diodia virginiana</i>	Buttonweed	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Developed-Open Space; Non-Specific Disturbed
<i>Draba verna</i>	Spring draba		Developed-Open Space; Non-Specific Disturbed
<i>Duchesnea indica</i>	Indian strawberry	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Diospyros virginiana</i>	persimmon	Coastal Plain Depression Wetlands; Interdune Swales and Ponds; Maritime Dune Grassland; Maritime Dune Woodland	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest
<i>Distichlis spicata</i>	Seashore saltgrass	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Distichlis spicata</i>	saltgrass	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Echinochloa crusgalli</i>	Barnyardgrass		Developed-Open Space; Non-Specific Disturbed
<i>Echinochloa muricata var. microstachya</i>	Rough barnyardgrass	Coastal Plain Depression Wetlands; Interdune Swales and Ponds; Maritime Dune Grassland; Maritime Dune Woodland	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest
<i>Eclipta prostrata (Eclipta alba)</i>	False daisy	Coastal Plain Depression Wetlands; Interdune Swales and Ponds; Maritime Dune Grassland; Maritime Dune Woodland	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Elaeagnus pungens</i>	Thorny elaeagnus	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Elaeagnus umbellata</i>	Autumn Olive	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.
<i>Eleocharis acicularis</i>	Needle spikerush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Eleocharis compressa</i>	Flatstem spikerush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Eleocharis obtusa</i>	Blunt spikerush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Eleocharis parvula</i>	Dwarf spikerush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Eleocharis quadrangulata</i>	squarestem spikerush	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Eleocharis spectabilis</i>	Purple lovegrass	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Eleocharis vivipara</i>	Viviparous spikerush	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Elephantopus tomentosus</i>	Devil's grandmother; Elephantsfoot	Mesic Mixed Pine-Hardwood Forest; Maritime Dune Woodland	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Maritime Forest
<i>Elymus virginicus</i>	Virginia wildrye	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Developed-Open Space; Non-Specific Disturbed
<i>Epifagus virginiana</i>	Beech drops	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Eragrostis curvula</i>	Weeping lovegrass		Developed-Open Space; Non-Specific Disturbed
<i>Eragrostis hirsuta</i>	Bigtop lovegrass		Developed-Open Space; Non-Specific Disturbed
<i>Eragrostis pilosa</i>	Indian lovegrass		Developed-Open Space; Non-Specific Disturbed
<i>Eragrostis spectabilis</i>	Purple lovegrass		Developed-Open Space; Non-Specific Disturbed
<i>Erigeron philadelphicus</i>	Philadelphia fleabane		Developed-Open Space; Non-Specific Disturbed
<i>Erigeron pulchellus</i>	Robin's plaintain	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Erigeron quercifolius</i>	Overleaf fleabane	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Developed-Open Space; Non-Specific Disturbed
<i>Erigeron strigosus</i>	Lesser daisy fleabane		Developed-Open Space; Non-Specific Disturbed
<i>Erigeron vernus</i>	Early whitetop fleabane	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale
<i>Eupatorium capillifolium</i>	Dog fennel		Successional Shrub/Scrub (Clear Cut)
<i>Conoclinium coelestinum (Eupatorium coelestinum)</i>	Mist flower	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Eupatorium hyssopifolium</i>	Hyssop-leaved thoroughwort	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Developed-Open Space; Non-Specific Disturbed
<i>Eupatorium leucolepis</i>	White-bract thoroughwort	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Eupatorium mohrli</i>	Morhr's thoroughwort	Coastal Plain Depression Wetlands; Tidal Oligohaline Marsh	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Eupatorium perfoliatum</i>	Common boneset	Coastal Plain Depression Wetlands; Tidal Oligohaline Marsh	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Eupatorium rotundifolium</i>	Round leaved boneset	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Ageratina altissima (Eupatorium rugosum)</i>	White snakeroot	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Euphorbia cyparissias</i>	Cypress spurge		Developed Open Space; Non-Specific Disturbed
<i>Euphorbia polygonifolia</i>	Northern seaside spurge		Northern Atlantic Coastal Plain Dune and Swale (on dunes)
<i>Euphorbia sp.</i>	Spurge	variety of habitats	variety of habitats
<i>Euonymus americana</i>	Strawberry bush	Not associated with any particular habitat	Not associated with any particular habitat
<i>Euthamia graminifolia</i>	Flat-top goldentop	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Euthamia caroliniana (Euthamia tenuifolia)</i>	Slender goldentop	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Developed Open Space; Non-Specific Disturbed
<i>Fagus grandifolia</i>	American beech	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Lolium arundinaceum (Festuca elatior; Festuca arundinacea)</i>	Tall fescue		Developed Open Space; Non-Specific Disturbed
<i>Festuca trachyphylla (Festuca ovina)</i>	Sheep fescue		Developed Open Space; Non-Specific Disturbed
<i>Lolium pratense (Festuca pratensis)</i>	Meadow fescue		Developed Open Space; Non-Specific Disturbed
<i>Fragaria virginiana</i>	Strawberry	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Non-Specific Disturbed
<i>Fraxinus americana</i>	White ash	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Fuirena pumila</i>	Dwarf umbrella-sedge	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Festuca sp.</i>	fescue grass	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Gaillardia pulchella</i>	Firewheel	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Galactia regularis</i>	Milk pea	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Galium aparine</i>	cleavers	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Upland Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt
<i>Galium aparine</i>	cleavers	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Galium circaezans</i>	Licorice bedstraw	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Galium hispidulum</i>	coastal bedstraw	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Galium pilosum</i>	Hairy bedstraw	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Galium tinctorium</i>	Stiff marsh bedstraw	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Gamochaeta purpurea (Gnaphalium purpureum)</i>	Spoonleaf purple everlasting		Developed Open Space; Non-Specific Disturbed
<i>Gaylussacia sp.</i>	Huckleberry	variety of habitats	variety of habitats
<i>Gelsemium sempervirens</i>	Evening trumpetflower	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Geranium sp.</i>	Cranes' bill		Developed Open Space; Non-Specific Disturbed
<i>Geum canadense</i>	White avens	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Geum virginianum</i>	Cream avens	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Pitch Pine Lowland

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Glecoma hederacea</i>	Ground ivy		Developed Open Space; Non-Specific Disturbed
<i>Gleditsia triacanthos</i>	Honey locust	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Pseudognaphalium obtusifolium</i> (<i>Gnaphalium obtusifolium</i>)	Fragrant rabbit tobacco	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Dune Woodland	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Goodyera</i> sp.	Rattlesnake plantain	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Gratiola neglecta</i>	Clammy hedgehyssop		Developed Open Space; Non-Specific Disturbed
<i>Platanthera integra</i> (<i>Habenaria integra</i>)	Yellow orchid	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Hamamelis virginiana</i>	Witch hazel	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Croptilon divaricatum</i> (<i>Haplopappus</i> sp.)	Golden aster	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Hedera helix</i>	English ivy	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Helenium</i> sp.	Sneezeweed		Developed Open Space; Non-Specific Disturbed
<i>Helianthemum canadense</i>	longbranch frostweed	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Crocantemum</i> sp. (<i>Helianthemum</i> sp.)	Frostweed	variety of habitats	variety of habitats
<i>Hemerocallis fulva</i>	Orange daylily		Developed Open Space; Non-Specific Disturbed
<i>Heterotheca subaxillaris</i>	camphorweed	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Hexastylis virginica</i>	Heartleaf wild ginger	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Hibiscus laevis</i>	Halberdleaf rosemallow	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Hibiscus moscheutos</i>	Swamp rose mallow	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Hieracium gronovii</i>	Hairy hawkweed	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Holcus lanatus</i>	Velvet grass		Non-Specific Disturbed
<i>Honckenya peploides</i> ssp. <i>robusta</i>	Seaside sandplant	beaches and dunes	beaches and dunes
<i>Houstonia caerulea</i>	Azure bluet	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Houstonia pusilla</i>	Tiny bluet		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Hudsonia tomentosa</i>	beach heather	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Huperzia</i> spp. (<i>Lycopodium</i> spp.)	Ground pines	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Hydrocotyle umbellata</i>	Marsh pennywort	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Hypericum crux-andreae</i> (<i>Ascyrum sans</i>)	St. Peterswort	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Hypericum gentianoides</i>	Orangegrass		Non-Specific Disturbed
<i>Hypericum hypericoides</i>	St. Andrew's cross	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Hypericum mutilum</i>	Dwarf St. Johnswort	Tidal Oligohaline Marsh; Coastal Plain Depression Wetlands	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Hypericum punctatum</i>	Spotted St. Johnswort		Non-Specific Disturbed
<i>Hypochaeris radicata</i>	Hairy cat's ear		Non-Specific Disturbed
<i>Hypoxis hirsuta</i>	Star grass	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ilex attenuata 'Fosteri'</i>	Foster's holly		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Ilex cassine</i>	Dahoon	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Ilex cornuta</i>	Chinese holly		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Ilex cornuta 'Burfordi'</i>	Burford holly		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Ilex glabra</i>	Inkberry	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Ilex opaca var. opaca</i>	American holly	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ilex vomitoria</i>	Yaupon	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Impatiens capensis</i>	Jewelweed	Maritime Swamp Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ionactis linariifolia</i>	Linear; Stiffleafed aster	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ipomoea pandurata</i>	Man of the earth		Developed Open Ground; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Ipomoea purpurea</i>	Common morning glory		Developed Open Ground; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Itea virginica</i>	Virginia willow	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Iva frutescens</i>	Jesuit's bark	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Iva imbricata</i>	seacoast marsh-elder	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Juglans nigra</i>	Black walnut	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Juncus biflorus</i>	Bog rush	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Juncus brachycarpus</i>	Whiteroot rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juncus canadensis</i>	Canadian rush	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Juncus debilis</i>	Weak rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juncus dichotomus</i>	Forked rush		Non-Specific Disturbed
<i>Juncus diffusissimus</i>	Slimpod rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Juncus effusus</i>	common rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juncus gerardi</i>	Black oak grass	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Juncus marginatus</i>	Grassleaf rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juncus repens</i>	Creeping rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juncus roemerianus</i>	Needlegrass rush; Blackneedle rush	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Juncus scirpoides</i>	Needlepod rush		Non-Specific Disturbed
<i>Juncus validus</i>	Roundhead rush	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Juniperus virginiana</i>	eastern red cedar	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Kalmia latifolia</i>	mountain laurel	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Lactuca canadensis</i>	Tall blue lettuce		Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lactuca serriola</i>	Prickly lettuce		Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lactuca spp.</i>	Weedy lettuce		Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lagerstroemia indica</i>	Crepe myrtle		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Lamium amplexicaule</i>	Henbit deadnettle		Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lechea maritima</i>	Pinweed	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Lechea maritima var. virginica</i>	Virginia pinweed	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Lechea pulchella</i>	Leggett's pinweed	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Lechea racemulosa</i>	Illinois pinweed	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Leontodon autumnalis</i>	Common catsear		Developed-Open Space; Non-specific Disturbed
<i>Lepidium virginicum</i>	Virginia pepperweed		Developed Open Space; Non-Specific Disturbed
<i>Lespedeza bicolor</i>	Shrub lespedeza		Developed Open Ground; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lespedeza cuneata</i>	Chinese lespedeza; Sericea bushclover		Developed Open Ground; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Lespedeza procumbens</i>	Trailing lespedeza	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Lespedeza repens</i>	Creeping lespedeza	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Upland Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Maritime Forest
<i>Kummerowia striata (Lespedeza striata)</i>	Japanese clover		Developed-Open Space; Non-specific Disturbed
<i>Lespedeza violacea</i>	Violet lespedeza	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Upland Forest	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Maritime Forest
<i>Lespedeza virginica</i>	slender lespedeza	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Leucanthemum lacustre</i>	Portuguese daisy		Developed Open Space; Non-Specific Disturbed
<i>Eubotrys racemosus (Leucothoe racemosa)</i>	Swamp doghobble	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Liatris virgata (Liatris graminifolia)</i>	Grass-leaved blazing star	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Liatris pilosa</i>	Shaggy blazing star	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ligustrum sinense</i>	privet	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Lindernia dubia</i>	False pimpernel	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Linum sp.</i>	Flax		Developed Open Space; Non-Specific Disturbed
<i>Lipocarpa maculata</i>	American halfchaff sedge	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Liquidambar styraciflua</i>	sweet gum	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Liriodendron tulipifera</i>	tuliptree	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Listera australis</i>	Southern twayblade	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Lobelia cardinalis</i>	Cardinal flower	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Lobelia inflata</i>	Indian tobacco		Developed Open Space; Non-Specific Disturbed
<i>Lobelia puberula</i>	Downy lobelia	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Lonicera japonica</i>	Japanese honeysuckle	Pine Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Lonicera sempervirens</i>	coral honeysuckle	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Ludwigia leptocarpa</i>	Seedbox	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Luzula acuminata</i>	Hairy woodrush	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Luzula bulbosa</i>	Bulbous woodrush	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Lycopodiella alopecuroides</i>	foxtail clubmoss	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Lycopodiella appressa</i>	Southern bog club moss	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Lycopodiella inundata</i>	Marsh club moss	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Dendrolycopodium obscurum</i> (<i>Lycopodium obscurum</i>)	Ground pine	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Lycopus americanus</i>	American water horehound	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Lythrum lineare</i>	Wand lythrum	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Magnolia grandiflora</i>	southern magnolia	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Magnolia virginiana</i>	sweetbay	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Malus angustifolia</i>	Crabapple	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Gonolobus suberosus</i> (<i>Matelea gonocarpa</i>)	Milkvine	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Mazus japonicus</i>	Japanese mazus		Non-Specific Disturbed
<i>Mecardonia acuminata</i>	Axilflower	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Melilotus alba</i>	White sweetclover		Non-Specific Disturbed
<i>Melilotus officinalis</i>	Sweet clover		Non-Specific Disturbed
<i>Melothria pendula</i>	Creeping cucumber		Non-Specific Disturbed

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Microstegium vimineum</i>	Japanese Stilt Grass	This is an exotic invasive species that can invade any mesic to sub-hydric forested habitat. It is not indicative of or tied to any specific forest habitat type.	This is an exotic invasive species that can invade any mesic to sub-hydric forested habitat. It is not indicative of or tied to any specific forest habitat type.
<i>Mikania scandens</i>	climbing hempvine	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Mitchella repens</i>	Partridgeberry	Maritime Swamp Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Mollugo verticillata</i>	Carpet weed		Non-Specific Disturbed
<i>Monarda punctata</i>	Horsemint; Spotted beebalm	Maritime Dune Grassland; Maritime Upland Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest
<i>Monotropa uniflora</i>	Indian pipe	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Maritime Upland Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Northern Atlantic Coastal Plain Maritime Forest
<i>Morella cerifera (Myrica cerifera)</i>	southern bayberry	Maritime Swamp Forest; Maritime Upland Forest; Mesic Mixed Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Morella cerifera (Myrica cerifera)</i>	southern bayberry	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Morella pensylvanica</i>	northern bayberry	Maritime Dune Scrub; Mesic Mixed Hardwood Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Morus alba</i>	White mulberry		Developed-Open Space; Non-specific Disturbed
<i>Morus rubra</i>	Red mulberry	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Muscari racemosum</i>	Grape hyacinth		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Myosotis arvensis</i>	Field forget-me-not		Developed-Open Space; Non-specific Disturbed
<i>Morella carolinensis (Myrica heterophylla)</i>	Southern bayberry	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Nandina domestica</i>	Heavenly bamboo		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Nothoscordum bivalve</i>	False garlic		Developed-Open Space; Non-specific Disturbed
<i>Nuphar lutea (Nuphar variegatum)</i>	Spatterdock	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Nuttallanthus canadensis</i>	Canada toadflax		Developed-Open Space; Non-specific Disturbed
<i>Nyssa biflora</i>	Swamp blackgum	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest
<i>Nyssa sylvatica</i>	black gum	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Oenothera biennis</i>	Common evening-primrose		Developed-Open Space; Non-specific Disturbed
<i>Oenothera humifusa</i>	Seabeach evening primrose	Maritime Swamp Forest	Northern Atlantic Coastal Plain Dune and Swale (on dunes)
<i>Oenothera laciniata</i>	Cutleaf evening primrose		Developed-Open Space; Non-specific Disturbed
<i>Onoclea sensibilis</i>	Sensitive fern	Coastal Plain Depression Wetlands; Maritime Swamp Forest	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Central Atlantic Coastal Plain Maritime Forest
<i>Oenothera humifusa</i>	seabeach evening primrose	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Osmanthus americanus</i>	devilwood	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Osmanthus xfortunei</i>	Fortune's osmanthus		Developed-Low Density; Developed-Medium Density
<i>Osmunda regalis</i>	royal fern	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Oxalis dillemii</i>	Wood sorrel		Developed-Open Space; Non-specific Disturbed
<i>Oxalis stricta</i>	Common yellow oxalis		Developed-Open Space; Non-specific Disturbed
<i>Oxalis violacea</i>	Violet wood sorrell	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Oxydendrum arboreum</i>	sourwood	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Packera tomentosa</i>	woolly ragwort	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Panicum amarum</i> var. <i>amarulum</i>	coastal panicgrass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Panicum amarum</i> var. <i>amarum</i>	bitter panicgrass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Coleataenia anceps</i> (<i>Panicum anceps</i>)	Beaked panicgrass	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest
<i>Panicum capillare</i>	Witch-grass		Developed-Open Space; Non-specific Disturbed
<i>Panicum verrucosum</i>	Warty panicgrass	Maritime Swamp Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland
<i>Panicum virgatum</i>	Switch grass	Coastal Plain Depression Wetlands; Tidal Oligohaline Marsh	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Paspalum dilatatum</i>			Developed-Open Space; Non-specific Disturbed
<i>Passiflora incarnata</i>	purple passion flower		Developed-Open Space; Non-specific Disturbed
<i>Paulownia tomentosa</i>	Princess tree		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Persea borbonia</i>	redbay	Maritime Swamp Forest; Maritime Upland Forest; Mesic Mixed Pine-Hardwood Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Persicaria hydropiperoides</i> (<i>Polygonum hydropiperoides</i>)	swamp smartweed	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Persicaria sagittata</i> (<i>Polygonum sagittatum</i>)	Tearthumb	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Persicaria pensylvanica</i> (<i>Polygonum pensylvanicum</i>)	Pennsylvania smartweed	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Phleum pratense</i>	Timothy		Developed-Open Space; Non-specific Disturbed
<i>Aronia arbutifolia</i> (<i>Photinia pyrifolia</i>)	Red chokeberry	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Photinia serrulata</i>	Chinese photinia		Developed-Low Density; Developed-Medium Density
<i>Phragmites australis</i>	common reed	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Physalis walteri</i>	Walter's groundcherry	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Phytolacca americana</i>	American pokeweed		Non-Specific Disturbed
<i>Picea abies</i>	Norway spruce		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Picea pungens</i> var. <i>glauca</i>	Colorado blue spruce		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Picea rubens</i>	Red spruce		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Pinus echinata</i>	Shortleaf pine	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Pinus elliotii</i>	Slash pine	Maritime Swamp Forest; Maritime Upland Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Pinus strobus</i>	White pine	Maritime Upland Forest	Central Atlantic Coastal Plain Maritime Forest
<i>Pinus taeda</i>	loblolly pine	Interdune Swales and Ponds; Maritime Upland Forest; Mesic Mixed Pine-Hardwood Forest	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale; Northern Atlantic Coastal Plain Maritime Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Pinus thunbergiana</i>	Japanese black pine		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Pinus virginiana</i>	Scrub pine	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Pityopsis graminifolia</i> (<i>Chrysopsis graminifolia</i>)	Narrowleaf silkgrass	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Pityopsis graminifolia</i> var. <i>latifolia</i>	Pineland golden aster	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Plantago aristata</i>	Largebracted plantain		Non-Specific Disturbed
<i>Plantago lanceolata</i>	narrowleaf plantain	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Plantago major</i>	Common plantain		Non-Specific Disturbed
<i>Platanus occidentalis</i>	American sycamore	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Pluchea purpurascens</i>	Marsh fleabane; Sweetscent	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Poa compressa</i>	Canada bluegrass		Developed-Open Space; Non-specific Disturbed
<i>Poa pratensis</i>	Kentucky bluegrass		Developed-Open Space; Non-specific Disturbed
<i>Podophyllum peltatum</i>	May-apple	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Polygonella articulata</i>	coastal jointweed	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Persicaria arifolia</i> (<i>Polygonum arifolium</i>)	Halbred-leaved tearthumb	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Persicaria longiseta</i> (<i>Polygonum cespitosum</i>)	Smartweed; Oriental lady's thumb		Developed-Open Space; Non-specific Disturbed
<i>Persicaria amphibia</i> (<i>Polygonum coccineum</i>)	Swamp smartweed	Coastal Plain Depression Wetlands; Tidal Oligohaline Marsh	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Polygonum glaucum</i>	seaside knotweed	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Persicaria maculosa</i> (<i>Polygonum persicaria</i>)	Lady's Thumb		Developed-Open Space; Non-specific Disturbed
<i>Persicaria punctata</i> (<i>Polygonum punctatum</i>)	Dotted smartweed	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Polygonum prolificum</i> (<i>Polygonum ramosissimum</i> var. <i>prolificum</i>)	small bushy knotweed	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Polypremum procumbens</i>	Juniperleaf		Developed-Open Space; Non-specific Disturbed
<i>Polystichum acrostichoides</i>	Christmas fern	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Pontederia cordata</i>	pickerelweed	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Populus alba</i>	White poplar		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Populus deltoides</i>	Eastern cottonwood	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Populus nigra</i>	Lombardy poplar		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Potamogeton diversifolius</i>	Water-thread pondweed	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Pontederia cordata</i>	Pickerelweed	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Potentilla canadensis</i>	Dwarf cinquefoil	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Prunella vulgaris</i>	Hook weed		Developed Open Space; Non-specific Disturbed
<i>Prunus cerasifera</i>	Purple-leaf plum		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Prunus persica</i>	Peach		Non-specific Disturbed
<i>Prunus serotina</i>	black cherry	Maritime Dune Scrub; Mesic Mixed Hardwood Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Prunus virginiana</i>	Common choke cherry	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Pteridium aquilinum</i>	bracken fern	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Ptilimnium capillaceum</i>	Herb William	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Pueraria lobata</i>	Kudzu		Developed Open Space; Non-Specific Disturbed
<i>Pyrus calleryana</i>	Bradford pear		Developed-Low Density; Developed-Medium Density; Developed-Open Space; Non-specific Disturbed
<i>Quercus alba</i>	White oak	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus coccinea</i>	Scarlet oak	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus falcata</i>	southern red oak	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Quercus hemisphaerica</i>	Darlington's oak	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Quercus ilicifolia</i>	Bear oak	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus incana</i>	bluejack oak	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Quercus laevis</i>	Turkey oak	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus laurifolia</i>	Laurel oak	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Quercus lyrata</i>	Overcup oak	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Quercus marilandica</i>	Blackjack oak	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus michauxii</i>	Swamp chestnut oak	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Quercus nigra</i>	water oak	Maritime Dune Woodland; Mesic Mixed-Pine Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus pagoda</i>	cherrybark oak	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Quercus palustris</i>	Pin oak	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Quercus phellos</i>	Willow oak	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Quercus rubra</i>	Northern red oak	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Quercus stellata</i>	post oak	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Quercus velutina</i>	black oak	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Quercus virginiana</i>	live oak	Maritime Dune Scrub; Maritime Dune Woodland; Maritime Upland Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Ranunculus abortivus</i>	Littleleaf buttercup		Developed-Open Space; Non-specific Disturbed
<i>Ranunculus bulbosus</i>	Bulbous buttercup		Developed-Open Space; Non-specific Disturbed
<i>Ranunculus parviflorus</i>	Smallflower buttercup		Developed-Open Space; Non-specific Disturbed
<i>Ranunculus repens</i>	Creeping buttercup		Developed-Open Space; Non-specific Disturbed
<i>Ranunculus sardous</i>	Hairy buttercup		Developed-Open Space; Non-specific Disturbed
<i>Raphanus raphanistrum</i>	Wild raddish		Developed-Open Space; Non-specific Disturbed
<i>Rhexia mariana</i>	Maryland meadowbeauty	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Rhexia virginica</i>	Handsome Harry	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Rhus copallinum</i>	Winged sumac	Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Rhus glabra</i>	Smooth sumac		Developed Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Rhus typhina (Rhus hirta)</i>	Staghorn sumac		Developed Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Rhus radicans</i>	Poison ivy	variety of habitats	variety of habitats
<i>Rhynchospora corniculata</i>	Shortbristle horned beaksedge	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Rhynchospora glomerata</i>	Clustered beaksedge	Maritime Swamp Forest; Coastal Plain Depression Wetlands	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Richardia brasiliensis</i>	Mexican clover		Non-Specific Disturbed
<i>Robinia pseudoacacia</i>	Black locust	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Rorippa sp.</i>	Forked cress; Yellow-cress		Developed-Open Space; Non-specific Disturbed
<i>Rosa multiflora</i>	multiflora rose	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Rosa palustris</i>	swamp rose	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Rubus allegheniensis</i>	Common blackberry	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest; Non-Specific Disturbed
<i>Rubus pensilvanicus (Rubus argutus)</i>	Sawtooth blackberry	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest; Non-Specific Disturbed
<i>Rubus flagellaris (Rubus enslenii)</i>	Southern dewberry		Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Rubus hispidus</i>	Bristly dewberry	Maritime Upland Forest; Maritime Swamp Forest; Mixed Mesic Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Rubus sp.</i>	blackberry	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Rumex acetosella</i>	Red sorrel; Sheep sorrel		Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Rumex conglomeratus</i>	Dock		Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Rumex crispus</i>	Curly dock		Non-Specific Disturbed
<i>Rumex verticillatus</i>	swamp dock	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Sabatia angularis</i>	Rosepink	Mixed Mesic Hardwood Forest; Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Sabatia stellaris</i>	Rose of Plymouth	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Saccharum spp. (Erianthus spp.)</i>	Plume grasses	variety of habitats	variety of habitats
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Non-Specific Disturbed
<i>Salicornia depressa</i>	Virginia glasswort	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Salix alba</i>	White Willow	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Salix caroliniana</i>	Coastal plain willow	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland
<i>Salix discolor</i>	Pussy willow	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Non-Specific Disturbed
<i>Salix matsudana tortuosa</i>	Corkscrew willow		Developed-Low Density; Developed-Medium Density
<i>Salix nigra</i>	black willow	Interdune Swales and Ponds; Maritime Swamp Forest	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale; Central Atlantic Coastal Plain Maritime Forest
<i>Salix x sepulcralis (Salix babylonica)</i>			Developed-Low Density; Developed-Medium Density
<i>Salsola kali</i>	Russian thistle	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Sambucus canadensis (Sambucus nigra var. canadensis)</i>	Elderberry	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Non-Specific Disturbed
<i>Sambucus sp.</i>	Elder	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest; Non-Specific Disturbed
<i>Saponaria officinalis</i>	Bouncing Bet		Non-Specific Disturbed
<i>Sassafras albidum</i>	sassafras	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Saururus cernuus</i>	Lizards tail	Forested Wetland; Bald Cypress - Tupelo Swamp	Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Schizachyrium littorale</i>	shore little bluestem	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Schoenoplectus americanus</i>	chairmaker's bulrush	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Schoenoplectus pungens</i>	Common three square	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Schoenoplectus robustus (Scirpus robustus)</i>	Saltmarsh bulrush	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Scirpus atrovirens</i>	Green bulrush	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Scirpus cyperinus</i>	woolgrass	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Scirpus spp.</i>	bulrushes	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Scleranthus annuus</i>	German knotgrass		Non-Specific Disturbed
<i>Scutellaria integrifolia</i>	Hyssop skullcap	Forested Wetland	Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Secale cereale</i>	Rye grass		Developed-Low Density; Developed-Medium Density
<i>Packera aurea (Senecio aureus)</i>	Golden ragwort	Forested Wetland	Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Sesuvium maritimum</i>	slender seapurslane	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Setaria glauca</i>	Pearl millet		Developed-Open Space; Non-Specific Disturbed
<i>Sherardia arvensis</i>	Blue fieldmadder		Developed-Open Space; Non-Specific Disturbed
<i>Silene latifolia</i>	Bladder campion		Developed-Open Space; Non-Specific Disturbed
<i>Sisyrinchium mucronatum</i>	Common blue-eyed grass		Developed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Smilax auriculata</i>	Dune greenbrier	Maritime Upland Forest	Northern Atlantic Coastal Plain Maritime Forest
<i>Smilax bona-nox</i>	Saw greenbrier	Maritime Dune Scrub; Maritime Dune Woodland; Maritime Upland Forest; Maritime Swamp Forest; Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Pine Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest; Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Smilax glauca</i>	roundleaf greenbrier	Maritime Dune Scrub; Maritime Dune Woodland; Maritime Upland Forest; Maritime Swamp Forest; Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Pine Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest; Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Smilax rotundifolia</i>	Roundleaf greenbrier	Maritime Dune Scrub; Maritime Dune Woodland; Maritime Upland Forest; Maritime Swamp Forest; Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest; Pine Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Maritime Forest; Central Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Smilax spp.</i>	Greenbrier	variety of habitats	variety of habitats
<i>Solanum carolinense</i>	Carolina horsenettle		Disturbed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Solidago odora</i>	Sweet goldenrod	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Successional Shrub/Scrub (Clear Cut)
<i>Solidago pinetorum</i>	Small's goldenrod	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Successional Shrub/Scrub (Clear Cut)
<i>Solidago rugosa</i>	Wrinkleleaf; Roughstemmed goldenrod	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest; Successional Shrub/Scrub (Clear Cut)
<i>Solidago sempervirens</i>	seaside goldenrod	Maritime Dune Grassland; Maritime Swamp Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Central Atlantic Coastal Plain Maritime Forest
<i>Solidago erecta (Solidago speciosa var. erecta)</i>	Showy goldenrod	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Successional Shrub/Scrub (Clear Cut)
<i>Sonchus asper</i>	Spiny sowthistle		Disturbed-Open Space; Non-Specific Disturbed
<i>Sorghum halepense</i>	Johnson grass		Disturbed-Open Space; Non-Specific Disturbed
<i>Spartina alterniflora</i>	smooth cordgrass	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Spartina cynosuroides</i>	big cordgrass	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Spartina patens</i>	saltmeadow cordgrass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Sporobolus michauxianus (Spartina pectinata)</i>	Freshwater cordgrass	Tidal Oligohaline Marsh	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Sphagnum molle</i>	Soft peatmoss	Maritime Swamp Forest	Atlantic Coastal Plain Peatland Pocosin and Canebrake
<i>Spiranthes eatonii</i>	Eaton's Ladies'-tresses	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Stellaria media</i>	Common chickweed		Disturbed-Open Space; Non-Specific Disturbed
<i>Strophostyles helvola</i>	dune bean	Interdune Swales and Ponds	Southeastern Coastal Plain Interdunal Wetland; Northern Atlantic Coastal Plain Dune and Swale
<i>Strophostyles umbellata</i>	Pink fuzzybean	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Suaeda linearis</i>	annual seepweed	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Suaeda maritima ssp. maritima</i>	herbaceous seepweed	Upper Beaches and Overwash Flats	Northern Atlantic Coastal Plain Sandy Beach; Central Atlantic Coastal Plain Sandy Beach
<i>Symplocos tinctoria</i>	common sweetleaf	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Symphotrichum lateriflorum (Aster vimineus)</i>	Small white aster	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest
<i>Symphotrichum novi-belgii (Aster novi-belgii)</i>	New york aster	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Taraxacum officinale</i>	Dandelion		Non-Specific Disturbed
<i>Taxodium distichum</i>	bald cypress	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Teucrium canadense</i>	American germander	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Teucrium scorodonia</i>	Wood germander	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Thelypteris hexagonoptera</i>	Broad beech fern	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Thuja occidentalis</i>	Arbovitae	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Tilia cordata</i>	Little-leaf linden		Developed-Low Density; Developed-Medium Density; Developed-Open Space
<i>Tillandsia usneoides</i>	Spanish moss	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Tipularia discolor</i>	Crippled crane-fly	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Torreyochloa pallida</i>	Pale mannagrass	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Toxicodendron radicans</i>	eastern poison ivy	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Hypericum virginicum (Triadenum virginicum)</i>	Marsh st. Johnswort	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Trichostema dichotomum</i>	Blue curls	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Trifolium arvense</i>	Rabbitfoot clover		Non-Specific Disturbed
<i>Trifolium campestre</i>	Low Hop clover		Non-Specific Disturbed
<i>Trifolium incarnatum</i>	Crimson clover		Non-Specific Disturbed
<i>Trifolium pratense</i>	Red clover		Non-Specific Disturbed

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Trifolium procumbens</i>	Low hop clover		Non-Specific Disturbed
<i>Trifolium repens</i>	White clover		Non-Specific Disturbed
<i>Triodanis perfoliata</i>	Clasping Venus' looking-glass		Disturbed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Tripsacum dactyloides</i>	Eastern gamagrass		Disturbed-Open Space; Non-Specific Disturbed; Successional Shrub/Scrub (Clear Cut)
<i>Typha angustifolia</i>	narrowleaf cattail	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Typha latifolia</i>	Cat-tail	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Ulmus americana</i>	American elm	Forested Wetland; Tidal Hardwood Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Ulmus pumila</i>	Siberian elm		Developed-Low Density; Developed-Medium Density; Disturbed-Open Space; Non-Specific Disturbed
<i>Ulmus thomasi</i>	Rock elm	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Uniola paniculata</i>	sea oats	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Utricularia sp.</i>	Bladderwort	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Developed Open Space; Non-Specific Disturbed
<i>Vaccinium angustifolium</i>	Lowbush blueberry	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Vaccinium arboreum</i>	Farkleberry	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Vaccinium corymbosum</i>	highbush blueberry	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Vaccinium fuscatum</i>	Black highbush blueberry	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Vaccinium stamineum</i>	Deerberry	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Vaccinium tenellum</i>	Small black blueberry	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Southern Piedmont Dry Oak-(Pine) Forest
<i>Valerianella locusta</i>	Lewiston cornsalad	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest; Developed Open Space; Non-Specific Disturbed
<i>Valerianella radiata</i>	Beaked cornsalad		Developed Open Space; Non-Specific Disturbed
<i>Verbascum blattaria</i>	Moth mullein		Developed Open Space; Non-Specific Disturbed
<i>Verbascum thapsus</i>	Common mullein		Developed Open Space; Non-Specific Disturbed
<i>Verbena bonariensis</i>	Purpletop vervain		Developed Open Space; Non-Specific Disturbed
<i>Verbena brasiliensis</i>	Brazilian vervain		Non-Specific Disturbed
<i>Verbesina occidentalis</i>	Yellow crownbeard	Mesic Mixed Pine-Hardwood Forest	Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland
<i>Verbesina virginica</i>	White crownbeard	Mesic Mixed Hardwood Forest	Southern Atlantic Coastal Plain Mesic Hardwood Forest;
<i>Vernonia sp.</i>	Ironweed	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond; Developed Open Space; Non-Specific Disturbed
<i>Veronica peregrina</i>	Neckweed		Developed Open Space; Non-Specific Disturbed
<i>Veronica serpyllifolia</i>	Thymeleaf speedwell		Developed Open Space; Non-Specific Disturbed
<i>Vicia angustifolia</i>	Garden vetch		Non-Specific Disturbed
<i>Vicia hirsuta</i>	Tiny vetch		Non-Specific Disturbed
<i>Vicia sativa</i>	Garden vetch		Non-Specific Disturbed

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Vinca minor</i>	common periwinkle	This is an exotic invasive species that, while usually found in/adjacent to previously developed locations; can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that, while usually found in/adjacent to previously developed locations; can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.
<i>Viola affinis</i>	Sand violet	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Viola bicolor</i>	Field pansy		Non-Specific Disturbed
<i>Viola sororia (Viola papilionacea)</i>	Common blue violet	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest; Non-Specific Disturbed
<i>Viola septemloba</i>	Southern coastal violet	Mesic Mixed Pine-Hardwood Forest	Southern Piedmont Dry Oak-(Pine) Forest
<i>Vitis aestivalis</i>	Summer grape	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Vitis labrusca</i>	Fox grape	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Vitis riparia</i>	Riverbank grape	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Vitis rotundifolia</i>	muscadine grape	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Vitis spp</i>	grape	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Vitis vulpina</i>	Frost grape	Maritime Upland Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine-Hardwood Forest	Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Central Appalachian Dry Oak-Pine Forest; Northern Atlantic Coastal Plain Pitch Pine Lowland; Southern Piedmont Dry Oak-(Pine) Forest; Southern Appalachian Montane Pine Forest and Woodland; Southern Appalachian Low-Elevation Pine Forest
<i>Wisteria floribunda</i>			Non-Specific Disturbed
<i>Wisteria frutescens</i>		Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Wisteria sinensis</i>	Chinese wisteria	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habitat type.
<i>Wisteria spp.</i>	wisteria	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Woodwardia areolata</i>	netted chain fern	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Woodwardia virginica</i>	Virginia chain fern	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale

Little Creek Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Xanthium strumarium</i>	Rough cocklebur		Non-Specific Disturbed
<i>Xyris jupicai</i>	Richard yellow-eyed grass	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Xyris platylepis</i>	Tall yelloweyed grass	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Yucca filamentosa</i>	Adam's needle	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Yucca sp.</i>	Yucca; Spanish bayonet	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Zanthoxylum clava-herculis</i>	Hercules' club	Maritime Dune Woodland	Northern Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Acer rubrum</i>	Red maple	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Agrostis alba</i>	Redtop	Developed Areas	Developed Areas
<i>Ailanthus altissima</i>	Tree of heaven	This is an exotic invasive species that can invade any open or forest habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that can invade any open or forest habitat. It is not indicative of or tied to any specific habitat type.
<i>Albizia julibrissin</i>	Mimosa tree	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habitat type.
<i>Ammophila breviligulata</i>	American beachgrass	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Andropogon virginicus</i>	Broomsedge	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Artemisia stelleriana</i>	Dusty miller	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Cakile edentula</i>	Sea rocket	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Carex kobomugi</i>	Asiatic or Japanese sedge	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Carex striata</i>	Walter's Sedge	Maritime Dune Grassland; Sand Beach/Dune	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Atlantic Coastal Plain Small Blackwater River Floodplain Forest

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Carya glabra</i>	Pignut hickory	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Cenchrus tribuloides</i>	Dune sandbur	Maritime Dune Grassland; Sand Beach/Dune	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Clethra alnifolia</i>	Sweet pepper bush	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Cynodon dactylon</i>	Bermuda grass	Developed Areas	Developed Areas
<i>Cyperus grayi</i>	Gray's flatsedge	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Cyperus neotropicalis</i> (formerly <i>Lipocarpha maculata</i>)	American halfchaff sedge	MaritimeSwamp Forest; Coastal Plain Depression Wetlands; Aquatic Habitat	Northern Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest
<i>Cyperus polystachyos</i>	Coast flatsedge	Interdunal Wetland; Non-Riverine Flatwood / Swamp; Upland Depression Swamp	Northern Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest; Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Dactylis glomerata</i>	Orchard grass	Developed Areas	Developed Areas
<i>Desmodium strictum</i>	Pineland tick-trefoil	Maritime Upland Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Digitaria sanguinalis</i>	Crab grass	Developed Areas	Developed Areas
<i>Diodia teres</i>	Poorjoe	Maritime Dune Grassland; Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Diospyros virginiana</i>	Persimmon	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Elaeagnus umbellata</i>	Autumn olive	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habtiat type.	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habtiat type.
<i>Eleocharis vivipara</i>	Viviparous spikerush	Aquatic Habitat	Aquatic Habitat
<i>Festuca elatior</i>	tall fescue	Non-native, planted in Developed Areas	Non-native, planted in Developed Areas
<i>Galium bermudense</i> (formerly <i>G.hispidulum</i>)	Coastal bedstraw	Maritime Upland Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Gelsemium sempervirens</i>	Yellow jessamine	Maritime Dune Scrub; Maritime Forest	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Maritime Upland Forest
<i>Hedera helix</i>	English ivy	Maritime Upland Forests	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Heterotheca subaxillaris</i>	camphorweed	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Hudsonia tomentosa</i>	beach heather	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Humulus japonicus</i>	Japanese hops	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habtiat type.	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habtiat type.
<i>Ilex opaca</i>	American holly	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Itea virginica</i>	Virginia willow	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Iva imbricata</i>	Seacoast marsh-elder	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Juncus repens</i>	Creeping rush	Aquatic Habitat	Aquatic Habitat
<i>Juniperus virginiana</i>	Eastern red cedar	Forested Wetland	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Lespedeza cuneata</i>	Chinese lespedeza	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habtiat type.	This is an exotic invasive species that can invade any open or forested habitat. It is not indicative of or tied to any specific habtiat type.
<i>Lespedeza</i> spp.	Lespedeza	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Ligustrum sinense</i>	Chinese privet	Maritime Upland Forests	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Liquidambar styraciflua</i>	Sweet gum	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Lonicera japonica</i>	Japanese honeysuckle	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Lonicera sempervirens</i>	Coral honeysuckle	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Microstegium vimineum</i>	Japanese stilt grass	This is an exotic invasive species that can invade any mesic to sub-hydric forested habitat. It is not indicative of or tied to any specific forest habitat type.	This is an exotic invasive species that can invade any mesic to sub-hydric forested habitat. It is not indicative of or tied to any specific forest habitat type.
<i>Morella cerifera</i>	Wax myrtle	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Morella heterophylla</i>	Southern bayberry	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Morella pensylvanica</i>	Northern bayberry	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Nyssa sylvatica</i>	Black gum	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Oenothera humifusa</i>	Seabeach evening primrose	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Osmanthus americanus</i>	wild olive	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Panicum amarum</i> var. <i>amarulum</i>	beach panic grass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Panicum amarum</i> var. <i>amarum</i>	bitter seabeach grass	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Panicum</i> spp	panic grasses	Aquatic Habitat	Aquatic Habitat

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Panicum</i> spp	panic grasses	Maritime Dune Grassland; Sand Beach/Dune	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Panicum verrucosum</i>	warty panic grass	Aquatic Habitat	Aquatic Habitat
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Maritime Upland Forests	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Phragmites australis</i>	common reed	This is an exotic invasive species that can invade any open wetland habitat and adjacent uplands.	This is an exotic invasive species that can invade any open wetland habitat and adjacent uplands.
<i>Physalis walteri</i>	dune groundcherry	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Pinus taeda</i>	loblolly pine	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Pinus virginiana</i>	scrub pine	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Platanus occidentalis</i>	American sycamore	Maritime Swamp Forest	Central Atlantic Coastal Plain Maritime Forest; Northern Atlantic Coastal Plain Dune and Swale
<i>Poa pratensis</i>	Kentucky bluegrass	Developed Areas	Developed Areas
<i>Pontamogeton diversifolius</i>	water-thread pondweed	Aquatic Habitat	Aquatic Habitat
<i>Prunus serotina</i>	black cherry	Maritime Upland Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Pteridium aquilinum</i>	bracken fern	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Pueraria montana</i>	kudzu	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habitat type.	This is an exotic invasive species that can invade any open or forest edge habitat. It is not indicative of or tied to any specific habitat type.

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Quercus falcata</i>	southern red oak	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Quercus hemisphaerica</i>	Darlington's oak	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Quercus incana</i>	bluejack oak	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Quercus nigra</i>	water oak	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Quercus virginiana</i>	live oak	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Robinia pseudoacacia</i>	black locust	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Rubus allegheniensis</i>	blackberry	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Salix nigra</i>	black willow	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Sassafras albidum</i>	sassafras	Maritime Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Schizachyrium littorale</i>	seaside little bluestem	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Secale cereale</i>	domestic rye grass	Developed Areas	Developed Areas
<i>Smilax glauca</i>	roundleaf greenbrier	Maritime Dune Scrub; Maritime Forest; Maritime Upland Forests	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Maritime Upland Forest; Northern Atlantic Coastal Plain Maritime Forest

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Solidago sempervirens</i>	seaside goldenrod	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Strophostyles helvola</i>	dune bean	Maritime Dune Grassland	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Symplocos tinctoria</i>	common sweetleaf	Maritime Upland Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Taxodium distichum</i>	bald cypress	Coastal Plain Depression Wetlands	Southern Atlantic Coastal Plain Depression Pondshore; Northern Atlantic Coastal Plain Pond
<i>Tillandsia usneoides</i>	Spanish moss	Maritime Forest; Maritime Upland Forests	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Trifolium repens</i>	white clover	Developed Areas	Developed Areas
<i>Uniola paniculata</i>	sea oats	Sand Beach/Dune	Atlantic Coastal Plain Small Blackwater River Floodplain Forest
<i>Utricularia</i> spp.	bladderwort species	Aquatic Habitat	Aquatic Habitat
<i>Vaccinium stamineum</i>	deer berry	Forested Wetland; Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Bald Cypress - Tupelo Swamp	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Vitis rotundifolia</i>	muscadine grape	Maritime Forest; Maritime Upland Forests	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Maritime Forest
<i>Vitis</i> spp	grape	Forested Wetland; Maritime Upland Forests	Northern Atlantic Coastal Plain Tidal Swamp; Atlantic Coastal Plain Blackwater Stream Floodplain Forest; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt

JEB Fort Story Flora Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Wisteria</i> spp.	wisteria	Maritime Dune Scrub	Northern Atlantic Coastal Plain Dune and Swale; Southern Atlantic Coastal Plain Dune and Maritime Grassland
<i>Xyris jupicai</i>	Richard yellow-eyed grass	Aquatic Habitat	Aquatic Habitat

JEB Little Creek Fort Story T&E Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Bombus affinis</i>	Rusty Patch Bumblebee	Upper Beach / Overwash Flat	Central Atlantic Coastal Plain Sandy Beach
<i>Bombus terricola</i>	Yellow Banded Bumble Bee	Tidal Bald Cypress Forest / Woodland; Tidal Hardwood Swamp; Upper Beach / Overwash Flat; Bald Cypress - Tupelo Swamp; Basic Mesic Forest; Mesic Mixed Hardwood Forest; Piedmont / Coastal Plain Oak - Beech / Heath Forest	Northern Atlantic Coastal Plain Tidal Swamp; Central Atlantic Coastal Plain Sandy Beach; Atlantic Coastal Plain Blackwater Stream Floodplain Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Calidric canutus rufa</i>	Red Knot	Tidal Freshwater Marshes	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
<i>Caretta caretta</i>	Loggerhead Sea Turtle	High-Energy Tidal River Shore; Tidal Freshwater Marsh; Tidal Oligohaline Marsh; Tidal Shrub Swamp; Salt Flat; Salt Scrub; Sea-Level Fen; Tidal Mesohaline / Polyhaline Marsh; Upper Beach / Overwash Flat	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Central Atlantic Coastal Plain Sandy Beach
<i>Cartrema americana</i> (formerly <i>Osmanthus americanus</i> var. <i>americanus</i>)	Wild olive	Maritime Upland Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh
<i>Charadrius melodus</i>	Piping Plover	Upper Beach / Overwash Flat	Central Atlantic Coastal Plain Sandy Beach
<i>Chelonia mydas</i>	Green sea turtle	High-Energy Tidal River Shore; Tidal Freshwater Marsh; Tidal Oligohaline Marsh; Tidal Shrub Swamp; Salt Flat; Salt Scrub; Sea-Level Fen; Tidal Mesohaline / Polyhaline Marsh; Upper Beach / Overwash Flat	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Central Atlantic Coastal Plain Sandy Beach
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	High-Energy Tidal River Shore; Tidal Freshwater Marsh; Tidal Oligohaline Marsh; Tidal Shrub Swamp; Salt Flat; Salt Scrub; Sea-Level Fen; Tidal Mesohaline / Polyhaline Marsh; Upper Beach / Overwash Flat	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Central Atlantic Coastal Plain Sandy Beach
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	High-Energy Tidal River Shore; Tidal Freshwater Marsh; Tidal Oligohaline Marsh; Tidal Shrub Swamp; Salt Flat; Salt Scrub; Sea-Level Fen; Tidal Mesohaline / Polyhaline Marsh; Upper Beach / Overwash Flat	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Central Atlantic Coastal Plain Sandy Beach
<i>Falco peregrinus</i>	Peregrine falcon	Upper Beach / Overwash Flat; Acidic Oak - Hickory Forest; Basic Oak Hickory Forest; Dry-Mesic Calcareous Forest	Central Atlantic Coastal Plain Sandy Beach; Northeastern Interior Dry-Mesic Oak Forest
<i>Iva imbricata</i>	Seacoast marsh elder	Maritime Dune Grassland	Central Atlantic Coastal Plain Sandy Beach
<i>Lechea maritima</i> var. <i>virginica</i>	Virginia beach pinweed	Maritime Dune Grassland	Central Atlantic Coastal Plain Sandy Beach
<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	High-Energy Tidal River Shore; Tidal Freshwater Marsh; Tidal Oligohaline Marsh; Tidal Shrub Swamp; Salt Flat; Salt Scrub; Sea-Level Fen; Tidal Mesohaline / Polyhaline Marsh; Upper Beach / Overwash Flat	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Central Atlantic Coastal Plain Sandy Beach
<i>Myotis septentrionalis</i>	Norther Long-eared Bat	Maritime Swamp Forest; Mesic Mixed Hardwood Forest; Mesic Mixed Pine Hardwood Forest; Maritime Upland Forest	Southern and Central Appalachian Cove Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Quercus incana</i>	Bluejack oak	Mesic Mixed Hardwood Forest	Southern and Central Appalachian Cove Forest; Southern Atlantic Coastal Plain Mesic Hardwood Forest
<i>Sterna antillarum</i>	Least tern	Upper Beach / Overwash Flat	Central Atlantic Coastal Plain Sandy Beach

JEB Little Creek Fort Story T&E Species List

Scientific Name	Common Name	VA Ecosystem Classification System	NVC Ecological System (national)
<i>Sterna dougallii dougallii</i>	Roseate Tern	Upper Beach / Overwash Flat	Central Atlantic Coastal Plain Sandy Beach
<i>Tillandsia usneoides</i>	Spanish moss	Maritime Upland Forest; Maritime Swamp Forest	Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Southern Atlantic Coastal Plain Mesic Hardwood Forest; Atlantic Coastal Plain Blackwater Stream Floodplain Forest
<i>Xyris platylepis</i>	Tall yellow-eyed grass	Interdunal Wetland	Central Atlantic Coastal Plain Sandy Beach

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Acanthospermum australe</i>	Paraguayan starburr	O	FS
<i>Acer palmatum</i>	Japanese maple	o ²	LC
<i>Acer platanoides</i>	Norway maple	o ²	LC
<i>Acer rubrum</i>	Red maple	O	LC FS
<i>Acer saccharinum</i>	Silver maple	o ²	LC
<i>Acer saccharum</i>	Sugar maple	O	LC
<i>Achillea millefolium</i>	Common yarrow	O	FS
<i>Agalinis purpurea</i>	Purple false foxglove	P	FS
<i>Agrostis alba</i>	Redtop	P	FS
<i>Agrostis hyemalis</i>	Tickle grass	O	LC
<i>Agrostis tenuis</i>	Colonial bentgrass	p ²	LC
<i>Ailanthus altissima</i>	Tree of heaven	o ²	LC FS
<i>Aira caryophylla</i>	Silver hair grass	o ²	LC
<i>Albizia julibrissin</i>	Mimosa; Silktree	o ²	LC FS
<i>Alisma subcordatum</i>	American water plantain	P	FS
<i>Allium canadense</i>	Meadow garlic	O	LC
<i>Allium vineale</i>	Field garlic; Wild garlic	p ²	FS
<i>Alnus incana rugosa (Alnus rugosa)</i>	Speckled alder	O	LC
<i>Alnus serrulata</i>	Common alder	P	LC FS
<i>Ambrosia bidentata</i>	Lanceleaf ragweed	P	FS
<i>Amelanchier canadensis</i>	Canadian serviceberry	O	LC FS
<i>Amelanchier laevis</i>	Allegheny serviceberry	O	LC
<i>Amelanchier stolonifera</i>	Running serviceberry	P	FS
<i>Ammophila breviligulata</i>	American beachgrass	O	LC FS
<i>Amphicarpa bracteata</i>	American hogpeanut	P	FS
<i>Anagallis arvensis</i>	Scarlet pimpernel	P	FS
<i>Anaphalis margaritacea</i>	Western pearly everlasting	o ²	LC
<i>Andropogon virginicus</i>	Broom sedge	P	LC FS
<i>Anthoxanthum odoratum</i>	Sweet vernalgrass	o ²	LC
<i>Apios americana</i>	Groundnut	P	FS
<i>Apocynum cannabinum</i>	Indianhemp	O	LC FS
<i>Apocynum sibiricum</i>	Clasping dogbane	P	FS
<i>Aquilegia canadensis</i>	Red columbine	O	LC
<i>Arabidopsis thaliana</i>	Mouseear cress	O	FS
<i>Aralia spinosa</i>	Hercules' club	P	LC FS
<i>Arceuthobium pusillum</i>	American mistletoe	P	FS
<i>Arisaema triphyllum</i>	Jack in the pulpit	P	LC FS
<i>Aristida tuberculosa</i>	Seabeach threeawn	P	
<i>Artemisia stelleriana</i>	Oldwoman	O	LC FS
<i>Asclepias incarnata</i>	Swamp milkweed	P	FS
<i>Asclepias lanceolata</i>	Smooth orange milkweed	P	FS
<i>Asclepias syriaca</i>	Common milkweed	P	FS
<i>Asimina triloba</i>	Pawpaw	P	LC FS
<i>Asparagus officinalis</i>	Garden asparagus	P	FS
<i>Asplenium platyneuron</i>	Ebony spleenwort	O	LC FS

Enclosure 1

Flora of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Aster pilosus</i>	Heath aster	P	FS
<i>Athyrium filix-femina</i>	Common ladyfern	P	LC FS
<i>Atriplex cristata</i>	crested saltbush	P	
<i>Atriplex patula</i>	Spearscale	P	LC FS
<i>Avena fatua</i>	Wild oats	P	FS
<i>Azalea</i> sp.	Azalea	P	LC
<i>Baccharis halimifolia</i>	Groundsel tree	O	LC FS
<i>Betula nigra</i>	River birch	O	LC
<i>Betula populifolia</i>	Gray birch	O	LC
<i>Bidens bipinnata</i>	Spanish needles	P	FS
<i>Bidens frondosa</i>	Sticktight; Beggar ticks	P	FS
<i>Bidens polylepis</i>	Beggar ticks	P	FS
<i>Bignonia capreolata</i>	Cross-vine	P	FS
<i>Boehmeria cylindrica</i>	False nettle	P	FS
<i>Boltonia caroliniana</i>	Carolina doll's daisy	P	FS
<i>Borrichia frutescens</i>	Sea oxeye	P	FS
<i>Botrychium dissectum</i> var. <i>obliquum</i>	Common grape fern	P	FS
<i>Brassica juncea</i>	Indian mustard	P	FS
<i>Bromus</i> sp.	Brome grass	O	LC
<i>Bulbostylis capillaries</i>	Densetuft hairsedge	O	FS
<i>Cakile edentula</i>	American sea rocket	O	LC FS
<i>Callicarpa americana</i>	American beautyberry	P	LC FS
<i>Calystegia sepium</i>	Hedge false bindweed	O	FS
<i>Campsis radicans</i>	Trumpet creeper	O	LC FS
<i>Carex alata</i>	Broadwing sedge	O	FS
<i>Carex albolutescens</i>	Greenwhite sedge	O	LC
<i>Carex folliculata</i>	Northern long sedge	P	FS
<i>Carex kobomugi</i>	Asiatic sand sedge	o ²	LC FS
<i>Carex longii</i>	Long's sedge	P	FS
<i>Carex lupulina</i>	Hop sedge	P	FS
<i>Carex lurida</i>	Shallow sedge	P	FS
<i>Carex striata</i>	Sedge	O	FS
<i>Carex striata</i> var. <i>brevis</i>	Walter's sedge	P	FS
<i>Carpinus caroliniana</i>	Ironwood	O	LC
<i>Carya alba</i> (<i>Carya tomentosa</i>)	Mockemut hickory	O	LC
<i>Carya cordiformis</i>	Bitternut hickory	P	LC FS
<i>Carya glabra</i>	Pignut hickory	P	LC FS
<i>Carya illinoensis</i>	Pecan	O	LC
<i>Carya ovata</i>	Shagbark hickory	O	LC
<i>Carya</i> spp.	Hickories	O	LC
<i>Cassia fasciculata</i>	Partridge pea	O	LC FS
<i>Castanea pumila</i>	Chinkapin	O	FS
<i>Cedrus deodara</i>	Deodar cedar	o ²	LC
<i>Celtis laevigata</i>	Sugarberry	P	LC FS
<i>Celtis occidentalis</i>	Hackberry	P	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Cenchrus tribuloides</i>	Sanddune sandbur	O	LC FS
<i>Centella asiatica</i>	Centella; Spadeleaf	O	LC FS
<i>Cephalanthus occidentalis</i>	Buttonbush	O	LC FS
<i>Cerastium viscosum</i>	Clammy chickweed	P	FS
<i>Cercis canadensis</i>	Eastern redbud	O	LC
<i>Chaerophyllum tainturieri</i>	Wild chervil	P	FS
<i>Chamaecyparis pisifera</i>	Sarawa false cypress	o ²	LC
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	O	LC
<i>Chamaesyce bombensis</i>	Southern beach spurge	O	FS
<i>Chamaesyce polygonifolia</i>	Seaside sandmat	P	LC FS
<i>Chasmanthium laxum</i>	Slender woodcoats	O	LC FS
<i>Chenopodium ambrosioides</i>	Mexican tea	O	FS
<i>Chimaphila maculata</i>	Striped princess pine	O	LC FS
<i>Chrysopsis falcate</i>	Nothern golden aster	O	LC
<i>Chrysopsis gossypina</i> spp. <i>Cruiseana</i>	Cottony Goldenaster	P	
<i>Cirsium horridulum</i>	Yellow thistle	O	FS
<i>Cirsium repandum</i>	Coastal-plain thistle	O	FS
<i>Clematis dioscoreifolia</i>	Clematis	P	FS
<i>Clethra alnifolia</i>	Sweet pepper bush; Coast white alder	O	LC FS
<i>Clitoria mariana</i>	Butterfly pea	O	FS
<i>Cnidocolus stimulosus</i>	Spurge-nettle	O	FS
<i>Commelina communis</i>	Asiatic dayflower	o ²	LC FS
<i>Conopholis americana</i>	American squawroot	O	FS
<i>Conyza canadensis</i>	Horseweed	P	FS
<i>Conyza canadensis</i> var. <i>pusilla</i>	Canadian horseweed	P	FS
<i>Cornus amomum</i>	Silky dogwood	O	FS
<i>Cornus florida</i>	Flowering dogwood	P	LC FS
<i>Cornus kousa</i>	Kousa dogwood	o ²	LC
<i>Cortaderia selloana</i>	Uruguayan pampas grass	O	LC
<i>Crataegus nitida</i>	Glossy hawthorn	O	LC
<i>Croton glandulosus</i>	Croton	O	LC FS
<i>Cryptotaenia canadensis</i>	Canadian honewort	P	FS
<i>Cuscuta gronovii</i>	Common dodder	O	LC
<i>Cuscuta pentagona</i>	Five Angled dodder	P	LC FS
<i>Cynodon dactylon</i>	Bermudagrass	P	FS
<i>Cynoglossum virginianum</i>	Wild comfrey	P	FS
<i>Cyperus esculentus</i>	Chufa flatsedge	O	FS
<i>Cyperus filicinus</i>	Fern flatsedge	O	FS
<i>Cyperus grayi</i>	Gray's flatsedge	O	LC FS
<i>Cyperus plukenetii</i>	Plukenet's flatsedge	O	FS
<i>Cyperus polystachyos</i>	Flatsedge	P	FS
<i>Cyperus pseudovegetus</i>	Marsh flatsedge	P	FS
<i>Cyperus retrorsus</i>	Pine barren flatsedge	O	FS
<i>Cyperus strigosus</i>	Strawcolored flatsedge	P	FS
<i>Cytisus scoparius</i>	Scotch broom	P	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Dactylis glomerata</i>	Orchard grass	p2	FS
<i>Daucus carota</i>	Queen Anne's lace	O	LC FS
<i>Decodon verticillatus</i>	Swamp loosestrife	P	LC FS
<i>Dentaria</i> sp.	Rockcress	P	FS
<i>Desmanthus illinoensis</i>	Prairie bundleflower	P	FS
<i>Desmodium strictum</i>	Pine barren ticktrefoil	O	FS
<i>Dianthus armeria</i>	Deptford pink	o2	LC
<i>Dichanthelium clandestinum</i>	Deer tongue	O	LC
<i>Dichanthelium dichotomum</i>	Cypress panicgrass	O	LC
<i>Dichanthelium ovale</i>	Eggleaf rosette grass	P	LC FS
<i>Dichanthelium scoparium</i>	Panic broom grass	O	LC
<i>Digitaria sanguinalis</i>	Northern crab grass	P	FS
<i>Diodia teres</i>	Poorjoe	O	LC FS
<i>Diodia virginiana</i>	Buttonweed	O	FS
<i>Diospyros virginiana</i>	Persimmon	O	LC FS
<i>Distichlis spicata</i>	Seashore saltgrass	O	LC
<i>Draba verna</i>	Spring draba	P	FS
<i>Duchesnea indica</i>	Indian strawberry	P	FS
<i>Echinochloa crus-galli</i>	Barnyardgrass	P	FS
<i>Echinochloa muricata</i> var. <i>microstachya</i>	Rough barnyardgrass	P	FS
<i>Eclipta alba</i>	False daisy	P	FS
<i>Elaeagnus pungens</i>	Thomy elaeagnus	o2	LC
<i>Elaeagnus umbellata</i>	Autumn olive	o2	FS
<i>Eleocharis acicularis</i>	Needle spikerush	O	LC
<i>Eleocharis compressa</i>	Flatsem spikerush	O	LC
<i>Eleocharis obtusa</i>	Blunt spikerush	P	FS
<i>Eleocharis parvula</i>	Dwarf spikerush	O	LC
<i>Eleocharis quadrangulata</i>	Square-stemmed spikerush	O	LC
<i>Eleocharis rostellata</i>	Beaked spikerush	O	LC
<i>Eleocharis spectabilis</i>	Purple lovegrass	O	LC
<i>Eleocharis vivipara</i>	Viviparous spikerush	O	FS
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	P	FS
<i>Elephantopus tomentosus</i>	Devil's grandmother; Elephantsfoot	P	FS
<i>Elymus virginicus</i>	Virginia wildrye	P	FS
<i>Epifagus virginiana</i>	Beech drops	P	FS
<i>Eragrotis curvula</i>	Weeping lovegrass	P	FS
<i>Eragrotis hirsulta</i>	Bigtop lovegrass	O	FS
<i>Eragrotis pilosa</i>	Indian lovegrass	P	FS
<i>Eragrotis spectabilis</i>	Purple lovegrass	O	FS
<i>Erigeron philadelphicus</i>	Philadelphia fleabane	P	FS
<i>Erigeron pulchellus</i>	Robin's plaintain	P	FS
<i>Erigeron quercifolius</i>	Overleaf fleabane	P	FS
<i>Erigeron strigosus</i>	Lesser daisy fleabane	P	FS
<i>Erigeron vernus</i>	Early whitetop fleabane	P	FS
<i>Euonymus americana</i>	Strawberry bush	O	LC

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Eupatorium capillifolium</i>	Dog fennel	P	LC
<i>Eupatorium coelestinum</i>	Mist flower	P	FS
<i>Eupatorium hyssopifolium</i>	Hyssop-leaved thoroughwort	O	LC FS
<i>Eupatorium leucolepis</i>	White-bract thoroughwort	O	LC
<i>Eupatorium mohril</i>	Morhr's thoroughwort	O	FS
<i>Eupatorium perfoliatum</i>	Common boneset	O	LC
<i>Eupatorium rotundifolium</i>	Round leaved boneset	P	FS
<i>Eupatorium rugosum</i>	White snakeroot	P	FS
<i>Euphorbia cyparissias</i>	Cypress spurge	O	FS
<i>Euphorbia polygonifolia</i>	Northern seaside spurge		LC
<i>Euphorbia</i> sp.	Spurge	P	FS
<i>Euthamia graminifolia</i>	Flat-top goldentop	P	LC FS
<i>Euthamia tenuifolia</i>	Slender goldentop	O	LC
<i>Fagus grandifolia</i>	American beech	P	LC FS
<i>Festuca elatior</i>	Tall fescue	p2	FS
<i>Festuca ovina</i>	Sheep fescue	O	LC
<i>Festuca pratensis</i>	Meadow fescue	O	LC
<i>Fragaria virginiana</i>	Strawberry	P	FS
<i>Fraxinus americana</i>	White ash	O	LC
<i>Fuirena pumila</i>	Dwarf umbrella-sedge	O	LC
<i>Gaillardia pulchella</i>	Firewheel	O	FS
<i>Galactia regularis</i>	Milk pea	O	FS
<i>Galium aparine</i>	Stickywilly	O	LC FS
<i>Galium circaezans</i>	Licorice bedstraw	P	FS
<i>Galium hispidulum</i>	Coastal bedstraw	O	FS
<i>Galium pilosum</i>	Hairy bedstraw	O	FS
<i>Galium tinctorium</i>	Stiff marsh bedstraw	O	FS
<i>Gamochaeta purpurea</i>	Spoonleaf purple everlasting	P	LC
<i>Gaylussacia</i> sp.	Huckleberry	P	FS
<i>Gelsemium sempervirens</i>	Evening trumpetflower	O	LC FS
<i>Geranium</i> sp.	Cranes' bill	P	FS
<i>Geum canadense</i>	White avens	P	FS
<i>Geum virginianum</i>	Cream avens	P	FS
<i>Glecoma hederacea</i>	Ground ivy	P	FS
<i>Gleditsia triacanthos</i>	Honey locust	O	LC
<i>Gnaphalium obtusifolium</i>	Early everlasting	P	FS
<i>Gnaphalium purpureum</i>	Cudweed	O	FS
<i>Goodyera</i> sp.	Rattlesnake plantain	P	FS
<i>Gratiola neglecta</i>	Clammy hedgehyssop	P	FS
<i>Habenaria integra</i>	Yellow orchid	P	FS
<i>Hamamelis virginiana</i>	Witch hazel	P	FS
<i>Haplopappus</i> sp.	Golden aster	P	FS
<i>Hedera helix</i>	English ivy	o2	LC FS
<i>Helenium</i> sp.	Sneezeweed	P	LC FS
<i>Helianthemum canadense</i>	Frostweed	O	LC

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Helianthemum carolinianum</i>	Carolina frostweed	O	LC
<i>Helianthemum</i> sp.	Frostweed	P	FS
<i>Hemerocallis fulva</i>	Orange daylily	o2	LC
<i>Heterotheca subaxillaris</i>	Camphorweed	O	FS
<i>Hexastylis virginica</i>	Heartleaf wild ginger	P	FS
<i>Hibiscus laevis</i>	Halberdleaf rosemallow	O	LC
<i>Hibiscus moscheutos</i>	Swamp rose mallow	O	LC FS
<i>Hieracium gronovii</i>	Hairy hawkweed; Queendevil	O	FS
<i>Holcus lanatus</i>	Velvet grass	p2	FS
<i>Honckenya peploides</i> ssp. <i>robusta</i>	Seaside sandplant	O	FS
<i>Houstonia caerulea</i>	Azure bluet	P	FS
<i>Houstonia pusilla</i>	Tiny bluet	P	FS
<i>Hudsonia tomentosa</i>	Wooly beachheather	O	LC FS
<i>Huperzia</i> spp. (<i>Lycopodium</i> spp.)	Ground pines	O	LC
<i>Hydrocotyle umbellata</i>	Marsh pennywort	O	FS
<i>Hypericum crux-andreae</i> (<i>Ascyrum sans</i>)	St. Peterswort	O	LC
<i>Hypericum gentianoides</i>	Orangegrass	P	FS
<i>Hypericum hypericoides</i>	St. Andrew's cross	P	FS
<i>Hypericum mutilum</i>	Dwarf St. Johnswort	O	FS
<i>Hypericum punctatum</i>	Spotted St. Johnswort	P	FS
<i>Hypochaeris radicata</i>	Hairy cat's ear	P	FS
<i>Hypoxis hirsuta</i>	Star grass	P	FS
<i>Ilex attenuata</i> 'Fosteri'	Foster's holly	o2	LC
<i>Ilex cassine</i>	Dahoon	o2	LC
<i>Ilex cornuta</i>	Chinese holly	o2	LC
<i>Ilex cornuta</i> 'Burfordid'	Burford holly	o2	LC
<i>Ilex glabra</i>	Inkberry	O	LC FS
<i>Ilex opaca</i>	American holly	O	LC FS
<i>Ilex vomitoria</i>	Yaupon	P	LC FS
<i>Impatiens capensis</i>	Jewelweed	O	LC
<i>Ionactis linariifolius</i>	Linear; Stiffleafed aster	O	FS
<i>Ipomoea pandurata</i>	Man of the earth	P	LC FS
<i>Ipomoea purpurea</i>	Common morning glory	p2	FS
<i>Itea virginica</i>	Virginia willow	P	FS
<i>Iva frutescens</i>	Jesuit's bark	O	LC FS
<i>Iva imbricata</i>	Sea-coast marsh elder	O	LC FS
<i>Juglans nigra</i>	Black walnut	P	LC FS
<i>Juncus biflorus</i>	Bog rush	O	FS
<i>Juncus brachycarpus</i>	Whiteroot rush	O	FS
<i>Juncus canadensis</i>	Canadian rush	O	LC
<i>Juncus debilis</i>	Weak rush	O	LC
<i>Juncus dichotomus</i>	Forked rush	O	FS
<i>Juncus diffusissimus</i>	Slimpod rush	P	FS
<i>Juncus effusus</i>	Common rush	O	LC FS
<i>Juncus gerardi</i>	Black oak grass	P	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Juncus marginatus</i>	Grassleaf rush	O	FS
<i>Juncus repens</i>	Creeping rush	P	FS
<i>Juncus roemerianus</i>	Needlegrass rush; Blackneedle rush	P	LC FS
<i>Juncus scirpoides</i>	Needlepod rush	O	LC FS
<i>Juncus validus</i>	Roundhead rush	O	FS
<i>Juniperus virginiana</i>	Eastern red cedar	O	LC FS
<i>Kalmia latifolia</i>	Mountain laurel	O	LC
<i>Krigia virginica</i>	Dwarf dandelion	P	LC FS
<i>Lactuca canadensis</i>	Tall blue lettuce	P	LC FS
<i>Lactuca serriola</i>	Prickly lettuce	P	FS
<i>Lactuca</i> spp.	Weedy lettuce	O	FS
<i>Lagerstroemia indica</i>	Crepe myrtle	o ²	LC
<i>Lamium amplexicaule</i>	Henbit deadnettle	O	FS
<i>Lechea maritima</i>	Pinweed	P	LC FS
<i>Lechea maritima</i> var. <i>virginica</i>	Virginia pinweed	P	FS
<i>Lechea pulchella</i>	Leggett's pinweed	O	FS
<i>Lechea racemulosa</i>	Illinois pinweed	P	FS
<i>Leontodon autumnalis</i>	Common catsear	O	LC
<i>Lepidium virginicum</i>	Virginia pepperweed	O	LC FS
<i>Lespedeza bicolor</i>	Shrub lespedeza	p ²	FS
<i>Lespedeza cuneata</i>	Chinese lespedeza; Sericea bushclover	o ²	FS
<i>Lespedeza procumbens</i>	Trailing lespedeza	P	FS
<i>Lespedeza repens</i>	Creeping lespedeza	P	FS
<i>Lespedeza striata</i>	Japanese clover	P	FS
<i>Lespedeza violacea</i>	Violet lespedeza	P	FS
<i>Lespedeza virginica</i>	Slender lespedeza	O	LC
<i>Leucanthemum lacustre</i>	Portuguese daisy	P	FS
<i>Leucothoe racemosa</i>	Swamp doghobble	O	FS
<i>Liatris graminifolia</i>	Grass-leaved blazing star	P	FS
<i>Liatris pilosa</i>	Shaggy blazing star	O	FS
<i>Ligustrum sinense</i>	Chinese privet	o ²	LC FS
<i>Lindernia dubia</i>	False pimpernel	O	FS
<i>Linum</i> sp.	Flax	P	FS
<i>Lipocarpa maculata</i>	American halfchaff sedge	O	FS
<i>Liquidambar styraciflua</i>	Sweetgum	P	LC FS
<i>Liriodendron tulipifera</i>	Tuliptree	P	LC FS
<i>Listera australis</i>	Southern twayblade	P	FS
<i>Lobelia cardinalis</i>	Cardinal flower	P	LC FS
<i>Lobelia inflata</i>	Indian tobacco	P	FS
<i>Lobelia puberula</i>	Downy lobelia	P	FS
<i>Lolium arundinaceum</i> (<i>Festuca arundinacea</i>)	Kentucky fescue	o ²	LC
<i>Lonicera japonica</i>	Japanese honeysuckle	O	LC FS
<i>Lonicera sempervirens</i>	Trumpet honeysuckle	o ²	LC FS
<i>Ludwigia leptocarpa</i>	Seedbox	P	LC FS
<i>Luzula acuminata</i>	Hairy woodrush	P	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Luzula bulbosa</i>	Bulbous woodrush	P	FS
<i>Lycopodiella alopecuroides</i>	Foxtail Clubmoss	O	
<i>Lycopodiella appressa</i>	Southern bog club moss	O	LC
<i>Lycopodiella inundata</i>	Marsh club moss	O	LC
<i>Lycopodium obscurum</i>	Ground pine	P	FS
<i>Lycopus americanus</i>	American water horehound	O	LC
<i>Lythrum lineare</i>	Wand lythrum	P	FS
<i>Magnolia grandiflora</i>	Southern magnolia	O	LC
<i>Magnolia virginiana</i>	Sweet bay	P	LC FS
<i>Malus angustifolia</i>	Crabapple	P	LC FS
<i>Matelea gonocarpa</i>	Milkvine	P	FS
<i>Mazus japonicus</i>	Japanese mazus	P	FS
<i>Mecardonia acuminata</i>	Axilflower	P	FS
<i>Melilotus alba</i>	White sweetclover	p2	FS
<i>Melilotus officinalis</i>	Sweet clover	o2	LC FS
<i>Melothria pendula</i>	Creeping cucumber	P	FS
<i>Microstegium virmineum</i>	Nepalese browntop	P	LC FS
<i>Mikania scandens</i>	Climbing hempweed	O	LC FS
<i>Mitchella repens</i>	Partridgeberry	P	LC FS
<i>Mollugo verticillata</i>	Carpet weed	P	FS
<i>Monarda punctata</i>	Horsemint; Spotted beebalm	O	FS
<i>Monotropa uniflora</i>	Indian pipe	O	FS
<i>Morella cerifera</i>	Wax myrtle	O	LC FS
<i>Morella pennsylvanica</i>	Northern bayberry	O	LC FS
<i>Morus alba</i>	White mulberry	o2	LC
<i>Morus rubra</i>	Red mulberry	o2	LC
<i>Muscari racemosum</i>	Grape hyacinth	P	FS
<i>Myosotis arvensis</i>	Field forget-me-not	P	FS
<i>Myrica cerifera</i>	Wax myrtle	O	FS
<i>Myrica heterophylla</i>	Southern bayberry	P	FS
<i>Nandina domestica</i>	Heavenly bamboo	o2	LC
<i>Nothoscordum bivalve</i>	False garlic	P	FS
<i>Nuphar lutea (Nuphar variegatum)</i>	Spatterdock	O	LC
<i>Nuttallanthus canadensis</i>	Canada toadflax	O	LC FS
<i>Nyssa biflora</i>	Swamp blackgum	P	FS
<i>Nyssa sylvatica</i>	Blackgum; Black tupelo	O	LC FS
<i>Oenothera biennis</i>	Common evening-primrose	O	FS
<i>Oenothera humifusa</i>	Seabeach evening primrose	O	LC FS
<i>Oenothera laciniata</i>	Cutleaf evening primrose	P	LC FS
<i>Onoclea sensibilis</i>	Sensitive fern	P	LC FS
<i>Opuntia humifusa</i>	Devil's-tongue	O	LC FS
<i>Osmanthus americana</i>	Wild olive; Devil wood	O	LC FS
<i>Osmanthus americanus</i>	Wild olive; Devil wood	O	LC FS
<i>Osmanthus xfortunei</i>	Fortune's osmanthus	o2	LC
<i>Osmunda cinnamomea</i>	Cinnamon fern	O	LC

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal fern	P	LC FS
<i>Oxalis dillenii</i>	Wood sorrel	P	FS
<i>Oxalis stricta</i>	Common yellow oxalis	P	LC FS
<i>Oxalis violacea</i>	Violet wood sorrell	P	FS
<i>Oxydendrum arboreum</i>	Sourwood	P	LC FS
<i>Packera tomentosa</i>	Woolly Ragwort	O	
<i>Panicum amarum</i>	Bitter panicgrass	O	LC FS
<i>Panicum amarum</i> ssp. <i>amarulum</i>	Beach panicgrass	O	FS
<i>Panicum amarum</i> ssp. <i>amarum</i>	Bitter seabeach grass	O	FS
<i>Panicum anceps</i>	Beaked panicgrass	P	FS
<i>Panicum capillare</i>	Witch-grass	P	FS
<i>Panicum verrucosum</i>	Warty panicgrass	P	FS
<i>Panicum virgatum</i>	Switch grass	O	LC
<i>Paronychia argyrocoma</i>	Silver whitflow-wort	P	FS
<i>Parthenocissus quinquefolia</i>	Virginia creeper	O	LC FS
<i>Paspalum dilatatum</i>	Dallisgrass	P	FS
<i>Passiflora incarnata</i>	Passion flower	P	FS
<i>Paulownia tomentosa</i>	Royal paulownia	o ²	LC
<i>Persea borbonia</i>	Red bay	P	LC FS
<i>Persicaria hydropiperoides</i>	Waterpepper	P	FS
<i>Persicaria pensylvanica</i>	Pennsylvania smartweed	O	
<i>Persicaria sagittata</i>	Tearthumb	P	FS
<i>Phleum pratense</i>	Timothy	p ²	FS
<i>Photinia pyrifolia</i>	Red chokeberry	O	FS
<i>Photinia serrulata</i>	Chinese photinia	o ²	LC
<i>Phragmites australis</i>	Common reed	o ²	LC FS
<i>Physalis walteri</i>	Walter's ground-cherry	O	FS
<i>Phytolacca americana</i>	American pokeweed	O	FS
<i>Picea abies</i>	Norway spruce	o ²	LC
<i>Picea pungens</i> var. <i>glauca</i>	Colorado blue spruce	o ²	LC
<i>Picea rubens</i>	Red spruce	o ²	LC
<i>Pinus echinata</i>	Shortleaf pine	O	LC
<i>Pinus elliotii</i>	Slash pine	O	LC
<i>Pinus strobus</i>	White pine	o ²	LC
<i>Pinus taeda</i>	Loblolly pine	O	LC FS
<i>Pinus thunbergiana</i>	Japanese black pine	o ²	LC
<i>Pinus virginiana</i>	Scrub pine	P	LC FS
<i>Pityopsis (Chrysopsis) graminifolia</i>	Narrowleaf silkgrass	O	LC
<i>Pityopsis graminifolia</i> var. <i>latifolia</i>	Pineland golden aster	P	FS
<i>Plantago aristata</i>	Largebracted plantain	O	LC FS
<i>Plantago lanceolata</i>	Narrowleaf plantain	O	LC FS
<i>Plantago major</i>	Common plantain	P	FS
<i>Platanus occidentalis</i>	Sycamore	P	LC FS
<i>Pluchea purpurascens</i>	Marsh fleabane; Sweetscent	P	FS
<i>Poa compressa</i>	Canada bluegrass	p ²	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Poa pratensis</i>	Kentucky bluegrass	P	LC FS
<i>Podophyllum peltatum</i>	May-apple	O	LC
<i>Polygonella articulata</i>	Coastal jointweed; Eastern jointweed	O	LC FS
<i>Polygonum arifolium</i>	Halbred-leaved tearthumb	P	FS
<i>Polygonum cespitosum</i>	Smartweed; Oriental lady's thumb	P	FS
<i>Polygonum coccineum</i>	Swamp smartweed	O	LC
<i>Polygonum glaucum</i>	Seaside Knotweed	P	
<i>Polygonum hydropiperoides</i>	Swamp smartweed	O	LC
<i>Polygonum pensylvanicum</i>	Smartweed	O	LC
<i>Polygonum persicaria</i>	Smartweed; Spotted ladys' thumb	p2	FS
<i>Polygonum punctatum</i>	Dotted smartweed	O	FS
<i>Polygonum ramosissimum</i>	Small Bushy Knotweed	P	
<i>Polygonum sagittatum</i>	Arrowleaf tearthumb	P	LC FS
<i>Polypremum procumbens</i>	Juniperleaf	O	LC FS
<i>Polystichum acrostichoides</i>	Christmas fern	P	LC FS
<i>Pontederia cordata</i>	Pickernelweed	O	LC FS
<i>Populus alba</i>	White poplar	p2	FS
<i>Populus deltoides</i>	Eastern cottonwood	O	LC
<i>Populus nigra</i>	Lombardy poplar	o2	LC
<i>Potamogeton diversifolius</i>	Water-thread pondweed	P	FS
<i>Potentilla canadensis</i>	Dwarf cinquefoil	P	FS
<i>Prunella vulgaris</i>	Hook weed	P	FS
<i>Prunus cerasifera</i>	Purple-leaf plum	o2	LC
<i>Prunus persica</i>	Peach	O	FS
<i>Prunus serotina</i>	Black cherry	O	LC FS
<i>Prunus serrulata</i>	Japanese flowering cherry	o2	LC
<i>Prunus virginiana</i>	Common choke cherry	O	LC
<i>Pseudognaphalium obtusifolium</i>	Rabbit tobacco	O	FS
<i>Pteridium aquilinum</i>	Bracken fern	O	LC FS
<i>Ptilimnium capillaceum</i>	Herb William	P	FS
<i>Pueraria lobata</i>	Kudzu	O	FS
<i>Pyrus calleryana</i>	Bradford pear	o2	LC
<i>Quercus alba</i>	White oak	P	LC FS
<i>Quercus coccinea</i>	Scarlet oak	O	LC
<i>Quercus falcata</i>	Southern red oak	O	LC FS
<i>Quercus hemisphaerica</i>	Darlington's oak	O	FS
<i>Quercus ilicifolia</i>	Bear oak	P	FS
<i>Quercus incana</i>	Bluejack oak	O	LC FS
<i>Quercus laevis</i>	Turkey oak	P	LC FS
<i>Quercus laurifolia</i>	Laurel oak	O	LC
<i>Quercus lyrata</i>	Overcup oak	O	LC
<i>Quercus marilandica</i>	Blackjack oak	O	LC FS
<i>Quercus michauxii</i>	Swamp chestnut oak	P	LC FS
<i>Quercus nigra</i>	Water oak	O	LC FS
<i>Quercus pagoda</i>	Cherrybark Oak	O	

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Quercus palustris</i>	Pin oak	O	LC
<i>Quercus phellos</i>	Willow oak	P	LC FS
<i>Quercus rubra</i>	Northern red oak	O	LC
<i>Quercus stellata</i>	Post oak	P	LC FS
<i>Quercus velutina</i>	Black oak	P	LC FS
<i>Quercus virginiana</i>	Live oak; Scrub live oak	O	LC FS
<i>Quercus virginica</i>	Live oak; Scrub live oak	O	LC FS
<i>Ranunculus abortivus</i>	Littleleaf buttercup	P	FS
<i>Ranunculus bulbosus</i>	Bulbous buttercup	P	FS
<i>Ranunculus parviflorus</i>	Smallflower buttercup	P	FS
<i>Ranunculus repens</i>	Creeping buttercup	O	LC
<i>Ranunculus sardous</i>	Hairy buttercup	P	FS
<i>Raphanus raphanistrum</i>	Wild raddish	O	FS
<i>Rhexia mariana</i>	Maryland meadowbeauty	P	LC FS
<i>Rhexia virginica</i>	Handsome harry	O	FS
<i>Rhododendron</i> sp.	Climbing azalea	P	FS
<i>Rhus copallina</i>	Winged sumac	O	LC FS
<i>Rhus glabra</i>	Smooth sumac	O	LC FS
<i>Rhus hirta</i> (<i>Rhus typhina</i>)	Staghorn sumac	O	LC
<i>Rhus radicans</i>	Poison ivy	P	FS
<i>Rhynchospora corniculata</i>	Shortbristle horned beaksedge	P	FS
<i>Rhynchospora glomerata</i>	Clustered beaksedge	O	LC
<i>Richardia brasiliensis</i>	Mexican clover	O	FS
<i>Robinia pseudoacacia</i>	Black locust	O	LC FS
<i>Rorippa</i> sp.	Forked cress; Yellow-cress	P	FS
<i>Rosa multiflora</i>	Multiflora rose	p2	LC FS
<i>Rosa palustris</i>	Swamp rose	O	LC FS
<i>Rubus allegheniensis</i>	Common blackberry	P	FS
<i>Rubus argutus</i>	Sawtooth blackberry	O	LC
<i>Rubus enslenii</i>	Southern dewberry	P	FS
<i>Rubus hispidus</i>	Bristly dewberry	O	LC
<i>Rubus</i> sp.	Blackberry		LC
<i>Rumex acetosella</i>	Red sorrel; Sheep sorrel	p2	FS
<i>Rumex conglomeratus</i>	Dock	P	FS
<i>Rumex crispus</i>	Curly dock	P	LC FS
<i>Rumex verticillatus</i>	Swamp dock	O	LC FS
<i>Sabatia angularis</i>	Rosepink	P	FS
<i>Sabatia stellaris</i>	Rose of Plymouth	P	FS
<i>Saccharum</i> spp. (<i>Erianthus</i> spp.)	Plume grasses	O	LC
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	O	LC
<i>Salicornia depressa</i>	Virginia glasswort	O	LC
<i>Salix alba</i>	White Willow	o2	LC
<i>Salix caroliniana</i>	Coastal plain willow	O	LC FS
<i>Salix discolor</i>	Pussy willow	O	LC
<i>Salix matsudana tortuosa</i>	Corkscrew willow	o2	LC

Enclosure 1

Flora of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Salix nigra</i>	Black willow	O	LC FS
<i>Salix x sepulcralis (babylonica)</i>	Weeping willow	o ²	LC
<i>Salsola kali</i>	Russian thistle	O	FS
<i>Sambucus nigra</i> var. <i>canadensis</i>	Elderberry	P	FS
<i>Sambucus</i> sp.	Elder	P	FS
<i>Saponaria officinalis</i>	Bouncing Bet	P	FS
<i>Sassafras albidum</i>	Sassafras	O	LC FS
<i>Saururus cernuus</i>	Lizards tail	P	LC FS
<i>Schizachyrium littorale</i>	Seaside little bluestem	O	LC FS
<i>Schoenoplectus americanus</i>	Chairmakers bulrush	O	LC FS
<i>Schoenoplectus pungens</i>	Common three square	P	LC FS
<i>Schoenoplectus robustus (Scirpus robustus)</i>	Saltmarsh bulrush	O	LC
<i>Scirpus atrovirens</i>	Green bulrush	P	FS
<i>Scirpus cyperinus</i>	Stalked bulrush; Woolgrass	P	LC FS
<i>Scleranthus annuus</i>	German knotgrass	P	FS
<i>Scutellaria integrifolia</i>	Hyssop skullcap	P	FS
<i>Secale cereale</i>	Rye grass	P	FS
<i>Senecio aureus</i>	Golden ragwort	P	FS
<i>Sesuvium maritimum</i>	Slender seapurslane	P	FS
<i>Setaria glauca</i>	Pearl millet	P	FS
<i>Sherardia arvensis</i>	Blue fieldmadder	P	FS
<i>Silene latifolia</i>	Bladder campion	P	FS
<i>Sisyrinchium mucronatum</i>	Common blue-eyed grass	P	FS
<i>Smilax auriculata</i>	Dune greenbrier	O	LC
<i>Smilax bona-nox</i>	Saw greenbrier	O	LC FS
<i>Smilax glauca</i>	Cat greenbrier	O	LC FS
<i>Smilax rotundifolia</i>	Roundleaf greenbrier	O	LC
<i>Smilax</i> spp.	Greenbrier	O	FS
<i>Solanum carolinense</i>	Carolina horsenettle	O	FS
<i>Solidago odora</i>	Sweet goldenrod	O	FS
<i>Solidago pinetorum</i>	Small's goldenrod	P	FS
<i>Solidago rugosa</i>	Wrinkleleaf; Roughstemmed	O	LC FS
<i>Solidago sempervirens</i>	Seaside goldenrod	O	LC FS
<i>Solidago speciosa</i> var. <i>erecta</i>	Showy goldenrod	P	FS
<i>Sonchus asper</i>	Spiny sowthistle	P	FS
<i>Sorghum halepense</i>	Johnson grass	p ²	FS
<i>Spartina alterniflora</i>	Smooth cordgrass	P	LC FS
<i>Spartina cynosuroides</i>	Big cordgrass	P	FS
<i>Spartina patens</i>	Saltmeadow cordgrass	O	LC FS
<i>Spartina pectinata</i>	Freshwater cordgrass	O	FS
<i>Sphagnum molle</i>	Soft peatmoss	O	FS
<i>Sphagnum</i> spp.	Shagnum	O	LC
<i>Spiranthes eatonii</i>	Eaton's Ladies'-tresses	O	FS
<i>Stellaria media</i>	Common chickweed	o ²	FS
<i>Strophostyles helvola</i>	Dune bean	O	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Strophostyles helvula</i>	Trailing fuzzybean	P	FS
<i>Strophostyles umbellata</i>	Pink fuzzybean	O	FS
<i>Suaeda linearis</i>	Annual seepweed	O	LC
<i>Suaeda maritima</i> ssp. <i>Maritima</i>	Herbaceous Seepweed	P	
<i>Symphyotrichum lateriflorum</i> (<i>Aster vimineus</i>)	Small white aster	O	LC
<i>Symphyotrichum novi-belgii</i> (<i>Aster novi-</i>	New york aster	O	LC
<i>Symplocos tinctoria</i>	Sweetleaf, Horse sugar	P	LC FS
<i>Taraxacum officinale</i>	Dandelion	P	LC FS
<i>Taxodium distichum</i>	Bald cypress	O	LC FS
<i>Teucrium canadense</i>	American germander	P	FS
<i>Teucrium scorodonia</i>	Wood germander	P	FS
<i>Thelypteris hexagonoptera</i>	Broad beech fern	P	FS
<i>Thuja occidentalis</i>	Arbovitae	O	LC
<i>Tilia cordata</i>	Little-leaf linden	o2	LC
<i>Tillandsia usneoides</i>	Spanish moss	O	LC FS
<i>Tipularia discolor</i>	Crippled cranefly	P	FS
<i>Torreyochloa pallida</i>	Pale mannagrass	P	FS
<i>Toxicodendron radicans</i>	Common poison ivy	O	LC FS
<i>Triadenum virginicum</i> (<i>Hypericum</i>	Marsh st. Johnswort	O	LC
<i>Trichostema dichotomum</i>	Blue curls	P	FS
<i>Trifolium arvense</i>	Rabbitfoot clover	P	FS
<i>Trifolium campestre</i>	Low Hop clover	P	FS
<i>Trifolium incarnatum</i>	Crimson clover	P	FS
<i>Trifolium pratense</i>	Red clover	P	LC FS
<i>Trifolium procumbens</i>	Low hop clover	O	LC
<i>Trifolium repens</i>	White clover	P	LC FS
<i>Triodanis perfoliata</i>	Clasping Venus' looking-glass	P	FS
<i>Tripsacum dactyloides</i>	Eastern gamagrass	P	FS
<i>Typha angustifolia</i>	Narrowleaf cattail	P	LC FS
<i>Typha latifolia</i>	Cattail	O	LC FS
<i>Ulmus americana</i>	American elm	P	LC FS
<i>Ulmus pumila</i>	Siberian elm	o2	LC
<i>Ulmus thomasii</i>	Rock elm	O	LC
<i>Uniola paniculata</i>	Sea oats	O	LC FS
<i>Utricularia</i> sp.	Bladderwort	P	FS
<i>Vaccinium angustifolium</i>	Lowbush blueberry	O	LC
<i>Vaccinium arboreum</i>	Farkleberry	P	FS
<i>Vaccinium corymbosum</i>	Highbush blueberry	O	LC FS
<i>Vaccinium fuscatum</i>	Black highbush blueberry	O	LC
<i>Vaccinium stamineum</i>	Deerberry	O	FS
<i>Vaccinium tenellum</i>	Small black blueberry	O	FS
<i>Valerianella locusta</i>	Lewiston cornsalad	P	FS
<i>Valerianella radiata</i>	Beaked cornsalad	P	FS
<i>Verbascum blattaria</i>	Moth mullein	P	FS
<i>Verbascum thapsus</i>	Common mullein	P	FS

Enclosure 1

Flora of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence	Geographic Site
<i>Verbena bonariensis</i>	Purpletop vervain	P	FS
<i>Verbena brasiliensis</i>	Brazilian vervain	O	FS
<i>Verbesina occidentalis</i>	Yellow crownbeard	P	FS
<i>Verbesina virginica</i>	White crownbeard	P	FS
<i>Vernonia</i> sp.	Ironweed	P	FS
<i>Veronica peregrina</i>	Neckweed	P	FS
<i>Veronica serpyllifolia</i>	Thymeleaf speedwell	P	FS
<i>Vicia angustifolia</i>	Garden vetch	P	FS
<i>Vicia hirsuta</i>	Tiny vetch	P	FS
<i>Vicia sativa</i>	Garden vetch	P	FS
<i>Vinca minor</i>	Common periwinkle	o ²	LC
<i>Viola affinis</i>	Sand violet	P	FS
<i>Viola bicolor</i>	Field pansy	P	FS
<i>Viola papilionacea</i>	Common blue violet	P	FS
<i>Viola septemloba</i>	Southern coastal violet	P	FS
<i>Vitis aestivalis</i>	Summer grape	P	LC FS
<i>Vitis labrusca</i>	Fox grape	O	LC FS
<i>Vitis riparia</i>	Riverbank grape	P	FS
<i>Vitis rotundifolia</i>	Muscadine grape	O	LC FS
<i>Vitis vulpina</i>	Frost grape	P	FS
<i>Wisteria floribunda</i>	Japanese wisteria	o ²	LC
<i>Wisteria frutescens</i>	American wisteria	P	FS
<i>Wisteria sinensis</i>	Chinese Wisteria	O	
<i>Wisteria</i> ssp.	Wisteria	O	FS
<i>Woodwardia areolata</i>	Netted chainfern	P	LC FS
<i>Woodwardia virginica</i>	Virginia chainfern	O	LC
<i>Xanthium strumarium</i>	Rough cocklebur	o ²	LC FS
<i>Xyris jupicai</i>	Richard yellow-eyed grass	P	FS
<i>Xyris platylepis</i>	Tall yelloweyed grass	O	LC
<i>Yucca filamentosa</i>	Adam's needle	O	FS
<i>Yucca</i> sp.	Yucca; Spanish bayonet	P	FS
<i>Zanthoxylum clava-herculis</i>	Hercules' club	O	FS

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
Marine Fish			
<i>Ablennes hians</i>	Flat needlefish	O	LC
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic sturgeon	O	LC
<i>Alectis ciliaris</i>	African pompano	O	LC
<i>Alosa aestivalis</i>	Blueback herring	O	LC
<i>Alosa mediocris</i>	Hickory shad	O	LC
<i>Alosa pseudoharengus</i>	Alewife	O	LC
<i>Alosa sapidissima</i>	American shad	O	LC
<i>Aluterus schoepfi</i>	Orange filefish	O	LC
<i>Anchoa hepsetus</i>	Broad-striped anchovy	O	LC
<i>Anchoa mitchilli</i>	Bay anchovy	P	LC FS
<i>Anguilla rostrata</i>	American eel	P	FS
<i>Archosargus probatocephalus</i>	Sheepshead	P	LC FS
<i>Astroscopus guttatus</i>	Northern stargazer	P	LC FS
<i>Bairdiella chrysoura</i>	Silver perch	P	LC FS
<i>Balistes capriscus</i>	Gray triggerfish	O	LC
<i>Brevoortia tyrannus</i>	Atlantic menhaden	P	LC FS
<i>Caranx crysos</i>	Blue runner	O	LC
<i>Caranx hippos</i>	Crevalle jack	O	LC
<i>Carcharhinus leucas</i>	Bull shark	O	LC
<i>Carcharhinus obscurus</i>	Dusky shark	P	LC FS
<i>Carcharhinus plumbeus</i>	Sandbar shark	P	LC FS
<i>Centropristis striata</i>	Black sea bass	P	LC FS
<i>Chaetodipterus faber</i>	Atlantic spadefish	O	LC
<i>Chaetodon ocellatus</i>	Spotfin butterflyfish	O	LC
<i>Chasmodes bosquianus</i>	Striped blenny (R)	O	LC
<i>Chilomycterus schoepfi</i>	Striped burrfish	O	LC
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	O	LC
<i>Clupea harengus</i>	Atlantic herring	O	LC
<i>Conger oceanicus</i>	Conger eel	O	LC
<i>Cynoscion nebulosus</i>	Spotted weakfish; Spotted sea	P	LC FS
<i>Cynoscion regalis</i>	Weakfish	P	LC FS
<i>Cyprinodon variegatus variegatus</i>	Sheepshead minnow (R)	O	LC
<i>Dasyatis americana</i>	Southern stingray	O	LC
<i>Dasyatis centroura</i>	Roughtail stingray	O	LC
<i>Dasyatis sabina</i>	Atlantic stingray	O	LC
<i>Dasyatis say</i>	Bluntnose stingray	O	LC
<i>Dorosoma cepedianum</i>	Gizzard shad	O	LC
<i>Echeneis naucrates</i>	Sharksucker	O	LC
<i>Elops saurus</i>	Ladyfish	O	LC
<i>Etropus crossotus</i>	Fringed flounder	O	LC

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Etropus microstomus</i>	Smallmouth flounder	O	LC
<i>Euthymus alletteratus</i>	Little tunny	P	FS
<i>Eucinostomus argenteus</i>	Spotfin mojarra	O	LC
<i>Evorthodus lyricus</i>	Lyre goby (R)	O	LC
<i>Fundulus heteroclitus heteroclitus</i>	Mummichog (R)	O	LC
<i>Fundulus luciae</i>	Spotfin killifish (R)	O	LC
<i>Fundulus majalis</i>	Striped killifish	P	LC FS
<i>Fundulus heteroclitus</i> ssp. <i>heteroclitus</i>	Mummichog	P	FS
<i>Gadus morhua</i>	Atlantic cod	O	LC
<i>Ginglymostoma cirratum</i>	Nurse shark	O	LC
<i>Gobiesox strumosus</i>	Skilletfish (R)	O	LC
<i>Gobiosoma bosc</i>	Naked goby (R)	O	LC
<i>Gobiosoma ginsburgi</i>	Seaboard goby (R)	O	LC
<i>Gymnura micrura</i>	Smooth butterfly ray	P	LC FS
<i>Hippocampus erectus</i>	Lined seahorse (R)	O	LC
<i>Hyporhamphus unifasciatus</i>	Halfbeak	P	FS
<i>Hypsoblennius hentz</i>	Feather blenny (R)	O	LC
<i>Lagocephalus laevigatus</i>	Smooth puffer	O	LC
<i>Lagodon rhomboides</i>	Pinfish	P	FS
<i>Larimus fasciatus</i>	Banded drum	O	LC
<i>Leiostomus xanthurus</i>	Spot	P	LC FS
<i>Leucoraja erinacea</i>	Little skate	O	LC
<i>Leucoraja ocellata</i>	Winter skate	P	FS
<i>Lobotes surinamensis</i>	Tripletail	O	LC
<i>Loligo pealei</i>	Loligo squid	P	FS
<i>Lophius americanus</i>	Goosefish	P	FS
<i>Lutjanus jocu</i>	Dog snapper	O	LC
<i>Megalops atlanticus</i>	Tarpon	O	LC
<i>Menidia beryllina</i>	Tidewater silverside	O	LC
<i>Menidia menidia</i>	Atlantic silverside	P	LC FS
<i>Menticirrhus americanus</i>	Southern kingfish	P	LC FS
<i>Menticirrhus littoralis</i>	Gulf kingfish	O	LC
<i>Menticirrhus saxatilis</i>	Northern kingfish	P	LC FS
<i>Merluccius bilinearis</i>	Silver hake	P	LC FS
<i>Microgobius thalassinus</i>	Green goby (R)	O	LC
<i>Micropogon undulatus</i>	Atlantic croaker	P	FS
<i>Morone americana</i>	White perch	P	LC FS
<i>Morone saxatilis</i>	Striped bass	P	LC FS
<i>Mugil cephalus</i>	Striped mullet	O	LC
<i>Mugil curema</i>	White mullet	O	LC
<i>Mustelus canis</i>	Smooth dogfish	P	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Myxeroperca microlepis</i>	Gag	O	LC
<i>Myliobatis freminvillei</i>	Bullnose ray	O	LC
<i>Odontaspis ferox</i>	Sand tiger shark	P	FS
<i>Oligoplites saurus</i>	Leatherjacket	O	LC
<i>Ophidion marginatum</i>	Striped cusk-eel	O	LC
<i>Opisthonema oglinum</i>	Atlantic thread herring	O	LC
<i>Opsanus tau</i>	Oyster toadfish	P	LC FS
<i>Orthopristis chrysoptera</i>	Pigfish	P	LC FS
<i>Paralichthys dentatus</i>	Summer flounder	P	LC FS
<i>Peprilus paru</i>	Harvestfish	O	LC
<i>Peprilus triacanthus</i>	Butterfish	P	LC FS
<i>Petromyzon marinus</i>	Sea lamprey	O	LC
<i>Pogonias cromis</i>	Black drum	O	LC
<i>Pollachius virens</i>	Pollock	O	LC
<i>Pomatomus saltatrix</i>	Bluefish	P	LC FS
<i>Priacanthus arenatus</i>	Bigeye	O	LC
<i>Prionotus evolans</i>	Striped searobin	O	LC
<i>Prionotus carolinus</i>	Northern searobin	P	LC FS
<i>Pristigenys alta</i>	Short bigeye	O	LC
<i>Pseudopleuronectes americanus</i>	Winter flounder	P	LC FS
<i>Rachycentron canadum</i>	Cobia	O	LC
<i>Raja eglanteria</i>	Clearnose ray	P	LC FS
<i>Raja ocellata</i>	Winter skate	P	FS
<i>Rhinoptera bonasus</i>	Cownose ray	P	LC FS
<i>Sciaenops ocellatus</i>	Red drum	P	LC FS
<i>Scomber scombrus</i>	Atlantic mackerel	O	LC
<i>Scomberomorus cavalla</i>	King mackerel	P	LC FS
<i>Scomberomorus maculatus</i>	Spanish mackerel	P	LC FS
<i>Scophthalmus aquosus</i>	Windowpane	P	LC FS
<i>Selene setapinnis</i>	Atlantic moonfish	P	LC FS
<i>Selene vomer</i>	Lookdown	P	LC FS
<i>Seriola dumerili</i>	Greater amberjack	O	LC
<i>Seriola zonata</i>	Banded rudderfish	O	LC
<i>Sphoeroides maculatus</i>	Northern puffer	O	LC
<i>Sphyrna borealis</i>	Northern sennet	O	LC
<i>Sphyrna zygaena</i>	Smooth hammerhead	O	LC
<i>Squalus acanthias</i>	Spiny dogfish	P	LC FS
<i>Squantina dumeril</i>	Atlantic angel shark	P	LC FS
<i>Stenotomus chrysops</i>	Scup	O	LC
<i>Stephanolepis hispidus</i>	Planehead filefish	O	LC
<i>Strongylura marina</i>	Atlantic needlefish	P	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Symphurus plagiusa</i>	Blackcheek tonguefish	P	LC FS
<i>Syngnathus floridae</i>	Dusky pipefish (R)	O	LC
<i>Syngnathus fuscus</i>	Northern pipefish (R)	O	LC
<i>Syngnathus louisianae</i>	Chain pipefish (R)	O	LC
<i>Synodus foetens</i>	Inshore lizardfish	P	LC FS
<i>Tautoga onitis</i>	Tautog	O	LC
<i>Trachinotus carolinus</i>	Florida pompano	P	LC FS
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	O	LC
<i>Trinectes maculatus</i>	Hogchocker	O	LC FS
<i>Urophycis chuss</i>	Red hake	O	LC
<i>Urophycis regia</i>	Spotted codling	P	LC FS
<i>Urophycis regius</i>	Spotted hake	P	FS
Marine Invertebrates			
<i>Callinectes sapidus</i>	Blue crab	P	FS
<i>Cancer</i> sp.	Cancer crab	P	FS
<i>Diopatra cuprea</i>	Sand worm	P	FS
<i>Donax variabilis</i>	Coquina	P	FS
<i>Emerita talpoida</i>	Mole crab	P	FS
<i>Ensis directus</i>	Razor clam	P	FS
<i>Ocypode albicans</i>	Ghost crab	P	FS
<i>Ovalipes ocellatus</i>	Lady crab	P	FS
<i>Pargurus</i> sp.	Hermit crab	P	FS
Freshwater Fish			
<i>Ameiurus catus</i>	White catfish	O	LC FS
<i>Ameiurus natalis</i>	Yellow bullhead	O	LC
<i>Ameiurus nebulosus</i>	Brown bullhead	O	LC FS
<i>Amia calva</i>	Bowfin	O	LC
<i>Anguilla rostrata</i>	American eel	O	LC
<i>Cyprinus carpio carpio</i>	Common carp	O	LC
<i>Dorosoma cepedianum</i>	Gizzard shad	O	LC
<i>Esox niger</i>	Chain pickerel	O	LC
<i>Enneacanthus gloriosus</i>	Bluespotted sunfish	O	FS
<i>Gambusia affinis</i>	Mosquitofish	O	FS
<i>Gambusia holbrooki</i>	Eastern mosquitofish	O	LC
<i>Lepomis gibbosus</i>	Pumpkinseed	O	LC FS
<i>Lepomis gulosus</i>	Warmouth	O	LC
<i>Lepomis macrochirus</i>	Bluegill	O	FS
<i>Lucania parva</i>	Rainwater killifish	O	LC
<i>Luxilus cornutus</i>	Common shiner	O	LC
<i>Menidia beryllina</i>	Tidewater silverside	O	LC
<i>Micropterus salmoides</i>	Largemouth bass	O	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Morone americana</i>	White perch	O	LC FS
<i>Notemigonus crysoleus</i>	Golden shiner	O	LC FS
<i>Perca flavescens</i>	Yellow perch	O	LC
<i>Pomoxis nigromaculatus</i>	Black crappie	O	LC FS
<i>Sander vitreus vitreus</i>	Walleye	O	LC
<i>Umbra pygmaea</i>	Eastern mudminnow	O	FS
Marine Mammals			
<i>Balaenoptera acutorostrata</i>	Minke whale	O	LC
<i>Balaenoptera physalus</i>	Finback whale	O	LC
<i>Megaptera novaeangliae</i>	Humpback whale	O	LC
<i>Trichechus manatus</i>	West Indian manatee	O	LC
<i>Tursiops truncatus</i>	Atlantic bottlenose dolphin	O	LC
Terrestrial Mammals			
<i>Blarina brevicauda</i>	Short-tailed shrew	P	FS
<i>Blarina carolinensis</i>	Southern short-tailed shrew	O	LC FS
<i>Canis latrans</i>	Coyote	P	FS
<i>Canis lupus</i>	Domestic dog	O	LC
<i>Castor canadensis</i>	Beaver	P	LC FS
<i>Corynorhinus rafinesquii</i> ssp. <i>macrotis</i>	Rafinesque's eastern big-eared bat	O	FS
<i>Cryptotis parva</i>	Least shrew	P	LC FS
<i>Didelphis virginiana</i> ssp. <i>virginiana</i>	Virginia opossum	O	LC FS
<i>Eptesicus fuscus</i> ssp. <i>fuscus</i>	Big brown bat	O	LC FS
<i>Felis catus</i>	Feral cat	O	LC FS
<i>Glaucanys volans</i> ssp. <i>volans</i>	Southern flying squirrel	P	LC FS
<i>Lasionycteris noctivagans</i>	Silver-haired bat	P	FS
<i>Lasiurus borealis</i> ssp. <i>borealis</i>	Eastern red bat	P	LC FS
<i>Lasiurus cinereus</i> ssp. <i>cinereus</i>	Hoary bat	P	FS
<i>Lasiurus intermedius</i> ssp. <i>floridanus</i>	Northern yellow bat	P	FS
<i>Lontra canadensis</i> ssp. <i>laxatina</i>	Northern river otter	P	LC FS
<i>Lutra canadensis</i>	River otter	O	FS
<i>Lynx rufus</i> ssp. <i>floridanus</i>	Florida bobcat	P	FS
<i>Mephitis mephitis</i>	Striped skunk	O	FS
<i>Microtus pennsylvanicus</i> ssp. <i>nigrans</i>	Dark meadow vole	P	LC FS
<i>Mictorus pinetorum</i> ssp. <i>scalapsoides</i>	Pine vole	P	LC FS
<i>Mus musculus</i> ssp. <i>musculus</i>	House mouse	O	LC FS
<i>Mustela frenata</i>	Long-tailed weasel	P	FS
<i>Mustela vison</i>	Common mink	P	FS
<i>Myocastor coypus</i>	Nutria	P	LC FS
<i>Myotis lucifugus</i>	Little brown bat	P	LC FS
<i>Myotis septentrionalis</i> ssp. <i>septentrionalis</i>	Northern myotis	P	FS
<i>Nycticeius humeralis</i>	Evening bat	O	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Ochrotomys nuttalli</i> ssp. <i>nuttalli</i>	Lewis' golden mouse	P	FS
<i>Odocoileus virginianus</i>	White-tail deer	O	FS
<i>Ondatra zibethicus</i>	Muskrat	P	LC FS
<i>Ondatra zibethicus</i> ssp. <i>macrodon</i>	Large-toothed muskrat	P	FS
<i>Oryzomys palustris</i>	Rice rat	P	FS
<i>Oryzomys palustris</i> ssp. <i>palustris</i>	Marsh rice rat	P	LC FS
<i>Perimyotis subflavus</i>	Tri-colored bat	P	FS
<i>Peromyscus gossypinus</i> ssp. <i>gossypinus</i>	Cotton mouse	P	FS
<i>Peromyscus leucopus</i>	White-footed mouse	O	LC FS
<i>Peromyscus leucopus noveboracensis</i> (S)	Northern white-footed mouse	P	LC
<i>Peromyscus leucopus</i> ssp. <i>easti</i>	Pungo white-footed mouse	P	FS
<i>Peromyscus leucopus</i> ssp. <i>leucopus</i>	Common white-footed mouse	P	FS
<i>Peromyscus nuttalli</i>	Golden mouse	P	FS
<i>Phocoena phocoena</i>	Harbor porpoise	O	LC
<i>Pipistrellus subflavus subflavus</i> (S)	Eastern pipistrelle	P	LC
<i>Procyon lotor</i> ssp. <i>lotor</i>	Raccoon	O	LC FS
<i>Rattus norvegicus</i> ssp. <i>norvegicus</i>	Norway rat	P	LC FS
<i>Rattus rattus</i>	Black rat	P	FS
<i>Reithrodontomys humilis</i> ssp. <i>humilis</i>	Eastern harvest mouse	O	LC FS
<i>Scalopus aquaticus</i> ssp. <i>aquaticus</i>	Eastern mole	P	LC FS
<i>Sciurus carolinensis</i> ssp. <i>carolinensis</i>	Gray squirrel	O	LC FS
<i>Sciurus carolinensis pennsylvanicus</i> (S)	Northern gray squirrel	P	LC
<i>Sigmodon hispidus</i>	Hispid cotton rat	O	LC FS
<i>Sorex hoyi</i> ssp. <i>winnemana</i>	Pygmy shrew	P	FS
<i>Sorex longirostris</i> ssp. <i>longirostris</i>	Southeastern shrew	P	FS
<i>Sorex longirostris</i> ssp. <i>fisheri</i>	Dismal Swamp southeastern shrew	P	FS
<i>Sylvilagus floridanus</i> ssp. <i>mallurus</i>	Eastern cottontail rabbit	O	LC FS
<i>Sylvilagus palustris</i> ssp. <i>palustris</i>	Marsh rabbit	P	FS
<i>Synaptomys cooperi</i> ssp. <i>helaletes</i>	Southern bog lemming	P	FS
<i>Synaptomys cooperi stonei</i> (S)	Stone's southern bog lemming	P	LC
<i>Tamias striatus</i> ssp. <i>fisheri</i>	Fisher's eastern chipmunk	P	FS
<i>Urocyon cinereoargenteus</i>	Gray fox	P	FS
<i>Urocyon cinereoargenteus</i> ssp.	Eastern gray fox	O	LC FS
<i>Vulpes vulpes</i> ssp. <i>fulva</i>	Red fox	O	LC FS
<i>Zapus hudsonius</i> ssp. <i>americanus</i>	Meadow-jumping mouse	P	FS
Birds			
<i>Accipiter cooperii</i>	Cooper's hawk	O	LC
<i>Accipiter striatus</i> ssp. <i>veloz</i>	Sharp shinned hawk	P	LC FS
<i>Actitis macularia</i>	Spotted sandpiper	P	LC FS
<i>Agelaius phoeniceus</i>	Red-winged blackbird	O	LC FS
<i>Aix sponsa</i>	Wood duck	P	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Ammodramus caudacutus</i>	Saltmarsh sharp-tailed sparrow	O	LC
<i>Ammodramus maritimus</i>	Seaside sparrow	O	LC
<i>Anas acuta</i>	Northern pintail	O	LC FS
<i>Anas americana</i>	American widgeon	O	LC
<i>Anas crecca carolinensis</i>	Green-winged teal	O	LC
<i>Anas clypeata</i>	Northern shoveler	O	LC
<i>Anas platyrhynchos</i> ssp. <i>platyrhynchos</i>	Mallard	O	LC FS
<i>Anas rubripes</i>	Black duck	P	LC FS
<i>Anas strepera</i>	Gadwall	O	LC
<i>Anthus rubescens</i>	American pipit	O	LC
<i>Archilochus colubris</i>	Ruby-throated hummingbird	O	LC FS
<i>Ardea alba</i>	Great egret	O	LC FS
<i>Ardea herodias</i>	Great blue heron	O	LC FS
<i>Arenaria interpres morinella</i>	Ruddy turnstone	O	LC
<i>Assipitir cooperii</i>	Cooper's hawk	P	FS
<i>Aythya affinis</i>	Lesser scaup	O	LC
<i>Aythya americana</i>	Redhead	P	LC FS
<i>Aythya collaris</i>	Ring-necked duck	O	LC
<i>Aythya marila</i>	Greater scaup	P	LC FS
<i>Aythya valisineria</i>	Canvasback	O	LC
<i>Baeolophus bicolor</i>	Tufted titmouse	O	LC
<i>Bombycilla cedrorum</i>	Cedar waxwing	O	LC FS
<i>Botaurus lentiginosus</i>	American bittern	P	FS
<i>Branta bernicla</i>	Brant	O	LC FS
<i>Branta canadensis</i>	Canada goose	O	LC FS
<i>Bubo virginianus</i>	Great horned owl	P	LC FS
<i>Bucephala albeola</i>	Bufflehead	O	LC
<i>Bucephala clangula</i>	Bufflehead	O	LC FS
<i>Buteo jamaicensis</i>	Red-tailed hawk	O	LC FS
<i>Buteo lineatus</i>	Red-shouldered hawk	P	LC FS
<i>Buteo platypterus</i> ssp. <i>platypterus</i>	Broad-winged hawk	P	FS
<i>Butorides virescens</i> ssp. <i>virescens</i>	Green heron	O	FS
<i>Calidris alba</i>	Sanderling	O	LC FS
<i>Calidris alpina hudsonia</i>	Dunlin	O	LC
<i>Calidris maritima</i>	Purple sandpiper	O	LC
<i>Calidris mauri</i>	Western sandpiper	O	LC
<i>Calidris minutilla</i>	Least sandpiper	O	LC
<i>Capella gallinago</i> ssp. <i>delicata</i>	Wilson's snipe	P	FS
<i>Caprimulgus caroliniensis</i>	Chuck-wills-widow	P	FS
<i>Cardinalis cardinalis</i>	Northern cardinal	O	LC FS
<i>Carduelis pinus</i>	Pine siskin	O	LC

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Carduelis tristis</i>	American goldfinch	O	LC
<i>Carpodacus mexicanus</i>	House finch	O	LC FS
<i>Carpodacus purpureus</i> ssp. <i>purpureus</i>	Purple finch	P	LC FS
<i>Cassidix mexicanus</i>	Boat-tailed grackle	P	FS
<i>Cathartes aura</i>	Turkey vulture	O	LC FS
<i>Catharus fuscescens</i>	Veery	O	FS
<i>Catharus guttatus</i>	Hermit thrush	O	LC
<i>Catharus ustulatus</i>	Swainson's thrush	O	LC FS
<i>Catoptrophorus semipalmatus</i>	Willet	O	LC
<i>Certhia americana</i>	Brown creeper	O	LC
<i>Certhia familiaris</i>	Brown creeper	P	FS
<i>Ceryle alcyon</i>	Belted kingfisher	O	LC
<i>Chaetura pelagica</i>	Chimney swift	O	LC FS
<i>Charadrius melodus</i>	Piping plover	P	FS
<i>Charadrius semipalmatus</i>	Semipalmated plover	O	LC
<i>Charadrius vociferous</i>	Killdeer	O	LC FS
<i>Chen caerulescens</i>	Snow goose	O	LC
<i>Chordeiles minor</i>	Common nighthawk	P	FS
<i>Circus cyaneus hudsonius</i>	Marsh hawk	P	LC FS
<i>Cistothorus palustris</i>	Marsh wren	P	LC FS
<i>Cistothorus platensis</i>	Sedge wren	P	LC FS
<i>Clangula hyemalis</i>	Oldsquaw/Long-tailed duck	O	LC
<i>Coccothraustes vespertinus</i>	Evening grosbeak	O	LC
<i>Coccyzus americanus</i> ssp. <i>americanus</i>	Yellow-billed cuckoo	O	FS
<i>Coccyzus erythrophthalmus</i>	Black-billed cuckoo	P	FS
<i>Colaptes auratus</i>	Northern flicker	O	LC FS
<i>Colinus virginianus</i>	Northern bobwhite	O	LC FS
<i>Columbia livia</i>	Rock dove	O	LC FS
<i>Contopus virens</i>	Eastern wood pewee	O	LC FS
<i>Coragyps atratus</i>	Black vulture	P	LC FS
<i>Corvus brachyrhynchos</i>	American crow	O	LC FS
<i>Corvus ossifragus</i>	Fish crow	O	LC FS
<i>Cyanocitta cristata</i>	Blue jay	O	LC FS
<i>Cygnus columbianus columbianus</i>	Tundra swan	O	LC
<i>Dendrocopos villosus</i>	Hairy woodpecker	P	FS
<i>Dendroica caerulescens</i>	Black-throated blue warbler	O	LC
<i>Dendroica castanea</i>	Bay-breasted warbler	P	FS
<i>Dendroica cerulea</i>	Cerulean warbler	P	FS
<i>Dendroica caerulescens</i>	Black-throated blue warbler	O	FS
<i>Dendroica coronata</i>	Yellow-rumped warbler	O	LC FS
<i>Dendroica coronata</i> ssp. <i>coronata</i>	Myrtle warbler	P	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Dendroica discolor</i>	Prairie warbler	O	LC FS
<i>Dendroica dominica</i>	Yellow-throated warbler	P	LC FS
<i>Dendroica magnolia</i>	Magnolia warbler	O	FS
<i>Dendroica palmarum</i>	Palm warbler	O	LC FS
<i>Dendroica pensylvanica</i>	Chestnut-sided warbler	O	LC
<i>Dendroica petechia</i>	Yellow warbler	P	LC FS
<i>Dendroica pinus</i>	Pine warbler	O	LC FS
<i>Dendroica striata</i>	Blackpoll warbler	P	LC FS
<i>Dendroica tigrina</i>	Cape warbler	P	FS
<i>Dendroica virens</i>	Black-throated green warbler	O	LC FS
<i>Dolichonyx oryzivorus</i>	Bobolink	P	FS
<i>Dryocopus pileatus</i>	Pileated woodpecker	O	LC FS
<i>Dumetella carolinensis</i>	Gray catbird	O	LC FS
<i>Egretta thula</i>	Snowy egret	O	LC
<i>Empidonax virescens</i>	Acadian flycatcher	P	FS
<i>Eremophila alpestris</i>	Horned Lark	O	LC
<i>Ereunetes pusillus</i>	Semi-palmated sandpiper	P	FS
<i>Euphagus carolinus</i>	Rusty blackbird	O	LC
<i>Falco columbarius</i>	Merlin	O	LC
<i>Falco peregrinus</i>	Peregrine falcon	O	LC FS
<i>Falco sparverius</i>	American kestrel	O	LC FS
<i>Florida coerulea</i> ssp. <i>coerulea</i>	Little blue heron	P	FS
<i>Fulica americana</i>	American coot	P	LC FS
<i>Gallinago gallinago</i>	Common snipe	O	LC
<i>Gavia immer</i>	Common loon	O	LC FS
<i>Gavia stellata</i>	Red-throated loon	O	LC
<i>Geothypis trichas</i>	Common yellowthroat	O	LC FS
<i>Guiraca caerulea</i>	Blue grosbeak	O	LC FS
<i>Haematopus palliatus</i>	American oystercatcher	O	LC
<i>Haliaeetus leucocephalus</i>	Bald eagle	O	LC FS
<i>Helmitheros vermivorus</i>	Worm eating warbler	O	FS
<i>Hirundo rustica</i> ssp. <i>erythrogaster</i>	Barn swallow	O	LC FS
<i>Hylocichla guttata</i> ssp. <i>faxoni</i>	Hermit thrush	P	FS
<i>Hylocichla mustelina</i>	Wood thrush	P	FS
<i>Icteria virens</i> ssp. <i>virens</i>	Yellow-breasted chat	P	FS
<i>Icterus galbula</i>	Baltimore oriole	P	FS
<i>Icterus parisorum</i>	Northern oriole	O	LC
<i>Icterus spurius</i>	Orchard oriole	O	LC FS
<i>Junco hyemalis</i>	Slate-colored junco	P	LC FS
<i>Lanius ludovicianus</i>	Loggerhead shrike	P	FS
<i>Larus argentatus</i>	Herring gull	O	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Larus atricilla</i>	Laughing gull	O	LC FS
<i>Larus delawarensis</i>	Ring-billed gull	O	LC FS
<i>Larus fuscus</i>	Lesser black-backed gull	O	LC
<i>Larus marinus</i>	Great black-backed gull	P	LC FS
<i>Larus philadelphia</i>	Bonaparte's gull	P	LC FS
<i>Leucophoyx thula</i> ssp. <i>thula</i>	Snowy egret	P	FS
<i>Limnodromus griseus</i>	Short-billed dowitcher	O	FS
<i>Lophodytes cucullatus</i>	Hooded merganser	O	LC FS
<i>Mareca americana</i>	American widgeon	P	FS
<i>Megaceryle alcyon</i> ssp. <i>alcyon</i>	Belted kingfisher	O	FS
<i>Megascops asio</i>	Eastern screech owl	O	LC
<i>Melanerpes carolinus</i>	Red-bellied woodpecker	P	LC FS
<i>Melanerpes erthrocephalus</i>	Red-headed woodpecker	P	FS
<i>Melanitta fusca</i>	White-winged scoter	O	LC FS
<i>Melanitta nigra americana</i>	Black scoter	O	LC
<i>Melanitta perspicillata</i>	Surf scoter	O	LC FS
<i>Melospiza georgiana</i>	Swamp sparrow	O	LC FS
<i>Melospiza melodia</i>	Song sparrow	O	LC FS
<i>Mergus merganser</i>	Common merganser	O	LC FS
<i>Mergus serrator</i>	Red-breasted merganser	O	LC FS
<i>Mimus polyglottos</i>	Northern mockingbird	O	LC FS
<i>Mniotilta varia</i>	Black-and-white warbler	O	LC FS
<i>Molothrus ater</i>	Brown-headed cowbird	O	LC FS
<i>Morus bassanus</i>	Northern gannet	O	LC FS
<i>Myiarchus crinitus</i>	Great-crested flycatcher	O	LC FS
<i>Nyctanassa violacea</i>	Yellow-crowned night-heron	P	FS
<i>Nycticorax nycticorax</i> ssp. <i>hoactli</i>	Black-crowned night heron	P	LC FS
<i>Oporonis formosus</i>	Kentucky warbler	O	FS
<i>Otus asio</i>	Screech owl	P	FS
<i>Oxyura jamaicensis</i>	Ruddy duck	O	LC
<i>Pandion haliaetus</i> ssp. <i>carolinensis</i>	Osprey	O	LC FS
<i>Parus bicolor</i>	Tufted titmouse	O	FS
<i>Parus carolinensis</i>	Carolina chickadee	O	FS
<i>Passer domesticus</i> ssp. <i>domesticus</i>	English sparrow	P	LC FS
<i>Passerculus sandwichensis</i>	Savannah sparrow	O	LC
<i>Passerella iliaca</i>	Fox sparrow	O	LC FS
<i>Passerina cyanea</i>	Indigo bunting	O	LC FS
<i>Pelecanus occidentalis</i>	Brown pelican	O	LC FS
<i>Phalacrocorax auritis</i>	Double-crested cormorant	O	LC FS
<i>Phalacrocorax carbo</i>	Great cormorant	O	LC
<i>Pheucticus ludovicianus</i>	Rose-breasted grosbeak	O	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Picoides pubescens</i>	Downy woodpecker	O	LC FS
<i>Picoides villosus</i>	Hairy woodpecker	O	LC
<i>Pipilo erythrophthalmus</i>	Eastern towhee	O	LC FS
<i>Piranga olivacea</i>	Scarlet tanager	P	LC FS
<i>Piranga rubra</i> ssp. <i>rubra</i>	Summer tanager	P	FS
<i>Plectrophenax nivalis</i>	Snow bunting	O	LC
<i>Pluvialis squatarola</i>	Black-bellied plover	O	LC FS
<i>Podiceps auritus</i>	Horned grebe	O	LC
<i>Podilymbus podiceps</i> ssp. <i>podiceps</i>	Pied-billed grebe	P	LC FS
<i>Poecile carolinensis</i>	Carolina chickadee	O	LC
<i>Poliotilta coerulea</i> ssp. <i>coerulea</i>	Blue-gray gnatcatcher	O	LC FS
<i>Progne subis</i> ssp. <i>subis</i>	Purple martin	O	LC FS
<i>Protonotaria citrea</i>	Prothonotary warbler	O	LC FS
<i>Quiscalus major</i>	Boat-tailed grackle	O	LC
<i>Quiscalus quiscula</i>	Common grackle	O	LC FS
<i>Rallus elagans</i> ssp. <i>elegans</i>	King rail	P	FS
<i>Rallus longirostris crepitans</i>	Clapper rail	O	LC
<i>Regulus calendula</i> ssp. <i>calendula</i>	Ruby-crowned kinglet	O	LC FS
<i>Regulus satrapa</i> ssp. <i>satrapa</i>	Golden-crowned kinglet	O	LC FS
<i>Rynchops niger</i>	Black skimmer	O	LC
<i>Sayornis phoebe</i>	Eastern phoebe	P	LC FS
<i>Scolopax minor</i>	American woodcock	O	LC
<i>Seiurus aurocapillus</i>	Ovenbird	O	LC FS
<i>Seiurus motacilla</i>	Louisiana waterthrush	P	LC
<i>Setophaga americana</i>	Northern parula	O	LC FS
<i>Setophaga ruticilla</i>	American redstart	O	FS
<i>Sialia sialis</i>	Eastern bluebird	O	LC FS
<i>Sitta canadensis</i>	Red-breasted nuthatch	P	LC FS
<i>Sitta carolinensis</i>	White-breasted nuthatch	P	LC FS
<i>Sitta pusilla</i>	Brown-headed nuthatch	P	LC FS
<i>Somateria mollissima</i>	Common eider	O	LC FS
<i>Sphyrapicus varius</i> ssp. <i>varius</i>	Yellow-bellied sapsucker	P	LC FS
<i>Spinus tristis</i>	American goldfinch	O	FS
<i>Spizella arborea</i> ssp. <i>arborea</i>	Tree sparrow	P	FS
<i>Spizella passerina</i> ssp. <i>passerina</i>	Chipping sparrow	O	LC FS
<i>Spizella pusilla</i>	Field sparrow	O	LC FS
<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow	O	LC FS
<i>Sterna albifrons</i>	Least tern	P	FS
<i>Sterna antillarum</i>	Least tern	O	LC
<i>Sterna caspia</i>	Caspian tern	O	LC FS
<i>Sterna forsteri</i>	Forster's tern	O	LC FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Sterna hirundo</i>	Common tern	O	LC FS
<i>Sterna maxima</i>	Royal tern	O	LC FS
<i>Sterna nilotica</i>	Gull-billed tern	O	LC
<i>Sterna sandvicensis</i>	Sandwich tern	O	LC FS
<i>Strix varia</i>	Barred owl	O	LC
<i>Sturnella magna</i>	Eastern meadowlark	P	LC FS
<i>Sturnus vulgaris</i>	European starling	O	LC FS
<i>Sula leucogaster</i>	Brown booby	O	FS
<i>Tachycineta bicolor</i>	Tree swallow	O	LC FS
<i>Thryothorus ludovicianus</i>	Carolina wren	P	LC FS
<i>Toxostoma rufum</i>	Brown thrasher	O	LC FS
<i>Tringa flavipes</i>	Lesser yellowlegs	O	LC
<i>Tringa melanoleuca</i>	Greater yellowlegs	O	LC FS
<i>Tringa solitaria</i>	Solitary sandpiper	O	FS
<i>Troglodytes aedon</i>	House wren	P	LC FS
<i>Troglodytes troglodytes</i>	Winter wren	O	LC FS
<i>Turdus migratorius</i>	American robin	O	LC FS
<i>Tyrannus tyrannus</i>	Eastern kingbird	O	LC FS
<i>Tyto alba</i> ssp. <i>pratincta</i>	Barn owl	P	FS
<i>Vermivora pinus</i>	Blue-winged warbler	P	FS
<i>Vireo flavifrons</i>	Yellow-throated vireo	P	FS
<i>Vireo griseus</i>	White-eyed vireo	O	LC FS
<i>Vireo olivaceus</i>	Red-eyed vireo	O	LC FS
<i>Vireo solitarius</i>	Blue-headed vireo	O	LC FS
<i>Wilsonia canadensis</i>	Canada warbler	O	LC
<i>Wilsonia citrina</i>	Hooded warbler	O	FS
<i>Zenaidura macroura</i>	Mourning dove	O	LC FS
<i>Zonotrichia albicollis</i>	White-throated sparrow	O	LC FS
Arthropods			
Order <i>Araneida</i>	Cob web weaver spider	P	FS
Order <i>Araneida</i>	Grass spider	P	FS
Order <i>Diptera</i>	Blue-bottle fly	P	FS
Order <i>Diptera</i>	Green-bottle fly	P	FS
Order <i>Lepidoptera</i>	Wood nip butterfly	P	FS
Order <i>Phalangida</i>	Daddy long legs	P	FS
Suborder <i>Anisoptera</i>	Dragonfly	P	FS
Suborder <i>Zygoptera</i>	Damselfly	P	FS
Subfamily <i>Pseudophyllinae</i>	Green katydid	P	FS
Subfamily <i>Vespinae</i>	Yellow jacket	P	FS
<i>Achalarus lyciades</i>	Hawk moth	P	FS
<i>Actias luna</i>	Royal walnut moth	P	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Aedes sollicitans</i>	Saltmarsh mosquito	P	FS
<i>Antheraea polyphemus</i>	Polyphemus moth	P	FS
<i>Apis mellifera</i>	Honey bee	P	FS
<i>Bombus griseocollis</i>	Bumble bee	P	FS
<i>Brachynemurus abdominalis</i>	Ant lion	P	FS
<i>Chorthippus curtipennis</i>	Meadow grasshopper	P	FS
<i>Chrysops vittatus</i>	Deer fly	P	FS
<i>Danaus plexippus</i>	Monarch butterfly	P	FS
<i>Dermacentor variabilis</i>	American dog tick	P	FS
<i>Dynastes tityus</i>	Unicorn beetle	P	FS
<i>Eacles imperialis</i>	Imperial moth	P	FS
<i>Gryllus veletis</i>	Field cricket	P	FS
<i>Hippodamia convergens</i>	Ladybird beetle	P	FS
<i>Latrodectus mactans</i>	Black widow spider	P	FS
<i>Libellula pulchella</i>	Ten-spot dragonfly	P	FS
<i>Lycosa</i> sp.	Wolf spider	P	FS
<i>Lygaeus kalmii</i>	Milkweed bug	P	FS
<i>Magicicada septendecim</i>	Annual cicada	P	FS
<i>Malacosoma americana</i>	American tint caterpillar	P	FS
<i>Mantis religiosa</i>	Praying mantis	P	FS
<i>Misumenops</i> sp.	Crab spider	P	FS
<i>Pieris rapae</i>	Cabbage butterfly	P	FS
<i>Schistocerca americana</i>	American grasshopper	P	FS
<i>Sibine stimulea</i>	Saddle back caterpillar	P	FS
<i>Strictocephala bubalus</i>	Buffalo tree hopper	P	FS
<i>Tabanua atratus</i>	Black horsefly	P	FS
<i>Vespula maculata</i>	Bald-faced hornet	P	FS
<i>Xylocopa virginica</i>	Carpenter bee	P	FS
Reptiles and Amphibians			
<i>Acris gryllus</i> ssp. <i>gryllus</i>	Coastal Plain (Southern) cricket	O	FS
<i>Agkistrodon contortrix</i> ssp. <i>mokason</i>	Northern copperhead	O	FS
<i>Agkistrodon piscivorus</i> ssp. <i>piscivorus</i>	Eastern cottonmouth	O	FS
<i>Ambystoma opacum</i>	Marbled salamander	O	FS
<i>Amphiuma means</i>	Two-toed amphiuma	O	FS
<i>Anaxyrus americanus americanus</i> (S)	Eastern American toad	P	LC
<i>Anaxyrus fowleri</i>	Fowler's toad	O	LC FS
<i>Anaxyrus terrestris</i>	Southern toad	O	LC
<i>Aspidoscelis sexlineata</i>	Eastern six-lined racerunner	O	LC
<i>Caretta caretta</i>	Loggerhead sea turtle	O	LC FS
<i>Carphophis amoenus</i> ssp. <i>amoenus</i>	Eastern wormsnake	O	LC FS
<i>Cemophora coccinea</i> ssp. <i>copei</i>	Northern scarletsnake	O	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story*JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia*

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Chelonia mydas</i>	Green sea turtle	O	LC FS
<i>Chelydra serpentina</i> ssp. <i>serpentina</i>	Common snapping turtle	O	LC FS
<i>Chrysemys picta</i> ssp. <i>picta</i>	Eastern painted turtle	O	LC FS
<i>Clemmys guttata</i>	Spotted turtle	O	FS
<i>Cnemidophorus sexlineatus</i>	Eastern six-lined racerunner	O	FS
<i>Coluber constrictor</i> ssp. <i>constrictor</i>	Northern black racer	O	LC FS
<i>Deirochelys reticularia</i>	Eastern chicken turtle	P	FS
<i>Dermochelys coriacea</i> (S)	Leatherback turtle	P	LC
<i>Desmognathus auriculatus</i>	Southern dusty salamander	P	FS
<i>Desmognathus fuscus</i>	Northern dusky salamander	P	FS
<i>Diadophis punctatus</i> ssp. <i>punctatus</i>	Southern ringneck snake	P	LC FS
<i>Elaphe obsoleta</i> ssp. <i>obsoleta</i>	Black rat snake	P	FS
<i>Eumeces fasciatus</i>	Common five-lined skink	O	FS
<i>Eumeces laticeps</i>	Broad-headed skink	P	FS
<i>Eumeces fasciatus</i>	Common five-lined skink	O	FS
<i>Eumeces inexpectatus</i>	Southeastern five-lined skink	O	FS
<i>Eurycea cirrigera</i>	Southern two-lined salamander	P	FS
<i>Eurycea guttolineata</i>	Three-lined salamander	P	FS
<i>Farancia abacura</i> ssp. <i>abacura</i>	Eastern mudsnake	O	FS
<i>Farancia erythrogramma</i> ssp.	Common rainbow snake	P	FS
<i>Gastrophryne carolinensis</i>	Eastern narrow-mouth toad	O	LC FS
<i>Hemidactylium scutatum</i>	Four-toed salamander	P	FS
<i>Heterodon platirhinos</i>	Eastern hognose snake	O	FS
<i>Hyla chrysoscelis</i>	Cope's gray treefrog	O	LC FS
<i>Hyla cinerea</i>	Green tree frog	O	LC FS
<i>Hyla femoralis</i>	Pine woods treefrog	P	FS
<i>Hyla gratiosa</i>	Barking treefrog	P	FS
<i>Hyla squirella</i>	Squirrel treefrog	O	LC FS
<i>Kinosternon bauri</i>	Striped mud turtle	P	FS
<i>Kinosternon subrubrum</i> ssp. <i>subrubrum</i>	Eastern mud turtle	P	LC FS
<i>Lampropeltis getula</i> ssp. <i>getula</i>	Eastern kingsnake	O	FS
<i>Lepidochelys kempii</i>	Kemp's Ridley sea turtle	O	LC FS
<i>Lithobates catesbeianus</i>	American bullfrog	O	LC FS
<i>Lithobates clamitans</i> ssp. <i>melanota</i>	Northern green frog	O	LC FS
<i>Lithobates sphenoccephalus</i>	Southern leopard frog	O	LC FS
<i>Malaclemys terrapin</i> ssp. <i>terrapin</i>	Northern diamond-back terrapin	P	FS
<i>Natrix erythrogaster</i> ssp. <i>erythrogaster</i>	Red bellied water snake	P	FS
<i>Nerodia sipedon</i> ssp. <i>sipedon</i>	Northern watersnake	P	LC FS
<i>Nerodia taxispilota</i>	Brown watersnake	O	FS
<i>Notophthalmus viridescens</i> ssp.	Red-spotted newt	P	FS
<i>Opheodrys aestivus</i> ssp. <i>aestivus</i>	Northern rough greensnake	O	FS

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

Enclosure 2

Fish and Wildlife of JEB Little Creek and Fort Story

JEB Little Creek – Fort Story INRMP, Virginia Beach, Virginia

Scientific Name	Common Name	Occurrence ¹	Geographic Site
<i>Ophisaurus ventralis</i>	Eastern slender glass lizard	P	FS
<i>Pantherophis alleghaniensis</i>	Eastern ratsnake	O	LC FS
<i>Plestidon fasciatus</i>	Common five-lined skink	O	LC
<i>Plestidon inexpectatus</i>	Southeastern five-lined skink	O	LC
<i>Plethodon chlorobryonis</i>	Atlantic Coast slimy salamander	O	LC FS
<i>Plethodon cinereus</i>	Eastern red-backed salamander	O	LC FS
<i>Pseudacris brimleyi</i>	Brimley's chorus frog	P	FS
<i>Pseudacris crucifer</i> ssp. <i>crucifer</i>	Northern spring peeper	O	LC FS
<i>Pseudacris ocularis</i>	Little grass frog	P	FS
<i>Pseudacris nigrita</i> (S)	Southern chorus frog	O	LC
<i>Pseudemys rubriventris</i>	Northern red-bellied cooter	O	LC FS
<i>Pseudotriton montanus</i> ssp. <i>montanus</i>	Eastern mud salamander	O	FS
<i>Psuedacris crucifer</i>	Spring peeper	P	FS
<i>Rana clamitans</i> ssp. <i>clamitans</i>	Bronze frog	P	FS
<i>Rana virgatipes</i>	Carpenter frog	P	FS
<i>Sceloporus undulatus</i> ssp. <i>hyacinthinus</i>	Eastern fence lizard	O	LC FS
<i>Scincella lateralis</i>	Little brown skink	O	LC FS
<i>Siren lacertina</i>	Greater siren	P	FS
<i>Stereochilus marginatus</i>	Many-lined salamander	P	FS
<i>Sternotherus odoratus</i>	Common musk turtle	P	LC FS
<i>Sternotherus odoratus</i>	Eastern musk turtle	P	FS
<i>Storeria dekayi</i> ssp. <i>dekayi</i>	Northern brown snake	P	FS
<i>Storeria occipitomaculata</i> ssp.	Northern red-bellied snake	P	FS
<i>Terrapene carolina</i> ssp. <i>carolina</i>	Eastern box turtle	O	LC FS
<i>Thamnophis sirtalis</i> ssp. <i>sirtalis</i>	Common gartersnake	O	LC FS
<i>Thamnopsis sauritus</i> ssp. <i>sauritus</i>	Eastern ribbon snake	P	FS
<i>Trachemys scripta</i> ssp. <i>elegans</i>	Red-eared slider	P	LC FS
<i>Trachemys scripta</i> ssp. <i>scripta</i>	Yellow-bellied slider	O	LC FS
<i>Virginia striatula</i>	Rough earthsnake	P	FS
<i>Virginia valeriae</i> ssp. <i>valeriae</i>	Eastern smooth earthsnake	P	FS

R = year round inhabitant of JEB Little Creek waters

S = Species whose presence at JEB Little Creek is unconfirmed, but may occur

Sources: Clark 1998, Guilfoyle and Fischer 1999, Guilfoyle and Fischer 2000, National Audubon Society 2012, NAVFAC Mid-Atlantic 2013, Navy 2010b, Navy 2012, Roble 2010, Townsend 2012, U.S. Army Waterways Experiment Station 2000, and Versar, Inc. 2006

¹O=occurs, P=potential to occur based on presence in Cape Henry Region

APPENDIX H: JEB LITTLE CREEK RAPTOR
MANAGEMENT PLAN

**RAPTOR MANAGEMENT PLAN
JOINT EXPEDITIONARY BASE LITTLE CREEK**

American Kestrel



Photo: Paul Block © 2009

**Final
October 2011**

Prepared By:
Naval Facilities Engineering Atlantic



Prepared For:
Naval Amphibious Base Little Creek



Contents

1.0 INTRODUCTION	5
2.0 Purpose and Objectives	6
3.0 Location and Description.....	6
4.0 Regulation, Policy and Guidance.....	7
4.1 Federal Regulations.....	7
4.2 State Regulations.....	9
4.3 Navy Policy and Guidance	9
5.0 Limiting Factors.....	11
6.0 SPECIES INFORMATION.....	11
6.1 Bald Eagle (<i>Haliaeetus leucocephalus</i>)	11
6.1.1 Species Description	11
6.1.2 Ecology.....	11
6.1.3 Habitat Requirements.....	12
6.1.4 Status at Installation.....	13
6.2 Osprey (<i>Pandion haliaeetus</i>).....	13
6.2.1 Species Description	13
6.2.2 Ecology.....	14
6.2.3 Habitat Requirements.....	14
6.2.4 Status at Installation.....	15
6.3 Red-tailed Hawk (<i>Buteo jamaicensis</i>)	15
6.3.1 Species Description	15
6.3.2 Ecology.....	15
6.3.3 Habitat Requirements.....	16
6.3.4 Status at Installation.....	16
6.4 Red-shouldered Hawk (<i>Buteo lineatus</i>)	17
6.4.1 Species Description	17
6.4.2 Ecology.....	17
6.4.3 Habitat Requirements.....	17
6.4.4 Status at Installation.....	18
6.5 Northern Harrier (<i>Circus cyaneus</i>)	18
6.5.1 Species Description	18
6.5.2 Ecology.....	18
6.5.3 Habitat Requirements.....	19
6.5.4 Status at Installation.....	19
6.6 Cooper’s Hawk (<i>Accipiter cooperii</i>)	19
6.6.1 Species Description	19
6.6.2 Ecology.....	20
6.6.3 Habitat Requirements.....	20
6.6.4 Status at Installation.....	20
6.7 Sharp-shinned Hawk (<i>Accipiter striatus</i>).....	21
6.7.1 Species Description	21
6.7.2 Ecology.....	21
6.7.3 Habitat Requirements.....	21
6.7.4 Status at Installation.....	22
6.8 Peregrine Falcon (<i>Falco peregrinus</i>).....	22
6.8.1 Species Description	22
6.8.2 Ecology.....	23

6.8.3	Habitat Requirements.....	23
6.8.4	Status at Installation.....	24
6.9	Merlin (<i>Falco columbarius</i>)	24
6.9.1	Species Description	24
6.9.2	Ecology.....	25
6.9.3	Habitat Requirements.....	25
6.9.4	Status at Installation.....	25
6.10	American Kestrel (<i>Falco sparverius</i>).....	25
6.10.1	Species Description	25
6.10.2	Ecology.....	26
6.10.3	Habitat Requirements.....	26
6.10.4	Status at Installation.....	27
6.11	Turkey Vulture (<i>Cathartes aura</i>)	27
6.11.1	Species Description	27
6.11.2	Ecology.....	28
6.11.3	Habitat Requirements.....	28
6.11.4	Status at Installation.....	28
6.12	Black Vulture (<i>Coragyps atratus</i>)	29
6.12.1	Species Description	29
6.12.2	Ecology.....	29
6.12.3	Habitat Requirements.....	29
6.12.4	Status at Installation.....	29
6.13	Great Horned Owl (<i>Bubo virginianus</i>).....	30
6.13.1	Species Description	30
6.13.2	Ecology.....	30
6.13.3	Habitat Requirements.....	31
6.13.4	Status at Installation.....	31
6.14	Barred Owl (<i>Strix varia</i>)	31
6.14.1	Species Description	31
6.14.2	Ecology.....	31
6.14.3	Habitat Requirements.....	32
6.14.4	Status at Installation.....	32
6.15	Short-eared Owl (<i>Asio flammeus</i>)	33
6.15.1	Species Description	33
6.15.2	Ecology.....	33
6.15.3	Habitat Requirements.....	33
6.15.4	Status at Installation.....	33
6.16	Eastern Screech Owl (<i>Otus asio</i>).....	34
6.16.1	Species Description	34
6.16.2	Ecology.....	34
6.16.3	Habitat Requirements.....	34
6.16.4	Status at Installation.....	35
6.17	Negative Factors and Beneficial Practices	35
	Training.....	36
	Building Construction	36
	Electrical Pole and Powerlines	37
	Structure Demolition.....	40
	Grounds Maintenance	41
	Urban Forestry	42
	Other Beneficial Management Recommendations.....	43

Feral Cat Control	43
Nest Boxes	44
Nest Platforms	45
Outreach	46
7.0 MANAGEMENT and STEWARDSHIP GOALS	48
8.0 REFERENCES	48

Tables

Table 1. Relative Sensitivity of Breeding Bald Eagles to Human Disturbance ..	12
Table 2: Nest Box Specifications	45
Table 3: Beneficial Management Practices by Species	46

Acronyms and Abbreviations

BGEPA	Bald and Golden Eagle Protection Act
BA	Biological Assessment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
INRMP	Integrated Natural Resources Management Plan
JEB Little Creek	Joint Expeditionary Base, Little Creek
MBTA	Migratory Bird Treaty Act
NSFIH	Naval Support Facility Indian Head
PZ	Protection Zone
RMP	Raptor Management Plan
USFWS	United States Fish and Wildlife Service
VGIF	Virginia Department of Game and Inland Fisheries
VFWS	Virginia Fish and Wildlife Information Service

1.0 INTRODUCTION

A variety of raptors are known to occur on Joint Expeditionary Base, Little Creek (JEB Little Creek). The purpose of the Raptor Management Plan (RMP) is to aide natural resource managers at JEB Little Creek in the management of raptors and their associated habitats. The RMP will help guide natural resource managers with recommendations for beneficial management and stewardship practices to support the raptor population on base while allowing the installation to fulfill its military mission

Specifically, the purposes of this RMP are to:

- Present information on each species;
- Identify the disturbances the species faces on the installation;
- Identify beneficial natural resource management practices for raptors;
- Avoid adverse impacts to installation mission.

This plan can be used as a supplement to the base Integrated Natural Resource Management Plan (INRMP) and/or for impact assessment of actions that may require Biological Assessments (BA), Environmental Assessments (EA), or Environmental Impact Statements (EIS).

What is a raptor? A raptor is a loosely defined term that can included any or all of the following families of birds in North America: Accipitridae (hawks, eagles, kites, harriers), Falconidae (falcons and caracaras), Pandionidae (ospreys), Cathartidae (vultures), Strigidae (true owls), and Tytonidae (barn owl). For the purpose of the RMP, the broadest definition of raptor will be used and include all families listed above that have members that are known or likely full-time or part-time residents of JEB Little Creek. This list was compiled utilizing the Virginia Game and Inland Fisheries (VGIF): Virginia Fish and Wildlife Information Service (VGIF 2010) . Below is a list of the species that have known or likely presence in the City of Virginia Beach and/or City of Norfolk (VFWIS 2011) and therefore may have a presence at JEB Little Creek. These species are discussed in the RMP.

- Bald Eagle (*Haliaeetus leucocephalus*)
- Osprey (*Pandion haliaetus*)
- Red-tailed Hawk (*Buteo jamaicensis*)
- Red-shouldered Hawk (*Buteo lineatus*)
- Northern Harrier (*Circus cyaneus*)
- Cooper's Hawk (*Accipiter cooperii*)
- Sharp-shinned Hawk (*Accipiter striatus*)
- Peregrine Falcon (*Falco peregrines*)
- Merlin (*Falco columbarius*)
- American Kestrel (*Falco sparverius*)

- Turkey Vulture (*Cathartes aura*)
- Black Vulture (*Coragyps atratus*)
- Great-horned Owl (*Bubo virginianus*)
- Barred Owl (*Strix varia*)
- Short-eared Owl (*Asio flammeus*)
- Eastern Screech Owl (*Otus asio*)

2.0 Purpose and Objectives

The purpose of the Raptor Management Plan is to guide natural resource managers through regulatory requirements and Navy policies while promoting raptor management and stewardship activities in support of the Navy mission. The objective of raptor management at JEB Little Creek is to maintain or increase current raptor activity on the installation by effective natural resource management practices and the stewardship of nesting, foraging, and roosting habitat. This should include the management, restoration, and protection of raptor habitats on the installation.

The Navy Environmental and Natural Resources Program Manual 5090 1.C (Navy 2007) states “*Responsibility for good stewardship of natural resources shall be an important and identifiable function of all commands*” and “*The Navy will also strive to protect and conserve natural resources throughout the land, sea, and air space areas in which the Navy operates*”.

The Compliance Guide for Commanding Officers of Navy Installations (Navy 2010) states “*The care, protection, and management of natural and cultural resources reflects environmental stewardship and is the best approach for preserving and enhancing ecosystem integrity, and sustaining both biological diversity and the continued availability of Navy land, sea, and air space for military and other uses. The dynamic of stewardship and readiness is essential for long-term military and environmental sustainability*”.

3.0 Location and Description

JEB Little Creek is located in the northeast corner of Virginia Beach at the mouth of the Chesapeake Bay in the Tidewater area of Virginia. It encompasses approximately 2,380 acres, which include a 470-acre harbor and over two miles of shoreline along the bay. The base is bounded by the Chesapeake Bay to the north, Shore Drive to the south, Lake Bradford and Chubb Lake to the east, and the city limits of Virginia Beach to the west. The surrounding land area is densely developed with residential, commercial, industrial developments, and recreational facilities. Several other military installations including Fort Story, Camp Pendleton Annex, Fleet Combat Training Center Atlantic (FCTCLANT) Dam Neck, and Naval Air Station (NAS) Oceana are also located in Virginia Beach in close proximity to JEB Little Creek.

JEB Little Creek is ecologically significant to the region as it supports one of the few remaining tracts of undeveloped coastal dunes in the area. The base has 2.3 miles of coastal primary and secondary sand dunes, which support rare maritime forest plant communities and specimens of rare Virginia plants. Large numbers of shorebirds and waterfowl also depend on these habitats for survival.

JEB Little Creek is located in the lowland subprovince of Virginia's Coastal Plain. JEB Little Creek lies in the Chesapeake Bay watershed with Little Creek Harbor as its main input to this watershed. Other prominent waterbodies are Lake Bradford and Lake Chubb.

4.0 Regulation, Policy and Guidance

Raptors are protected by a number of federal and state regulations plus Navy policy and guidelines.

4.1 Federal Regulations

The federal government provides legal protection to all raptors through the Migratory Bird Treaty Act (MBTA). Though no threatened or endangered raptors are located at JEB Little Creek, the Endangered Species Act (ESA) could offer raptors legal protection should a species become listed in the future. Additionally, the federal government provides legal protection to eagles through the Bald and Golden Eagle Protection Act (BGEPA).

Endangered Species Act

- **Section 7a** – Requires federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species. Federal agencies are required to consult with the United States Fish and Wildlife Service (USFWS) if an action “may affect” a listed species.
- **Section 9** – Makes it illegal for any entity to take a federally listed species. Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in such conduct.

None of the species discussed in this document are currently listed under the Endangered Species Act (ESA). The bald eagle and peregrine falcon were listed but have since been delisted and are no longer protected by ESA.

Bald and Golden Eagle Protection Act

The BGEPA prohibits the take of bald or golden eagles including their parts, nests, or eggs. Take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. Disturb includes activities which interfere with or interrupt normal breeding, feeding, or sheltering habits, causing injury, death, or nest abandonment. This includes impacts resulting from human alterations initiated around a previously used nest site when eagles are not present, if, upon their return, the alterations interfere with or interrupt normal breeding, feeding, or sheltering habits, and causes, injury, death, or nest abandonment (VGIF 2010).

This Act only applicable to the protection of bald eagles at JEB Little Creek since no golden eagles (*Aquila chrysaetos*) are currently known to breed in the eastern United States though they maybe a casual or winter transient periodically through the coastal plain. A few golden eagles have (7) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011(HMANA 2011).

The USFWS may issue a permit for the "take" of bald eagles under the BGEPA. The BGEPA authorizes the Secretary to permit take of eagles "*necessary for the protection of... other interests in any particular locality.*" This statutory language maybe applicable to JEB Little Creek activities that include, but are not limited to, proposed or ongoing military training and testing activities, energy development projects (including associated infrastructure development), and recreational activities that might "take" eagles as defined under the Eagle Act. However, in all cases, the take must be *necessary* to protect the interest, meaning that the interest cannot be protected without taking eagles despite implementation of all practicable measures to avoid and minimize the impact to eagles. Two types of permits are issued. The "Individual Permit" authorize limited, isolated instances of disturbance and in certain situations other take, but are not intended to authorize landscape-scale mortalities and injuries. And the "Programmatic Permit" designed to authorize take that is recurring and not in a specific timeframe and/or location. With adequate population data, projections for take, and enhanced mitigation, programmatic permits may authorize take over a longer period of time or across a larger area by a given industry, agency, or company. The permitting process should be started by contacting the local Ecological Services Office which for JEB Little Creek is located in Gloucester, Virginia.

- **Migratory Bird Treaty Act**

The Migratory Bird Treaty Act "*establishment of a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or*

carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird" . The list of birds covered under this law is expansive and includes all species discussed in this document.

4.2 State Regulations

At the state level, peregrine falcons (state threatened) and bald eagles (state threatened) are protected under Virginia's Endangered Species Act (COV 2006). Virginia's Bald Eagle Protection Guidelines (VGIF 2000), also helps to protect bald eagle nesting, roosting, loafing and feeding habitat by recommending a variety of protective management procedures and practices that are designed to benefit the bald eagle and its habitat within Virginia. Additionally, all raptors are protected by Code of Virginia (§29.1-521) and Virginia Department of Game and Inland Fisheries (VDGIF) regulations (4 VAC-15-30-10).

- **Virginia's Endangered Species Act**

Provides legal protection for state listed threatened and endangered species. Prohibits taking, transportation, processing, sale or offer of sale of those species. Implementing regulations passed pursuant to this authority (4 VAC 15-20-130 through 140) further defines "take" and other terms similarly to the federal ESA (COV 2006).

- **Virginia's Bald Eagle Protection Guidelines**

Developed and designed to protect bald eagles and their habitat by indicating protective zones around nests, roosts and shoreline use areas in which provisions of certain laws and their implementing regulations may apply (VGIF 2000).

4.3 Navy Policy and Guidance

Department of Defense Instruction 4715.03 (DODI 2011)

- 7.m – *"Implement migratory bird protection and conservation in accordance with all applicable laws and regulations"*.
- 7.m.(2).b- *"The Department of Defense shall protect the bald eagle under the Bald and Golden Eagle Protection Act and the MBTA in accordance with sections 668-668d of Reference (k) and parts 13 and 22 of Reference (n), regardless of Federal listing status"*.
- Enclosure 3: 3.b. (1) – *"Maintain or restore remaining native ecosystem types across their natural range of variation"*.
- Enclosure 3: 3.b. (2) – *"Maintain or reestablish viable populations of native species on an installation's areas of natural habitat, when practical"*.

- Enclosure 3: 3.d – *“The Department of Defense shall, to the best of its ability, implement conservation and management efforts to further the conservation of federally-listed species, as well as State-listed species when such action is practicable and does not conflict with military mission or capabilities”*.
- Enclosure 3: 3.f – *“The Department of Defense shall restore or rehabilitate altered or degraded landscapes and associated habitats”*.

Navy Environmental and Natural Resources Program Manual 5090.1C (Navy 2007)

- 24-6a – *“It is Navy policy to comply with applicable laws for the protection and management of wildlife resources, and to develop, where compatible with the mission, programs for the development, enhancement, and use of wildlife resources”*.
- 24-6h – *“Navy installations shall coordinate with the USFWS to minimize the effects of actions that may harm or kill migratory birds listed in reference (m), their young, or eggs. Contractors must have the appropriate permits when performing work for the Navy”*.
- 24-6j – *“Congress directs all Federal agencies to use their statutory and administrative authority, to the maximum extent practicable and consistent with each agent responsibilities, to conserve and to promote conservation of non-game fish and wildlife and their habitats”*.

Memorandum of Understanding (MOU) Between the U.S. Department of Defense and the U.S. Fish and Wildlife Service To Promote the Conservation of Migratory Birds (DODUSFWS 2006)

- D.b – *“Strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent or minimize the loss or degradation of habitats on DoD-managed lands”*.
- D.b.(1) – *“Identifying and avoiding management actions that have the potential to adversely affect migratory bird populations, including breeding, migration, or wintering habitats; and by developing and implementing, as appropriate, conservation measures that would avoid or minimize the take of migratory birds or enhance the quality of the habitat used by migratory birds”*.

Business Management System (BMS) 7.6 Fish and Wildlife Management (DON 2008)

- 7.6.4 – *“Maintain or enhance the quality and integrity of habitats used by game and non-game species”*.

5.0 Limiting Factors

The primary limiting factors for raptor populations in the southeastern Virginia and JEB Little Creek is habitat availability. The degradation and disturbance of a variety of habitat types has reduced the availability of the natural habitats used by raptors for nesting, foraging, and roosting. Other limiting factors at JEB Little Creek include amount of suitable habitat and disturbance from installation activities, including: construction, military training, testing, and operations.

These statements from Navy guidelines and policies show the importance of natural resource management and effective stewardship of those resources on navy lands.

6.0 SPECIES INFORMATION

6.1 Bald Eagle (*Haliaeetus leucocephalus*)

6.1.1 Species Description

Adult bald eagles are large dark brown raptors with pure white heads and tails. The eyes, feet, and bill of an adult are yellow. Adults have wingspans of 5.5 to 8 feet and weigh 8 to 14 pounds. Females are usually larger than males. For the first four to five years of life, juvenile and sub-adult bald eagles are dark brown to blackish and lack the white head and tail, but may have white mottling on the tail, belly, and underwings (USFWS 1999). Over the same time period the eyes, feet, and bill gradually change from black to yellow.

6.1.2 Ecology

Eagles typically congregate at winter roosts from November to January, but can be present from September to April (USFWS 2007, VGIF 2010). In the Chesapeake Bay region nest building occurs from November to January (VGIF 2010). Clutches of one to three eggs may appear as early as January, but are usually produced from February 13 to March 19. Eggs hatch after 34 to 38 days generally April in the Chesapeake Bay region. Young are brooded by both adults for six weeks after hatching and fledge nine to 14 weeks after hatching (mid-June in the Chesapeake Bay region) (Guilfoyle et al. 2000, VGIF 2010).

Bald eagles are opportunistic feeders that will prey on fish, waterfowl, shorebirds, mammals, turtles, and carrion. Dead trees are used more often than live trees for foraging perches (Guilfoyle et al. 2000). Perch selection is primarily based on availability of an abundant food source, and shoreline trees or snags provide the visibility and accessibility needed to locate aquatic prey (USFWS 2007). Perch sites are important in both nesting territories and foraging areas and may be used to hunt from, consume food, display, or act as sentry posts to advertise and defend the nesting territory. Bald eagles use communal roost sites at night for resting, and do not need to be near water and foraging sites. Use of summer roosts is heaviest from June to August, but can occur from April to October (Wallin 1984).

6.1.3 Habitat Requirements

Bald eagles preferred habitats are coasts, lakes, and rivers. Nearly 100 percent of successful nests in the U.S. are located within two miles of open water, with most within a half-mile (Guilfoyle et al. 2000). In addition to their proximity to open water, preferred nesting areas consist of open-canopied, mature, old-growth stands in largely undeveloped or lightly developed areas (Watts 1999, Guilfoyle et al. 2000); with most nests located approximately 100 yards from breaks in the forest, such as field edges, timber cuts, or roads (Cline 1990, Guilfoyle et al. 2000).

Bald eagles nest almost exclusively in live trees that are typically larger and taller than the surrounding trees, as these sites provide good visibility and a clear flight path to the nest (USFWS 1999, VGIF 2010). Most nest sites are found in the midst of large wooded areas adjacent to marshes or bodies of water, or in isolated trees located in marshes, on farmland, or in logged over areas where scattered seed trees remain (VGIF 2010). Loblolly pine (*Pinus taeda*) is most frequently used by eagles for nesting, but nests may also be constructed in Virginia pine (*Pinus virginiana*), oaks (*Quercus* spp.), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and hickory (*Carya* spp.; VGIF 2010).

Table 1. Relative Sensitivity of Breeding Bald Eagles to Human Disturbance

Phase	Activity	Sensitivity	Comments
I	Courtship/nest building (November – early February)	Most sensitive	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying (mid-February – mid-March)	Very sensitive	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling (up to 4 weeks, through end of April)	Very sensitive	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period (4 to 8 weeks, through the end of June)	Moderately sensitive	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestling period (8 weeks through fledging, through the end of July)	Very sensitive	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

(USFWS 2007)

Roost trees are usually the tallest, dominant tree in the forest and are located in areas protected by vegetative cover and topography, which provide shelter from wind and weather (USFWS 1999, USFWS 2007). Roost trees are generally large with open branching and strong horizontal limbs (Guilfoyle et al. 2000). In the Chesapeake Bay region, eagles only use deciduous trees, most often American beech, oaks, and tulip poplar, for roosting (USFWS 1990).

Environmental associations in Virginia include vegetated offshore islands; backwaters; inland open fresh/saline waters; coastal shallow/deep fresh marshes; coastal open fresh water; coastal salt flats; sounds/bays; mangrove swamps; woodland/crop fields ecotones; woodland/old field ecotones; woodland/water ecotones; and climax forest (VGIF 2010).

6.1.4 Status at Installation

Southeastern Virginia has a significant population of bald eagles. The bald eagle has been observed at JEB Little Creek (INRMP 2010) but is not a known breeder on the base. The 1999 Christmas Bird Count (CBC) included one observation of a bald eagle during this winter survey (JEBLC 2008). Virginia Fish and Wildlife Information Service (VFWIS) has the species as a known occurrence in the City of Virginia Beach and likely in the City of Norfolk. Though no nests are currently located at JEB Little Creek, bald eagles do have active or recently active nest in three locations in Norfolk and 15 in Virginia Beach according to the Center for Conservation Biology nesting data for 2011 (CCB 2011).

Areas of woodlands such as the mixed hardwood, mixed pine-hardwood forest, maritime evergreen forest and pine forest especially areas near open fresh, brackish and salt water habitats located primarily in the western, central and south-central sections of the base as the most likely location for this species (INRMP 2010). There is currently 670 acres of surface water at JEB Little Creek (INRMP 2010). With an increasing population of bald eagles in the region and suitable habitat such as the woodlands near and adjoining Lake Bradford located on the base, JEB Little Creek may have nesting or overwintering bald eagles in the future.

Additionally, bald eagles likely utilize the base during winter movements from September through November with the peak time lasting from mid-September through October. Modest numbers of this species (301) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these bald eagles may overwinter at or near JEB Little Creek while the majority transient through during their migratory movements.

6.2 Osprey (*Pandion haliaeetus*)

6.2.1 Species Description

The osprey is found throughout the world and is the only species in the family Pandionidae. The head has a white crest, the eyes are yellow and the face is divided by a dark eye-stripe.

Generally, the breast and belly are primarily white but may contain some dark streaking. The white extends to the wings with primaries, secondaries, and tail feathers mottled black and white. The back is blackish or dark brown. The osprey's feet are a pale gray in color and adapted to life of catching and carrying fish. In flight, osprey's can be confused with gulls because of their long, bent wings though they can be discerned by the slow wing-beats interspersed with glides. Juvenile osprey's are similar to adults but have white scaling on the back, less streaking on chest and orange eyes.

6.2.2 Ecology

Ospreys migrate with most wintering south of the United States border. Prior to mating, Ospreys form pair bonds through aerial flight displays and courtship feeding. Ospreys build large nests near or above water using dead trees, artificial structures and manmade nesting platforms. Nests maybe used year after year and a typically made of branches and twigs with a lining of small twigs, grass, bark, moss, bones, and other material. Nests are very large and may measure seven feet across and five feet deep. Two to four eggs are typical with both male and female sharing the incubation for 38-43 days. Young fledge from 44-59 days.

The Osprey is morphologically suited with specialize talons for eating fish and therefore fish is the primary food but when necessary small mammals, birds, and reptiles may be eaten. An Osprey will hover over the water when fishing before diving feet first to capture its prey. Once fish is captured, the Osprey typically turns the fish to be held headfirst to reduce drag when flying.

6.2.3 Habitat Requirements

Osprey rely on water for food thus live near rivers, estuaries, salt marshes, lakes, reservoirs, and other large bodies of water. This water can be fresh, salt or brackish. Osprey nest sites in Tidewater region are found in the following trees: Virginia pine (*Pinus virginiana*), loblolly pine (*Pinus taeda*), baldcypress (*Taxodium distichum*), eastern redcedar (*Juniperus virginiana*), live oak (*Quercus virginiana*), *Quercus* sp., yellow poplar (*Liriodendron tulipifera*) and American sycamore (*Platanus occidentalis*) (VGIF 2010).

Osprey nest in large trees at the edge of the forest near water or use natural or man-made structures (dead snags, channel markers, duck blinds, artificial nest platforms) over water. Eighty percent of the nests in the Tidewater region occur over water (VGIF 2010). Environmental associations in Virginia include cliffs/ledges; talus slopes; vegetated offshore islands; seasonally flooded lands with emergent vegetation; inland open freshwater; wooded swamps; coastal open freshwater; sounds/bays; and woodland/water ecotones (VGIF 2010).

6.2.4 Status at Installation

Southeastern Virginia has a significant population of osprey and this includes JEB Little Creek. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). JEB Little Creek has confirmed breeding ospreys at the base. Ospreys have been recorded at JEB Little Creek during CBCs during the years of 1999, 2003 and 2004 (JEBLC 2008). Therefore, it appears that the osprey is a year-long resident though it is possible that the winter population is different individuals than the spring/summer population. JEB Little Creek has an active monitoring and management program for ospreys that includes the installation of artificial nesting platforms. According to the 2010 INRMP update, three nesting platforms were erected in 1993 and three more in 1995. Breeding has been confirmed on base (INRMP 2010).

Areas of open fresh, brackish and salt water and the areas around any nests are the most likely location for this species. There is currently 670 acres of surface water at JEB Little Creek (INRMP 2010).

Additionally, ospreys likely utilize the base during fall migration from September through November with the peak time lasting from September through mid-October. High numbers of this species (2016) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these ospreys likely overwinter at or near JEB Little Creek while the majority transient through during their migratory movements.

6.3 Red-tailed Hawk (*Buteo jamaicensis*)

6.3.1 Species Description

Red-tailed hawks are the most abundant and widespread raptor in the United States. Red-tailed hawks are polymorphic in plumages (i.e. several variations). The following description is of the most "typical" eastern plumage.

Red-tailed hawks are large raptors with broad, rounded wings and a short, wide tail. Most red-tailed hawks have tawny brown head and upper back with a pale streaked belly. The underside of the wing has a dark bar between the shoulder and wrist. The underside of the tail is pale and reddish above. Young birds lack the reddish coloration instead having a tail that is brown and banded.

6.3.2 Ecology

Red-tailed hawks prey on primarily mammals especially rodents. This may include voles, mice, rats, rabbits, snowshoe hares, jackrabbits, and ground squirrels to name a few. Other prey has included pheasants, bobwhite quail, starlings, blackbirds, snakes and carrion. Red-tailed hawks

are aggressive protectors of their territories and frequently defend it against other birds such as other hawks, eagles, and great horned owls (*Bubo virginianus*),

Red-tailed hawks reach sexual maturity in two years. Pairs are monogamous and stay together for life. Breeding season is typically from late winter to early spring with courtship, breeding and nest building occurring during this period. The male and the female build the nest, or simply augment a previously used nest. Nests consist of sticks lined with bark strips, fresh foliage, and dry vegetation. Nests can be up to 6 feet high and 3 feet across. Nests are generally located in the crown of tall tree but have used cliff ledges and artificial structures when available. Egg laying typically occurs from March or April with one to three eggs being the standard clutch size. Female are the primary egg sitter while males provides prey. Eggs hatch after an incubation of period of 28 to 32 days and fledging occurs after approximately 45 more days. Fledging last around ten weeks but young birds can stay with their parents for up to seven months.

6.3.3 Habitat Requirements

Red-tailed hawks are raptors of open areas, woodland edge habitats and areas of patchy tall timber stands. Favorite habitats include old fields, grasslands, agricultural fields, open bogs, swampy woods, cleared lands, pastures and the edge of woodlands. Winter night-time roost may include thick conifer stands. Red-tailed hawks are often observed perched in the open on snags, tree limbs, utility poles and other exposed spots or along edges of fields. Additionally, red-tailed hawks are often seen soaring in wide circles high over habitats.

Environmental associations in Virginia include cliffs/ledges; talus slopes; rock outcrops; bare ground; snags; wooded swamps, woodland crop fields ecotones; woodland/old filed ecotones; woodland grassland ecotones; abandoned fields, stable forests, sub-climax forest; climax forest; stable prairie/grassland; sub-climax grassland; and climax grassland (VGIF 2010) .

6.3.4 Status at Installation

The red-tailed hawk is an abundant year-round resident of the coastal plain. Red-tailed hawks have been observed at JEB Little Creek during 1999, 2003, 2004, 2007 and 2008 CBC surveys (JEBLC 2008). The species is considered common during the winter months in the coastal plain (VGIF 2010). The red-tailed hawk breeds state-wide but is considered rare to uncommon in the coastal plain during the breeding period of spring and summer. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010).

The red-tailed hawk is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability of suitable habitat at the base. Areas of woodlands with available edge habitat of open areas such as the mixed mesic hardwood forest (INRMP 2010) near the golf course might be suitable habitat for a breeding pair.

Additionally, red-tail hawks likely utilize the base during fall migration from September through November with the peak time lasting from mid-October to mid-November (HMANA 2011). Low numbers of this species (390) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011(Hawkcount.org 2011 Kiptopeke count). Some of these hawks likely overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.4 Red-shouldered Hawk (*Buteo lineatus*)

6.4.1 Species Description

The red-shouldered hawk is a medium-sized hawk with long legs and tail. The eastern race has a medium brown head with streaking on neck and crown. Breast is cinnamon with reddish shoulders and white speckling on dark wings. Tail has three to four white bands between wider dark bands. In flight, the wings have a pale crescent near the tips. Juvenile are brown with an underside streaked brown and white. The tail has dark and light brown bands and wing crescents are tawny.

6.4.2 Ecology

The diet of the red-shouldered hawk consists of primarily small mammals, birds, reptiles (primarily snakes), amphibians, and crayfish. Typically hunts by dropping on prey from an elevated perch. Red-shouldered hawks may hunt from ground to catch mammals in burrows, hopping after them when they come out.

Nests are placed in main crotch of tree, often near water. Nest consist of a large bowl of sticks, dried leaves, strips of bark, mosses, lichens, and live conifer twigs. Red-shouldered hawks typically lay three to four eggs with the incubation period ranging from 28 to 33 days. Hatchlings are brooded for up to 40 days, fledging at about six weeks of age, but remain dependent on the parents until they are 17 to 19 weeks old.

6.4.3 Habitat Requirements

Forests with open understory, especially bottomland hardwoods, riparian areas, and flooded swamps. Red-shouldered hawks will also use parks, wooded neighborhoods and old fields on occasion. In Maryland, it prefers low wetland habitat for nesting hawks in western Maryland nested consistently near water and in large trees in mature stands (VGIF 2010).

Environmental associations in Virginia include seasonally flooded lands with emergent vegetation; inland shallow/deep fresh marshes; shrub swamps; wooded swamps; bogs; coastal shallow/deep fresh marsh; mangrove swamps; continuous forested stand (640-5000 acres); aquatic/terrestrial ecotones; hardwood forest (birch, sycamore, white oak, ash, poplar, red oak or tulip); climax forest; or vegetation-choked ponds (VGIF 2010).

6.4.4 Status at Installation

The red-shouldered hawk is an abundant year-round resident of the coastal plain and probably JEB Little Creek. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). This species has been observed at JEB Little Creek during 1998 and 1999 CBC surveys (JEBLC 2008). Though not confirmed, the red-shouldered hawk is a likely breeder at JEB Little Creek due to the availability of suitable habitats.

Areas of woodlands throughout the base such as the mixed hardwood and mixed pine-hardwood forest (INRMP 2010) located primarily in the western and south-central sections of the base as the most likely location for this species.

6.5 Northern Harrier (*Circus cyaneus*)

6.5.1 Species Description

The Northern harrier is a medium-sized, slim-bodied raptor with long wings, tails and legs. Males are 16 to 18 inches and females are generally larger at 18 to 20 inches in length. Adult males and females have different plumages or have dimorphic coloration. Both generally have a white patch on the upper tail coverts that is generally an excellent field indicator of the species. Both have an owl-like facial disc. Though there are many plumage variations, the typical male is gray on the head, neck and upper chest. Back and upper wings are sooty gray. Underside of wings and tail are generally whitish. The typical female Northern harrier is brown on the head, back and upper wings. The neck, under wings and chest are streaked with a tawny brown on a creamy background. For both male and females, eyes are yellow and the legs are an orange-yellow. The typical flight habit of the Northern harrier is an additional field indicator of the species and can be described as a low, cruising flight just above the vegetation with periodic flight pull-ups followed by return to the low cruise.

6.5.2 Ecology

As mentioned above, the Northern harrier hunts by flying or coursing close to the ground searching for prey. Prey consists of a variety of animals and includes voles, mice, rats, rabbits and other small mammals, birds, snakes, frogs and other small animals.

Breeding season for Northern harriers is generally from March to July. It begins with a fascinating aerial dance by males in order to attract females. This “skydance” may include somersaults, dives, loops and tumbles. Once paired with a female, a nest is constructed on the ground, among low vegetation such as bushes and grasses. The nest is constructed grasses, weeds, water plants, twigs and other vegetative materials. Two to nine eggs are laid and incubation takes approximately 30 days with fledging taking another 30 to 35 days.

6.5.3 Habitat Requirements

Northern harriers preferred habitats include wet meadows, prairies, grasslands, old fields, fresh, brackish and saltwater marshes. Environmental associations in Virginia include inland shallow and deep freshwater marshes; inland saline marshes; coastal shallow and deep freshwater marshes; coastal salt meadows; regularly flooded salt marshes; old field/water ecotones; crop field/water ecotones; crop field/grassland ecotones; grassland/old field ecotones; grassland/water ecotones; pastures; grasslands; old fields; meadows; abandoned fields; stable prairie/grassland; subclimax grassland and climax grassland (VGIF 2010).

6.5.4 Status at Installation

The Northern harrier is not a common raptor on the coastal plain of Virginia during the summer months with only five to 10 pairs breeding annually. These raptors are a more common winter resident and transient. Virginia WIS has the species as a likely occurrence in the City of Virginia Beach and in the City of Norfolk. This species was observed at JEB Little Creek during the 1998 and 2007 CBC surveys (JEBLC 2008). Status on the coastal plain for this species includes breeding individuals which are likely year-round residents, migrants or winter residents. Any of these statuses are possible at JEB Little Creek.

The Northern harrier is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability and size of suitable habitat at the base. Habitats at JEB Little Creek most suitable for Northern harrier usage include the interdunal wetlands, maritime dune grassland, dune woodland, maritime scrub, overwash flats and tidal marsh located in the northern and south central side of the base (INRMP 2010).

Additionally, these raptors likely utilize the base during fall migration from September through November with the peak time lasting from late September through October. Significant numbers of this species (534) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these hawks likely overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.6 Cooper's Hawk (*Accipiter cooperii*)

6.6.1 Species Description

The Cooper's hawk is a medium-sized hawk with broad, rounded wings and a very long tail. Males are 14 to 16 inches and females are generally larger at 16 to 19 inches in length. The head often appears large, the shoulders broad, and the tail rounded. Typical adults are blue-gray on the back with reddish bars on the chest and thick dark bands on the tail. Juveniles are brown above and crisply streaked with brown on the upper chest. Cooper's Hawks fly with a flap-flap-glide pattern even when crossing large open areas.

6.6.2 Ecology

Cooper's Hawks prey primarily on birds with medium-sized birds more commonly taken than smaller species. Common prey species include European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), rock pigeon (*Columba livia*), American robin (*Turdus migratorius*), and northern flicker (*Colaptes auratus*). Cooper's Hawks also prey on nests, chipmunks, hares, mice, squirrels, and bats. Pursuit flight is powerful, quick, and very agile, allowing the bird to thread its way through tree branches at top speed. One specialized hunting strategy is to fly fast and low to the ground, then up and over an obstruction to surprise prey on the other side.

Breeding season for Cooper's hawks is typically from March to July. Courting hawks display by flying with slow wingbeats, then gliding with wings held in a V. Male Cooper's hawks make a bowing display to females after pairing and before beginning to build the nest. Cooper's hawks build nests in pines, oaks, Douglas-firs, beeches, spruces, and other tree species. Nests are most often located on flat ground and in dense woods about 25-50 feet high in a crotch or on a horizontal branch. Male Cooper's hawks typically are the primary nest builder with the process taking about two weeks. Nests consist of sticks roughly two feet wide and 6-17 inches high with a cup-shaped depression in the middle. The cup is generally lined with bark flakes and green twigs. Two to six eggs are laid with hatching occurring after 30 to 35 days. Fledging takes an additional 27 to 34 days.

6.6.3 Habitat Requirements

Cooper's hawks are forest and woodland birds, but also use parks, wooded neighborhoods and old fields. They nest in a wide variety of forest types including riparian woodlands and forage in areas mixed with forests and openings.

Environmental associations in Virginia include woodland/crop field ecotones; woodland/old field ecotones; woodland/water ecotones; woodland/grassland ecotones; vegetated rows such as fence and roadside ditches; climax forest; or stable forest (VGIF 2010).

6.6.4 Status at Installation

The Cooper's hawk is not a common bird throughout its range and this includes the coastal plain of Virginia. Virginia WIS has the species as a known occurrence in the City of Virginia Beach and likely in the City of Norfolk (VGIF 2010). This species was observed at JEB Little Creek during the 1999 CBC surveys (JEBLC 2008). Status on the coastal plain for this species includes breeding individuals which are likely year-round residents, migrants or winter residents. Any of these statuses are possible at JEB Little Creek.

The Cooper's hawk is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability of suitable habitat at the base. Areas of woodlands with available edge habitat of open areas such as the mixed hardwood and mixed pine-hardwood forest (INRMP 2010)

located primarily in the western and south-central sections of the base as the most likely location for this species.

Additionally, Cooper's hawks likely utilize the base during fall migration from September through November with the peak time lasting from mid-October through November. High numbers of this species (2055) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these hawks likely overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.7 Sharp-shinned Hawk (*Accipiter striatus*)

6.7.1 Species Description

A small hawk species with distinct size differences between sexes. Males are 9.5 to 12 inches and females are generally larger at 11.5 to 14.5 inches in length. Adults have short broad wings and a black and gray banded, long square-ended tail often with a narrow white tip. Head is capped and the upperparts are blue-grey. The back may have a few white spots and the chest is white with reddish bars. Legs are reddish and often barred white. Legs are yellow and the bill is hooked with black and yellow. Juveniles have dark brown upperparts with each feather having a reddish edge lending to a scaly appearance. The brown head has white streaks and the white chest is streaked brown.

6.7.2 Ecology

The sharp-shinned hawk's primary prey is small birds. Due to the dimorphic size differences, males tend to take smaller birds such as sparrows, finches and wrens while and females will pursue larger species such as thrushes, robins and flickers. Sharp-shinned hawks often capture their prey at backyard bird feeders. If needed, sharp-shinned hawks will also eat rodents, lizards, frogs, snakes, and large insects. Hunting technique is to surprise and capture prey from cover or while flying through vegetation.

Sharp-shinned hawks breeding and nesting occurs in the spring and early summer. The hawks will construct a stick nest in a large coniferous or dense group of deciduous trees with usually 4 to 5 eggs laid. Hatching occurs in approximately 30 days. The hatchlings fledge at about a month old and continue to rely on their parents for an additional four weeks.

6.7.3 Habitat Requirements

Sharp-shinned hawks occur in a wide variety of habitats that include a variety of deciduous and coniferous woodland and forest types but seldom seen in heavily wooded areas. They prefer open woodlands, woodland edges, clearings, hedgerows, bushy pastures and shorelines where

abundant prey (small birds) is found. Hawks typically select mature forests and stream habitats for nesting preferring conifers with nest built at edge of clearing or opening in woods.

Environmental associations in Virginia include coniferous forest Norway spruce dominate; hardwood forest aspen dominate; hardwood forest willow dominate; vegetated rows such as fence and roadside ditches; stable prairie/grassland; sub-climax grassland or sub-climax forest (VGIF 2010).

6.7.4 Status at Installation

The sharp-shinned hawk is a fairly common raptor throughout its range and this includes the coastal plain of Virginia. Virginia WIS has the species as a known occurrence in the City of Virginia Beach and likely in the City of Norfolk (VGIF 2010). This species was observed at JEB Little Creek during the 1998, 1999, 2003, 2004, 2007 and 2008 CBC surveys (JEBLC 2008). Status on the coastal plain for the sharp-shinned hawk includes breeding individuals which are likely year-round residents, migrants or winter residents. All of these statuses are probable at JEB Little Creek.

The sharp-shinned hawk is a probable breeding bird at JEB Little Creek due to the availability of suitable habitat at the base and this species relative acceptance of human disturbance. Areas of woodlands with available edge habitat of open areas such as the mixed hardwood and mixed pine-hardwood forest (INRMP 2010) located primarily in the western and south-central sections of the base especially sections near riparian areas and human residences that have active bird feeders may be ideal for this species.

The sharp-shinned hawk appears to utilize the base during fall migration from September through November with the peak time lasting from mid-September through mid-November. Very high numbers of this species (9842) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). As seen in the CBC data, some of these hawks likely overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.8 Peregrine Falcon (*Falco peregrinus*)

6.8.1 Species Description

Male and female peregrine falcons have similar markings and plumage but females are significantly larger than the males. Males are about half the body weight of females with females weighing from 2 to 3.3 pounds. The peregrine falcon has a body length of 13–23 inches.

The most distinguishing marking of the peregrine falcon is the black mask or helmet that contrasts with the pale neck and throat. The back and wings are typically bluish black to slate

gray and the wing tips are black. The underparts are white to rusty and thin-barred dark brown or black. The tail is long, narrow and barred with a rounded black and white tip. The legs and feet are yellow and the beak is yellow and black. Juvenile birds are browner on the back and wings and streaked brown on the underparts.

6.8.2 Ecology

The peregrine falcon feeds mainly on medium-sized birds such as pigeons and doves, waterfowl, songbirds, and waders. Other prey at times may include small mammals such as bats, rats, mice, rabbits and squirrels. In urban areas, the main component of the falcon's diet is the rock pigeon (*Columbia livia*). The peregrine falcon typically hunts at dawn and dusk and requires an open area in order to hunt. Habitat suitable for foraging includes open water, marshes, valleys, fields and cityscapes using a high perch or flight to locate a prey item. Prey is captured by an aerial dive that may exceed 200 miles per hour, striking the prey in mid-air. The stunned or dead prey is then captured in the air then consumed on the ground or at a perch.

The peregrine falcon reaches breeding age at two or three years. Falcon's mate for life and return to the same nesting spot year after year. The Peregrine Falcon nests in a scrape, normally on cliff edges or high man-made structures such as bridges, buildings, towers and artificial nesting towers or boxes. The 23 identified nesting pairs in Virginia in 2010 nest locations included the following sites: nine artificial nesting towers, seven bridges, one reserve ship, one power plant stack, two fishing shacks, two cliff sites and one high-rise building (CCB 2010). The female chooses a nest site generally located under an overhang, on a vegetated ledge and south facing. If a natural site is chosen, then a shallow hollow is scraped out in the soil, gravel or dead vegetation. No additional material is added. Man-made nest boxes are often accepted. Nest and foraging territory is defended vigorously against other peregrines and other potential egg and nestling predators. Breeding season for peregrine falcons begins in February or March and may last until June with clutch size ranging from one to five eggs. Hatching occurs after approximately 30 days and fledging taking an additional 45 days. Juveniles may rely on adults for an additional two months post fledging. Re-nesting may occur if initial clutch fails.

6.8.3 Habitat Requirements

The peregrine falcon is found in terrestrial inland, aquatic and coastal areas. This species uses many man-made structures or unique natural habitats such as bridges, underpasses, utility poles, buildings, fences, hedgerows, farm ponds, snags, rocky outcrops, cliffs, ledges and islands. Migrant and wintering falcons are well known for frequenting coastal estuaries and intertidal mudflats where they prey heavily on shorebirds and waterfowl (VGIF 2010).

Environmental associations in Virginia include cliffs or ledges; rocky outcrops; ridges; snags; rocky offshore islands; vegetated offshore islands; coastal shallow and deep water marshes; coastal salt flats; or coastal salt meadows (VGIF 2010).

6.8.4 Status at Installation

The peregrine falcon is not a common bird throughout its range and this includes the eastern coastline of Virginia but its numbers have been increasing. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). Peregrine falcons are presently nesting on artificial platforms on Virginia barrier islands (VGIF 2010). This species was observed at JEB Little Creek during the 2004 CBC surveys (JEBLC 2008) and most recently a pair was observed on the western water tower in February 2010 (CBC 2010). Status on the coastal plain for this species includes breeding falcons which are likely year-round residents, migrants or winter residents. Any of these statuses are possible at JEB Little Creek.

The peregrine falcon is not a known breeder at JEB Little Creek due to the limited availability of suitable nesting locations at the base. Habitats at JEB Little Creek most suitable for peregrine falcon usage include the interdunal wetlands, maritime dune grassland, maritime dune woodland, maritime swamp forest, maritime scrub and overwash flats located in the northern side of the base along the coastline (INRMP 2010).

Additionally, peregrine falcons likely utilize the base during fall migration from September through November with the peak time lasting from mid-September through mid-October. Modest numbers of this species (771) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these hawks may overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.9 Merlin (*Falco columbarius*)

6.9.1 Species Description

Size differences between males and females are apparent in merlins with the average male weighing 5.8 ounces and the average female at 8.1 ounces. The length of merlins varies from 9.4 to 13 inches long with the females typically longer. Merlin's compared to other small falcons like the American kestrel are more robust and heavily built. These are small birds with their size comparable to an American robin (*Turdus migratorius*) and mourning dove (*Zenaida macroura*).

Merlin's exhibit sexual dimorphism not only in size but also appearance, male have a bluish grey back with underparts that are buff to slightly orange and streaked with black to reddish brown. The female and juveniles upperparts are brown to grey to dark brown and white to buff with brown spots underneath. The face of Merlins is less strongly patterned than other falcons with a white eyebrow (supercilium) and the faint dark face mask. The tail usually has some 3 to 4 wide black bands that vary from bold to faint with all having a black tip and ending in a narrow white band. The feet are yellow, eyes dark and the beak is black and yellow.

6.9.2 Ecology

6.9.3 Habitat Requirements

Merlin's are generally a species of open country. They can be found at the edge of forests and old fields or meadows; in open habitat with patches of woods; the edges of major burns; near open rock-barrens; in sparsely treed muskegs; along beaches and sand dunes; in prairies and deserts. In the coastal plain they are most numerous at coastal wetlands such as mudflats, ponds, marshes, and thickets preferring habitats that offer perches for hunting. Environmental associations in Virginia include stable prairie and grassland; sub-climax grassland; climax grassland; rock outcroppings; coastal dunes; and Aspen dominated forest (VGIF 2010).

6.9.4 Status at Installation

The merlin is an uncommon winter bird in coastline of Virginia and is not known to breed in the state. VFWIS has the species as a known occurrence in the City of Virginia Beach but not in Norfolk but this species was observed at JEB Little Creek during the 2003, 2004 and 2008 CBC surveys (VGIF 2010, JEBC 2008). Status on the coastal plain for this species includes only migrants or winter residents. Any of these statuses are possible at JEB Little Creek.

Winter habitats at JEB Little Creek most suitable for merlin usage include the interdunal wetlands, maritime dune grassland, maritime dune woodland, maritime swamp forest, maritime scrub and overwash flats located in the northern side of the base along the coastline (INRMP 2010).

Additionally, merlins likely utilize the base during fall migration from September through November with the peak time lasting from late-September through late-October. High numbers of this species (1416) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011 (HMANA 2011). Some of these merlins may overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.10 American Kestrel (*Falco sparverius*)

6.10.1 Species Description

The American kestrel is the smallest raptor in Virginia and is about the size of the American robin (*Turdus migratorius*). Also sexually dimorphic in plumage and size, the American kestrel has more similarities between sexes than the other sexually dimorphic raptors with some plumage and size overlap. They average seven to eight inches in length with the female typically larger than the male.

Male and female backs are rufous with black barring. Underparts of males are whitish and spotted black while the female is more buff with brown streaking. In both male and females, the head is white with a bluish grey cap. American kestrel have two black cheek markings on each side of the head. Male wings are bluish grey with black spots and white underneath with black barring. Female wings are rufous in color making wing coloration differences the easiest field marking to identify the different sexes in the field. The male and female tails are both rufous on the upperparts but the underside is significantly different with the male have a broad black sub-terminal band, and the female having several narrow dark black bars. First-year birds are similar in plumage to the adults.

6.10.2 Ecology

American kestrel's primary prey includes smaller animals such as grasshoppers, dragonflies, lizards, small birds, mice, and voles. Occasionally, kestrels will take slightly larger prey such as snakes, bats, and squirrels. Kestrels are most often observed perched on trees, power lines, utility poles, fence posts and rails. These perches are used for roosting and to aide in hunting. Additional hunting techniques include aerial hovering in the air, low flight over habitat or chasing prey in the air.

American kestrels reach sexually maturity by their first spring. Pair bonding is generally life-long with using the same nesting site every year. Kestrels nest in cavities but have shown adaptability to a variety of nesting strategies. Natural tree cavities and abandoned woodpecker holes are the preferred location but may use abandoned nests, building eaves, abandoned buildings, artificial nest boxes and cliffs. Four to five eggs are typically are laid with incubation lasting approximately 30 days. Nestlings generally fledge after another month.

6.10.3 Habitat Requirements

American kestrels that breed south of the 35 degrees north latitude are usually year-round residents but migration can also be stimulated by local weather conditions. American kestrels use a variety of habitats such as urban and suburban areas, pastureland, savannas, salt marshes and other open to semi-open regions. Primary habitat necessities are open or partially open country, perch availability and nesting locations.

Environmental associations in Virginia include cliffs and ledges; rocky outcrops; snags; seasonally flooded lands with emergent vegetation; inland freshwater meadows; woodland swamps; tree cavities in live and dead/dying trees; woodland/crop fields ecotones; woodland/old field ecotones; woodland/water ecotones; woodland/grassland ecotones; vegetated rows such as fence and roadside ditches; abandoned fields; stable prairie/grasslands; sub-climax grassland;

climax grassland; residential chimneys/attics; farm out-buildings/abandoned buildings; or parks (VGIF 2010).

6.10.4 Status at Installation

The American kestrel is has variable abundance throughout most its range including the coastal plain of Virginia. American kestrels have been observed at JEB Little Creek during 1998, 1999, 2003, 2004, 2007 and 2008 CBC surveys (JEBLC 2008). The species is considered abundant during the winter months in the coastal plain (VGIF 2010). The American kestrel breeds statewide but is considered uncommon in the coastal plain during the breeding period of spring and summer. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). Status on the coastal plain for this species includes breeding birds which are likely year-round residents, migrants or winter residents. Any of these statuses are possible at JEB Little Creek.

The American kestrel is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability of suitable habitat at the base. Open areas and ecotones are its preferred habitats and JEB Little Creek has little of this habitat type. Areas of suitable but marginal habitat include areas available edge habitat of open areas such as the mixed mesic hardwood forest (INRMP 2010) near the golf course, maritime scrub and maritime dune woodlands bordering the maritime grassland.

American kestrels likely utilize the base during fall migration from September through November with the peak time lasting from early-September to mid-October (HMANA 2011). Large numbers of this species (4093) passed through the Hawkwatch Kiptopeke station located on the tip of Virginia's Eastern Shore in the fall of 2011(HMANA 2011). Some of these hawks likely overwinter at JEB Little Creek while the majority transient through during their migratory movements.

6.11 Turkey Vulture (*Cathartes aura*)

6.11.1 Species Description

The turkey vulture is approximately 26 to 32 inches in height with wingspan of 68 to 72 inches and weighing about 3 to 6 pounds. Males and females are similar in appearance with females generally larger. Back, chest and wing feathers are brownish black. Wing feathers appear to be whitish gray on the underside. The head is mostly bald and reddish with the beak whitish and hooked. Eyes are gray-brown and feet are pink. An immature turkey vulture has a gray head and a black tip beak Voice is limited to hisses and grunts. In flight, the turkey vultures flaps infrequently and soars by holding its wings in a shallow V-shape, periodically rocking from side to side.

6.11.2 Ecology

Turkey vulture feed primarily on fresh carrion of various sizes. They have been known to supplement their diet with some plant matter, insects and other invertebrates. Ine vegetation, pumpkin and other crops, live insects and other invertebrates. Carrion is found generally by smell at distances of up to 12 miles.

The turkey vulture roosts nightly in communal groups that may number in the hundreds but forages alone during the day. These roosts locations include snags and manmade structures such as communication towers and water storage structures.

The breeding season of the turkey vulture is May through June. Nest locations include abandoned buildings, snags, cliffs, caves, rocky ledges, tree hollows, dead trees in swamps, abandoned hawk nests and vegetation thickets. Eggs are generally laid on a bare surface with no nest material added by the adults. Two eggs are typically laid with hatching occurring in 30 to 40 days. Fledging takes 60 to 70 days and family groups remain together until the fall of the hatch year.

6.11.3 Habitat Requirements

This species is a year-long resident in the southern United States but northern populations may migrate as far south as South America. The turkey vulture is abundant in its range and a habitat generalist that uses many habitat types such as open fields, road clearings, pastures, grasslands, wetlands, subtropical forests, shrublands, deserts, and foothills generally preferring more open areas versus dense vegetated areas.

Environmental associations in Virginia include dry caves; cliffs and ledges; rocky outcrops; ridges; snags; woodland swamps; tree cavities in live and dead/dying trees; hardwood forest dominated by sycamore; bare rock or abandoned buildings (VGIF 2010).

6.11.4 Status at Installation

The turkey vulture is a common bird throughout its range and this includes the eastern coastline of Virginia. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). This species was observed at JEB Little Creek during the 1998, 2003, 2007 and 2008 CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little Creek is as a breeding year-round resident.

The turkey vulture is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability of suitable habitat at the base. Most habitats at JEB Little Creek are suitable for turkey vultures usage as long as food is available. Nesting habitat may include areas of woodlands such as the mixed hardwood and mixed pine-hardwood forest (INRMP 2010) located primarily in the western and south-central sections of the base.

6.12 Black Vulture (*Coragyps atratus*)

6.12.1 Species Description

The black vulture is approximately 22 to 27 inches in height with wingspan of 54 to 66 inches and weighing about 3 to 6 pounds. Males and females are similar in appearance with most plumage colored a glossy black. Wing feathers are mainly black with the base of the primary feathers white that is apparent on the underside of the wing-tips during flight. Tail is glossy black, short and squared off. The head is mostly featherless and gray to black with a short, hooked beak. Eyes are brown and legs and feet are gray. In flight, the black vultures flaps more often, holds its wings flatter and lack the characteristic back and forth tipping of the turkey vulture. Vocalizations are uncommon but black vultures sometimes make soft hisses and grunts.

6.12.2 Ecology

The black vulture feeds primarily on carrion but has been known to scavenge garbage dumps, take eggs and to prey on small vulnerable mammals like new born livestock or deer. Carrion is found by visual clues or by following turkey vultures to the carcass site.

Like the turkey vulture, black vultures roost nightly in communal groups but unlike the turkey vulture, they will forage as groups during the day. Roosts locations are often shared with turkey vultures so requirements are similar with snags and manmade structures such as communication towers and water storage structures commonly used locations.

Breeding season varies with location but in Virginia it begins in February to April with two eggs generally laid. Nests are generally located in bottomland hardwoods, vegetation thickets, abandoned buildings, under trees and logs, bare ground and in rocky crevices. No nest material is collected though sometimes the nest may contain decorations such as bits of brightly colored plastic, shards of glass, or metal items such as bottle caps. Eggs are incubated by both sexes and hatch after 28 to 41 days. Fledging occurs after 60 to 80 days.

6.12.3 Habitat Requirements

Black vulture prefers lowland habitats such as fragmented forests, shrublands, open woods, grasslands, wetlands, pastures, swamps,

Environmental associations in Virginia include wet and dry caves; cliffs and ledges; snags; woodland swamps; tree cavities in live and dead/dying trees; or abandoned buildings (VGIF 2010).

6.12.4 Status at Installation

The black vulture is a common bird throughout its range and this includes the eastern coastline of Virginia. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia

Beach (VGIF 2010). This species has not been observed at JEB Little Creek during CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little Creek if present is as a breeding year-round resident.

The black vulture is a possible but not a probable breeding bird at JEB Little Creek due to the limited availability of suitable habitat at the base. Most habitats at JEB Little Creek are suitable for black vultures usage as long as food is available. Nesting habitat may include areas of woodlands such as the mixed hardwood and mixed pine-hardwood forest located primarily in the western and south-central sections of the base (INRMP 2010).

6.13 Great Horned Owl (*Bubo virginianus*)

6.13.1 Species Description

Great horned owls are 18 to 25 inches in length with a 40 to 60 inch wingspan. Females are typically larger than males. The “horned” comes from the large ear tufts of adults. The face is ruddy, brown or gray with a white throat patch. Their bellies are light with brown barring and the back is mottled brown. The eye is yellow and the legs and feet are covered in feathers.

Their vocalizations are deep resonant hoots that vary but often sound like hoo hoo hoo hoo hoo. Female’s have a higher pitched call that has a rise at the end and young owlets make hissing or screeching sounds.

6.13.2 Ecology

Great horned owls hunt at night using their sharp eyes and hearing to locate prey from a high perch then silently flying down to capture. Prey is generally small to medium mammals such as hares, rabbits, young raccoons, rats, squirrels, mice, moles, voles, shrews, bats, armadillos, muskrats and weasels. Birds such as coots, ducks, herons, gulls, woodpeckers, crows, pigeons, quail, turkey and songbirds are also part of their diet.

Great horned owls are early breeders with vocalizing beginning in the fall, pair bonding in December and breeding occurring in January and February. Nests are located in abandoned or seized nests from other animals such as crows, ravens, hawks or sometimes squirrels. Tree cavities and snags, cliffs, abandoned buildings and artificial platforms are also commonly used for nesting.

One to five eggs are typically laid with hatching occurring after 30 to 37 days. Fledging occurs after six to seven weeks but young may remain with parents for several months after fledging. Juvenile owls do not breed until the second or third year and often do not settle on a territory until they mate and nest. Paired owls are year-round residents and do not migrate.

6.13.3 Habitat Requirements

Great horned owls preferred habitats throughout their range include mature hardwood forest, dense coniferous forest, and mixed forests, tropical rainforests, pampas, prairies, mountainous areas, deserts, subarctic tundra, rocky coasts, mangrove swamps and urban areas. Hunting habitat may include meadows and salt marshes. Important habitat features include availability of snags, cavities and large stick nests.

Environmental associations in Virginia include seasonally flooded lands with emergent vegetation, inland freshwater meadows, inland shallow freshwater marshes, coastal shallow freshwater marshes, coastal saltwater marshes, woodland/crop fields ecotones; woodland/grassland ecotones; abandoned fields, climax forest, sub-climax grassland, climax grassland or stable prairie/grassland (VGIF 2010).

6.13.4 Status at Installation

The great-horned owl is an abundant year-round resident of the coastal plain and probably JEB Little Creek. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). This species has been observed at JEB Little Creek during 1999 and 2008 CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little Creek is as a breeding year-round resident.

The great-horned owl is a probable breeding bird at JEB Little Creek due to the availability of suitable habitat at the base. Areas of woodlands such as the mixed hardwood, mixed pine-hardwood forest, maritime evergreen forest and pine forest located primarily in the western and south-central sections of the base as the most likely location for this species (INRMP 2010).

6.14 Barred Owl (*Strix varia*)

6.14.1 Species Description

Barred owls are 16 to 25 inches long with a wingspan of 38 to 49 inches. Faces are pale with dark rings around the eyes. The owl's backs are mottled gray to brown and the belly is light with the chest having horizontal barring. The head is round and lacks ear tufts. Eyes are brown and the beak is yellow. And like the great horned owl, the legs and feet are covered in feathers up to the talons. Typical vocalization is a series of eight hoots that follow mnemonic pattern of "who cooks for you, who cooks for you all." Other calls may be heard during mating or when an owl is agitated.

6.14.2 Ecology

The barred owl is a generalist when it comes to feeding taking a variety of animals for prey such as voles, mice, shrews, rats, squirrels, rabbits, bats, moles, opossums, mink, weasels,

woodpeckers, quails, jays, blackbirds, doves and pigeons. Other documented but less common prey include domestic ducks, smaller owls, fish, turtles, frogs, crayfish, snakes, lizards, salamanders, slugs, scorpions, beetles, crickets, and grasshoppers. Barred owls locate prey from a perch at night and by flying through the woods before swooping down to capture their prey. A barred owl can sometimes be seen hunting before dark, however, this is generally near dusk or dawn.

Breeding occurs from January to April depending on latitude. Nest are often located in tree cavities but may also be abandoned or seized nests of other animals such as red-shouldered hawk, cooper's hawk, crow or squirrel. Barred owls are non-migratory, permanent residents and a nest site will often be reused the next season. Two to four eggs are typically laid with hatching occurring after four weeks and fledging after an additional four to five weeks.

6.14.3 Habitat Requirements

Habitats may include mixed woodland, coniferous woods, heavily wooded swamps, mixed transitional forests, suburban woods and deciduous forests often near open country where it may hunt for food. It prefers mature oak woods for nesting and feeding.

Environmental associations in Virginia include seasonally flooded lands with emergent vegetation, inland freshwater meadows, inland shallow freshwater marshes, coastal shallow freshwater marshes, shrub swamps, wooded swamps, cavities in live trees, woodland/water ecotones, climax forest, sub-climax grassland, climax grassland or stable prairie/grassland (VGIF 2010).

6.14.4 Status at Installation

The barred owl is a common year-round resident of the coastal plain's mature woodlands. VFWIS has the species as a known occurrence in the City of Virginia Beach and likely in the City of Norfolk (VGIF 2010).

This species has not been observed at JEB Little Creek during CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little Creek if present is as a breeding year-round resident.

The barred owl is an unlikely breeding bird at JEB Little Creek due to the lack of suitable habitat at the base. Areas of woodlands such as the mixed hardwood, mixed pine-hardwood forest, maritime evergreen forest and pine forest located primarily in the western and south-central sections of the base as the most likely location for this species if present (INRMP 2010).

6.15 Short-eared Owl (*Asio flammeus*)

6.15.1 Species Description

The short-eared owl is a medium-sized owl that averages 13 to 17 inches in length with a wingspan of 38 to 44 inches. Females tend to be larger than males. The back is mottled brown to yellow-brown with a pale streaked chest. The tail and broad wings are barred. Eyes are yellow to orange and the bill is black. The eyes are surrounded by dark feathers that give the appearance of a mask or sunglasses. The short-eared owl breeding voice is a low “hoo” or can be various barks, squeaks and squeals but is silent at over-wintering locations.

6.15.2 Ecology

Short-eared owls prey primarily on small mammals such as voles, mice and rats but will sometime feed on large insects and birds. Hunting is typically nocturnal but may occur during daylight hours as well as dawn and dusk. Hunting strategy is low flight over fields and meadows to locate and capture prey in vegetation.

Nesting mainly occurs in its northern range but is a casual breeder in the coastal plain and the Piedmont with nests typically located on the ground in open habitats such as prairie, tundra, savanna and meadows. Nests are located in vegetation and lined with weeds, grass, or feathers (Ehrlich 1988). Breeding season is March to June with 4 to 7 eggs laid. Hatching occurs after 21 to 37 days and fledging takes about four weeks.

6.15.3 Habitat Requirements

Summer and breeding habitats may include wet meadows, marshes, old fields, dunes, shrub thickets and pastures. Roosts maybe located in thickets or forests. Over-wintering habitats are similar but may include wood thickets located near open habitats.

Vegetated habitat associated with short-eared owls in Virginia include northern cordgrass prairie, mixed mesophytic forest, Appalachian oak forest, northern hardwoods and oak-hickory-pine forest (VGIF 2010). Environmental associations in Virginia include woodland/crop fields ecotones; woodland/old field ecotones; woodland/water ecotones; woodland/grassland ecotones; vegetated rows such as fence and roadside ditches; climax forest; or stable forest (VGIF 2010).

6.15.4 Status at Installation

The short-eared owl is a rare, transient winter bird and an uncommon breeder in coastal plain of Virginia. VFWIS has the species as a known occurrence in the City of Virginia Beach and likely in the City of Norfolk (VGIF 2010). Short-eared owl is known to hunt and roost in salt and freshwater marshes of the Chesapeake Bay. This species has not been observed at JEB Little Creek during CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little

Creek if present is as a breeding year-round resident or winter resident. Any of these statuses are possible at JEB Little Creek.

Habitats at JEB Little Creek most suitable for short-eared owl usage include the interdunal wetlands, maritime dune grassland, maritime dune woodland, maritime swamp forest, maritime scrub and overwash flats located in the northern side of the base along the coastline (INRMP 2010).

6.16 Eastern Screech Owl (*Otus asio*)

6.16.1 Species Description

The Eastern screech owl is a small owl with a length range of six to 10 inches and weighing only four to nine ounces. They have short tails, broad wings and the plumage varies from a red-brown to gray with streaking on the belly. The head is round and large for the body with distinct ear tufts. The eyes and bill are yellow. Though typically secretive, they are often heard at night, especially during their spring breeding season. The voice can be an insect sounding long tremolo or descending whinny or sometimes a series of hoots, barks and screeches.

6.16.2 Ecology

Eastern screech owls are nocturnal seeking a daytime roost in tree cavities, next to trunk of tree or other dense woodland cover. The very definition of a ecological generalist in its feeding habits, prey species range widely but insects such as beetles, moths, crickets, grasshoppers and cicadas comprising the most significant portion of their diet. Other prey species may include crayfish, snails, spiders, earthworms, scorpions, centipedes, mice, shrews, rats, voles, squirrels, rabbits, small fish, small snakes, lizards, baby soft-shelled turtles, small frogs, toads, salamanders and small to medium sized birds. Hunting occurs from dusk to dawn using their acute hearing and sight to locate prey generally from a perch. Open woods and field/wetland ecotones are often preferred hunting habitats.

Nests are located in a tree cavity, old woodpecker hole or man-made nest box and lined with fur and feathers. Breeding occurs from March to May with three to five eggs laid and hatching occurring after 21 to 28 days. Fledging takes an additional 30 to 32 days. Nest locations maybe used year after year if successful.

6.16.3 Habitat Requirements

Eastern screech owl habitat includes open woodlands, deciduous forests, wooded suburban parks and neighborhoods, wooded riparian areas, mature orchards, and open woodland ecotones with wetlands, meadows, and fields. Tree cavities, old woodpecker holes, man-made nest boxes and dense foliage are the most commonly used daytime roosts but owls may also use old buildings

and other manmade structures. Preferred breeding habitats are open deciduous, pine or mixed medium age woods.

Environmental associations in Virginia include snags, cavities in live and dead/dying trees, climax forest; farm outbuildings, residential or parks (VGIF 2010).

6.16.4 Status at Installation

The Eastern screech owl is an abundant year-round resident of the coastal plain and probably JEB Little Creek. VFWIS has the species as a known occurrence in the cities of Norfolk and Virginia Beach (VGIF 2010). This species has not been observed at JEB Little Creek during CBC surveys (JEBLC 2008). This species status on the coastal plain and JEB Little Creek if present is as a breeding year-round resident.

The Eastern screech owl is a probable breeding bird at JEB Little Creek due to the availability of suitable habitat at the base. Areas of woodlands such as the mixed hardwood, mixed pine-hardwood forest, maritime evergreen forest and pine forest especially areas near freshwater water habitats located primarily in the western and south-central sections of the base as the most likely location for this species (INRMP 2010).

6.17 Negative Factors and Beneficial Practices

Raptors are disturbed by human activities. Continued disturbances can cause raptors to abandon an area temporarily or permanently. Therefore, management plans should include provisions to reduce and restrict human activity. Provisions include maintaining a vegetative buffer around nesting, foraging, and roosting areas that provides a visual barrier from human disturbance; avoiding disruptive activities and development within raptor habitats are all beneficial practices for raptors.

JEB Little Creek should develop standard management practices to protect bald eagles based on current federal and state guidelines. Though no nesting bald eagles are currently known at JEB Little Creek, it is recommended that the base establishes and maintains two bald eagle protection zones (PZs) around any new and nests, should they appear. Recommended PZs are based on Virginia Guidelines (VGIF 2000) and are:

- **PZ1** - extends from the nest tree to a radius of 750 feet; and,
- **PZ2** - extends from 750 feet to 1,320 feet (quarter-mile) in radius;

PZs should remain in place while the nest is active and for three consecutive nesting seasons after the last season in which the nest was occupied (USFWSVDGIF 2000). Activities that were

routinely conducted at the time the nest was established are permitted within PZ1 and PZ2. JEB Little Creek should consult with USFWS if a proposed action involves any of the following:

- Potential to directly result in the take, harm, or harassment of an individual eagle;
- Proposed action within a quarter-mile of an active nest during the bald eagle nesting season involving activities that were not routinely conducted at the time the nest was established; or,
- Permanent changes to the landscape within PZ1 of a nest.

Training

Training at JEB Little Creek is mission critical, intermittent in nature, has a historic presence, and is consistent with past practices. Training has the potential to disturb raptors through increases in human activity. Therefore, JEB Little Creek should conduct surveys of training areas for raptor and especially bald eagle nest locations. If located, these nests should be avoided when practicable during training activities.

If nesting bald eagles (or other raptors) are observed, training activities at JEB Little Creek should adhere to the following guidelines around nest sites when prudent to avoid take of the bald eagle.

- If activity may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Any portion of a training area that falls within PZ2 may be closed during the bald eagle nesting season, December 15 through July 15, based on each training specific potential for impact;
- When prudent, training activities determined to be a threat to bald eagles may be delayed during the nesting season, December 15 through July 15; and,
- Training activities should be conducted outside of the nesting season within PZ2 as long as these activities will not cause permanent changes to the landscape within PZ1.

Building Construction

Building construction may require the removal of habitat and available habitat for raptors may be decreased. In addition, building construction in a new footprint has the potential to disturb raptors before, during, and after building construction. Impacts from new buildings will vary based on the visibility of these structures from the nest and the degree to which similar activities are occurring in proximity to the nest (USFWS 2007). Therefore, known locations of raptor nests especially bald eagles should be considered during potential bird disturbing activities. If a raptor nest location is known, than efforts should be made to avoid or minimize disturbance when practicable. If a bald eagle nest is observed then the natural resource managers should

determine whether a nest is active or inactive and construction activities may be planned accordingly to avoid disturbance.

The USFWS should be consulted for construction projects proposed that may disturb bald eagles during the bald eagle nesting season, December 15 through July 15. If the natural resource managers are unable to determine the impact of the activity the USFWS should be consulted. JEB Little Creek may make a request to the USFWS for the issuance of permits to “take bald eagles...where the taking is associated with but not the purpose of the activity and cannot practicably be avoided”. Most take authorized under this section will be in the form of disturbance” (USFWS 2009). The following guidelines are general recommendations for construction projects to help minimize negative effects on raptors.

- If demolition may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Construction within PZ2 should not occur during the bald eagle nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Any active raptor nest should not be removed or disturbed and efforts to avoid or minimize disturbance should be considered. Inactive nest may be removed after lack of activity is verified.
- Incorporate bird-friendly buildings designs, materials, lighting and landscaping to decrease avian collisions;

Electrical Pole and Powerlines

The existing network of electrical poles and powerlines at JEB Little Creek present a risk of injury and mortality to all raptors but especially larger species like the bald eagle, osprey, turkey vulture and black vulture. This risk is a consequence of the biological need of many raptors to forage, roost, or nest on elevated perches, and the physical spacing and exposure of electrical components along with the existence of powerlines in areas of frequent flight. A raptor is electrocuted when it simultaneously contacts a ground wire and one energized wire, phase conductor, jumper wire or bushing; or any combination of two energized wires, phase conductors, jumper wires or bushings. Any powerline and phase conductor that is separated by less than the flesh-to-flesh (wingspan) distance of a raptor

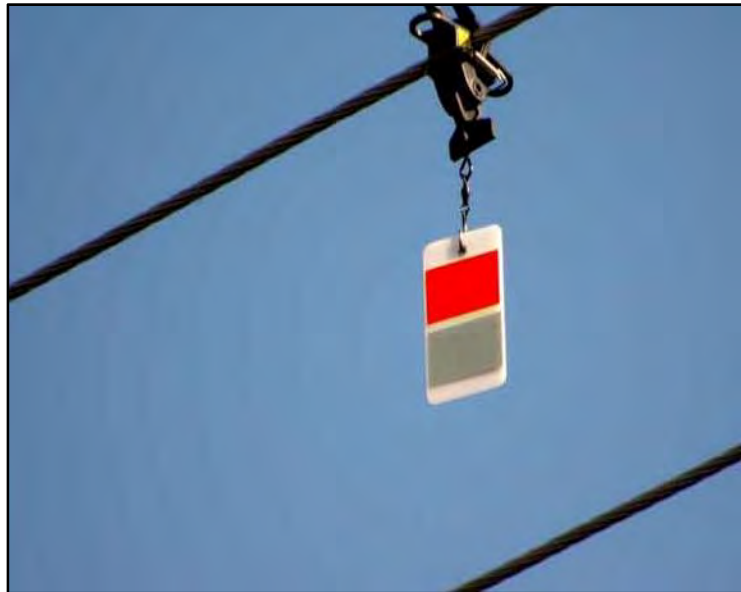


landing, perching, or taking off from a pole-top is an electrocution threat (APLIC 1994). Many species-related factors affect collisions with distribution lines including habitat, body size, flight ability, age, sex, mating, and competition with other species (APLIC 1994).

JEB Little Creek may implement management measure to greatly reduce this threat to raptors. Protection measures designed to reduce this risk include the installation of electrocution and line-strike preventative measures in areas of greatest risk. Electrocution prevention measures should include preventative measures designed to prevent the simultaneous contact of two energized areas of the pole-top design either by covering, spacing, or exclusion. Naval Support Facility Indian Head (NSFIH 2005) has had great success retrofitting electrical poles in high risk areas in the last several years and has greatly reduced bald eagle mortalities on the facility. NSFIH installed devices called phase covers developed to cover one phase and a small section of wire. The main goal is to prevent simultaneous touching of two phase conductors at one time with phases that are closer than 60 inches especially vulnerable. Depending on the phase configuration, as few as one or two phase cover per pole would virtually eliminate electrocution risk on that pole. Additional covers may be necessary with certain configurations.

Additional measures focused on aiding raptors in line-strike avoidance can be implemented.

These devices are designed to increase visibility of these distribution lines and can be installed in areas of greatest threat. The “bird flight diverters” or BFDs come in many shapes, sizes and function but generally incorporate some combination of movement, color or reflection to increase the visibility of the utility line that it is attached too. NSFIH has also utilized BFDs in their raptor electrocution and prevention program using a flapper design that incorporated all three visual attractants of color, reflection and movement.



To determine the areas of greatest risk at JEB Little Creek, natural resource managers should look at many factors to aide in their decision of which poles and lines are the primary candidates for retrofitting with electrocution and line-strike prevention devices. Areas of consideration are listed below.

- PZ2 buffer around active nest locations and roost locations;

- Electrical poles or utility lines with injury or mortality history;
- Near coastal and large bodies of water and;
- Identified flight corridors.

The following guidelines are provided to prevent or reduce raptors and bald eagle mortality from line strikes and electrocutions on existing electrical poles and distribution lines.

- Determine areas of greatest risk to raptors;
- Phase covers will be installed over the interior phase conductor on all powerline pole configurations in areas of greatest risk;
- Increase minimum spacing of 60 inches between the two outside phase conductors and energized lines on electrical poles lacking proper spacing, if new crossarms are installed, fiberglass crossarms will reduce the electrocution threat due to the electrical conductivity of moist wood;
- BFDs, incorporating several visual stimulants including fluorescent colors, reflective surfaces, motion, and glow in the dark technology, will be attached at 30-foot intervals directly to the center top line on distribution lines in areas of greatest risk;

Additionally, new electrical poles and utility lines should be considered an opportunity for planning and implementation of management practices developed to protect raptors. New electrical pole and utility line installation may require the development of a utility corridor called rights-of-way (ROW). Habitat disturbance may be required to install rights-of-way, which may result in a decrease of available habitat for raptors. In addition to an increased potential for line strikes and electrocutions, the installation of new electrical poles and distribution lines has the potential to disturb raptors during installation. Therefore, known locations of raptor nests especially bald eagles should be considered during potential bird disturbing activities. If a raptor nest location is known, than efforts should be made to avoid or minimize disturbance when practicable. If a bald eagle nest is observed then the natural resource managers should determine whether a nest is active or inactive and activities may be planned accordingly to avoid disturbance.

The USFWS should be consulted for all demolition projects proposed that may disturb bald eagles during the bald eagle nesting season, December 15 through July 15. If the natural resource managers are unable to determine the impact of the activity the USFWS should be consulted. JEB Little Creek may make a request to the USFWS for the issuance of permits to “take bald eagles...where the taking is associated with but not the purpose of the activity and cannot practicably be avoided”. Most take authorized under this section will be in the form of disturbance” (USFWS 2009). The following guidelines are general recommendations for new electrical pole and utility line projects especially if bald eagles are present.

- If activity may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Where possible, powerlines should be buried underground;
- ROW clearance within PZ2 should not occur during the bald eagle nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Powerline installation within PZ1 should not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- New electrical poles should contain fiberglass crossarms long enough to achieve a minimum spacing of 60 inches between the two outside phase conductors and energized lines;
- Phase covers should be installed over the interior phase conductor on all powerline pole configurations on new powerlines installed within areas of potential risk.
- BFDs, should be attached at 30-foot intervals directly to the center top line on new distribution lines and occurring within areas of line-strike potential.
- Where possible, new electrical poles and distribution lines should not be placed in eagle flight paths or near nests, roosts, and foraging areas;
- Where possible, distribution lines should be placed as close to or below the height of nearby trees, as some raptors will gain altitude to avoid the highly visible treeline; and,
- Where possible, new electrical poles and distribution lines should be oriented parallel, as opposed to perpendicular, to raptor especially bald eagle flight corridors (e.g., between the nest site and foraging areas).

Structure Demolition

The practice of demolition of existing structures could be beneficial to raptors in some specific circumstances. If the area of the structure removal is replanted with native vegetation or allowed to go natural rather than replaced with a new structure, the area could be additional habitat for raptors.

This activity typically involves the use of pneumatic jackhammers, backhoes, flatbed trucks, skid steer loaders, bulldozers and dump trucks. Demolition has the potential to disturb nesting raptors and bald eagles through increased vehicle and foot traffic, and loud noises associated with the demolition. Therefore, known locations of raptor nests especially bald eagles should be considered during potential bird disturbing activities. If a raptor nest location is known, than efforts should be made to avoid or minimize disturbance when practicable. If a bald eagle nest is observed then the natural resource managers should determine whether a nest is active or inactive and demolition activities may be planned accordingly to avoid disturbance.

The USFWS should be consulted for all demolition projects proposed that may disturb bald eagles during the bald eagle nesting season, December 15 through July 15. If the natural resource managers are unable to determine the impact of the activity the USFWS should be consulted. JEB Little Creek may make a request to the USFWS for the issuance of permits to “take bald eagles...where the taking is associated with but not the purpose of the activity and cannot practicably be avoided”. Most take authorized under this section will be in the form of disturbance” (USFWS 2009). The following guidelines are general recommendations for demolition projects.

- If demolition may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Demolition within PZ2 should not occur during the bald eagle nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Efforts should be taken when demolishing buildings near a bald eagle or other raptor nest to avoid causing permanent changes to the natural landscape;
- During demolition, all abandoned distribution wires should be removed to reduce line-strike hazards to bald eagles and other raptors; and,
- Abandoned electrical and utility poles in areas that promote roosting around energized electrical poles and powerlines should be removed.
- If no new structure is to be built, efforts to replant with landscape appropriate native vegetation should be considered.

Grounds Maintenance

The practice of ground maintenance can be adapted to provide a benefit for raptors and also reduce the base maintenance costs. Natural resource managers can identify areas of the base that are currently maintained by mowing that fall outside of the required safety distance of a 50-foot radius around buildings and within 6-feet of parking lots and roads. These areas can be permanently removed from the mowing rotation and allowed to either go natural or to plants with native grasses and other herbaceous plants. Areas that maybe considered might include locations such as between holes on the golf course, utility corridors and the outer borders of the playing fields. Areas such as this will attract various insects, birds, small mammals and other wildlife thus providing potential foraging locations for many raptors but especially the American kestrel, red-tailed hawk, northern harrier, Cooper’s hawk and short-eared owl. These areas may need mowing every few years to control overgrowth by woody vegetation.

Grounds maintenance typically involves the use of tractors, riding mowers, walk-behind mowers, weed-eaters, and leaf blowers. Therefore, grounds maintenance has the potential to disturb nesting raptors especially bald eagles through increased foot traffic, and loud noises. Therefore, known locations of raptor nests especially bald eagles should be considered during potential bird

disturbing activities. If a raptor nest location is known, than efforts should be made to avoid or minimize disturbance when practicable. If a bald eagle nest is observed then the natural resource managers should determine whether a nest is active or inactive and grounds maintenance activities may be planned accordingly to avoid disturbance.

If a bald eagle nest is present, natural resource managers would determine where grounds maintenance can be conducted during the bald eagle nesting season, December 15 through July 15. If the natural resource managers are unable to determine the impact of the activity the USFWS should be consulted. JEB Little Creek may make a request to the USFWS for the issuance of permits to “take bald eagles...where the taking is associated with but not the purpose of the activity and cannot practicably be avoided”. Most take authorized under this section will be in the form of disturbance” (USFWS 2009).

The following VGIF guidelines are general recommendations for grounds maintenance (VGIF 2000).

- If activities may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Mowing should not take place within PZ2 of the nest. The natural resource managers should provide the grounds maintenance crew with a map of the restricted areas;
- If short-eared owls are present, have ground maintenance crews use flushing devices on mowers;
- Leaf blowing should not take place within PZ2 of the nest; and
- The use of herbicide or pesticides toxic to wildlife should be restricted within both PZ1 and PZ2 at all times (USFWSVDGIF 2000, USFWS 2007).

Urban Forestry

No commercial forestry occurs at JEB Little Creek, due to lack of sufficient forest resources to justify a program. JEB Little Creek does maintain the trees throughout the base. These urban forestry management activities may pose threats to nesting raptors through loss of the nests or nesting trees, nest disturbance, removal of dead trees and snags. Therefore, known locations of raptor nests especially bald eagles should be considered during potential bird disturbing activities. If a raptor nest location is known, than efforts should be made to avoid or minimize disturbance when practicable. If a bald eagle nest is observed then the natural resource managers should determine whether a nest is active or inactive and grounds maintenance activities may be planned accordingly to avoid disturbance.

If a bald eagle nest is present, natural resource managers would determine where urban forestry can be conducted during the bald eagle nesting season, December 15 through July 15. If the natural resource managers are unable to determine the impact of the activity the USFWS should be consulted. JEB Little Creek may make a request to the USFWS for the issuance of permits to “take bald eagles...where the taking is associated with but not the purpose of the activity and cannot practicably be avoided”. Most take authorized under this section will be in the form of disturbance” (USFWS 2009).

Urban forest management practices at JEB Little Creek should adhere to the following guidelines around nest sites to avoid take of the bald eagle.

- If activities may disturb bald eagles, natural resource managers should consider contacting USFWS;
- Urban forestry should not take place within PZ2 of a bald eagle nest during the nesting season, December 15 through July 15. The natural resource managers should provide the urban forestry crew with a map of the restricted areas;
- A maximum number of large trees (living or dead) should be retained, if practicable, within PZ2 as roost and perch sites (trees with open crowns and stout lateral limbs are preferable);
- The use of herbicide or pesticides toxic to wildlife should be restricted within both PZ1 and PZ2 at all times (USFWSVDGIF 2000, USFWS 2007).

Other Beneficial Management Recommendations

Natural resource managers can recommend and implement beneficial management techniques to benefit raptors at JEB Little Creek. Many of these recommendations were listed above but some additional beneficial techniques are discussed below.

Feral Cat Control

Feral cats are a significant stressor on the avian population. It is estimated that more than 60 million feral cats are in the United States and that they are responsible for the mortality of an estimated 480 million birds a year and this does not include the multitude of other wildlife such as small mammals and others. Though the vast majority of birds killed by feral cats are small passerines and ground dwelling birds, it is probable that some raptors maybe vulnerable in certain situations such a during nesting, hatchling and fledgling stages especially the non-cavity low or ground nesting species such as Northern harrier, turkey vulture and short-eared owl.

Additionally, feral cats as stated above have a significant negative effect on populations of small mammals and other wildlife that generally make up all or a significant portion of the diets of all the raptor species discussed in this document except the bald eagle and osprey. Therefore, continuation of the current feral cat program at JEB Little Creek is an excellent beneficial natural

resources management program that will benefit biodiversity on base. According to the 2010 INRMP update, as part of the Pest Management Program, JEB Little Creek currently has the following policies as part of their feral cat program (INRMP 2010).

- Encouraging responsible pet ownership and limiting access to food and shelter.
- Vaccination, registration, and tags are required for every pet on base.
- Spay and neuter programs are promoted and all pets must be kept under strict supervision.
- The feeding of strays is prohibited and all dumpsters have to be secured.
- Pet and wildlife information is provided to base personnel through the regional outreach specialist.

It is recommended that a trapping program be added to this list to decrease the population. Without this type of program, feral cats will continue to increase in population and continue to negatively affect the wildlife on base. If implemented Navy policy should be strictly adhered to. This policy (DON 2002) states that *“Dogs, cats and other privately owned or stray animals will not be permitted to run at large on military reservations”*. Additionally, in the policy letter from 2002, it is stated that *“Navy commands must ensure the humane capture and removal of free roaming cats and dogs”* As part of this letter, it bans the trap, neuter and release method of control on Navy lands but recommends an approach in which the proper animal control facility is consulted for the proper and humane disposition of captured feral cats (DON 2002).

Nest Boxes

JEB Little Creek has a nest box program that includes bluebird, mallard and wood ducks boxes located in various locations on base (INRMP 2010). The idea of nest boxes is to offer additional nesting locations that otherwise may not be available in order to attract a target species not currently located on base or to increase populations if already present. Nest boxes can be designed and constructed to fit the biological need of many species of cavity nesting birds. The box is then placed in a location with suitable habitat for the target species.

This type of program is ideal for application to the cavity nesting species of raptors such as American kestrel, barred owl and Eastern screech owl. It is recommended that nest boxes be constructed for these four species and installed in appropriate habit on base. Some construction specifications are listed below. Specific instructions are readily available on the internet but box sizes are not included here because of the variability of the specifications. Once installed, it is recommended that natural resource managers periodically survey for usage and old nest material should be removed prior to each nesting season.

Table 2: Nest Box Specifications

Species/Specifications	Hole size (in)	Floor Area (in)	Cavity Depth (in)	Entrance Height (in)	Habitat	Height off ground
American kestrel	3 inches	8x8	12 to 15	9 to 12	Open field, meadow or woodland edge	10 to 30 feet
Barred owl	8 inches	13x13	22 to 28	14 to 18	Mature woodlands	Minimum of 15 feet
Eastern screech owl	3 inches	8x8	12 to 15	9 to 12	Woodlands	10 to 30 feet, facing north

There are numerous suitable locations for installation of nest boxes for the three raptor species most likely to benefit from a program. American kestrel boxes could be placed on trees or utility poles bordering open areas near the ball field and the golf course. The barred owl boxes could be located in habitats that might include areas of mature and dense woodlands such as maritime swamp forest, mesic mixed hardwood forest, mesic mixed pine hardwood forest and the pine forest in the southeastern and central sections of the base located primarily in the northern, southeastern and central sections of the base. The Eastern screech owl would benefit from box placement in the habitats of maritime dune woodlands, maritime evergreen forest, swamp forest, mesic mixed hardwood forest, mesic mixed pine hardwood forest and the pine forest located primarily in the northern, southeastern and central sections of the base.

Nest Platforms

As noted in the 2010 INRMP update, JEB Little Creek participates in an osprey nest monitoring program and constructed six nesting platforms in the 1990s (INRMP 2010). These platforms offer ospreys alternate nesting locations that hopefully will discourage nesting on light and utility poles. General monitoring and maintenance of these poles would continue to benefit the species on base.

Other species that would benefit from a nest platform program would include red-tailed hawks, peregrine falcons and great-horned owls. Red-tailed hawk platforms are generally about two foot by two foot and set on top of a 15 foot or taller pole in an open area such as near the ball fields and golf course. The great-horned owl platform is designed similar to the red-tailed hawk but would benefit in a placement near the edge of woodlands, fragmented woodlands or in mixed age forest. Habitats in JEB Little Creek include maritime mesic mixed pine hardwood forest and the pine forest located primarily in the southeastern and central sections of the base. It should be noted, that the great-horned owl is a territorial nester and has been known to be aggressive

7.0 MANAGEMENT and STEWARDSHIP GOALS

The overall goal of the RMP is for JEB Little Creek to promote ecosystem diversity on their base through proper management and stewardship of natural resources to support the military mission. By maintaining habitats suitable for raptors to forage, roost, nest and seek cover, JEB Little Creek promotes the important ecosystem component of predation in which raptors fulfill. Having predators in an ecosystem has long been known to science as important to maintain the balance necessary for that ecosystem. Predators help maintain biodiversity by limiting some species populations from increasing and thus out competing other populations of animals. In the case of raptors, this is particularly relevant in the control of small mammal (mice, rats, voles etc.) populations that make up such a large portion of many of the raptor species diet. Specifically, this goal may be achieved through implementation of the following management practices:

- Maintaining and restoring habitat features which are attractive to raptors;
- Providing manmade or maintaining natural nest and perch sites;
- Preventing disturbance at nesting, foraging, and roosting sites; and
- Promoting raptor information and stewardship through various forms of outreach.

8.0 REFERENCES

- Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions With Power Lines: The State of the Art in 1994. Edison Electric Institute. Washington, D.C.
- Center for Conservation Biology, College of William and Mary (CCB). 2010. Virginia Peregrine Falcon Monitoring and Management Program: Year 2010 Report
- Center for Conservation Biology, College of William and Mary (CCB). 2011. Virginia Bald Eagle Nest and Productivity Survey: Year 2011 Report
- Cline, K. 1990. Bald Eagles in the Chesapeake: A Management Guide for Landowners. National Wildlife Federation, Washington, D.C.
- Commonwealth of Virginia (COV). 2006. Virginia's Endangered Species Act. Code of Virginia. (§ 29.1-563-§29.1-570.
- Department of Defense and U.S. Fish and Wildlife Service (DODUSFWS). 2006. Memorandum of Understanding (MOU) Between the U.S. Department of Defense and the U.S. Fish and Wildlife Service To Promote the Conservation of Migratory Birds.
- Department of Defense Instruction (DODI). 2011. Natural Resource Conservation Program 4715.03.
- Department of the Navy (DON). 2002. Policy Letter Preventing Feral Cat and Dog Populations on Navy Property. Chief of Naval Operations.

- Department of the Navy (DON). 2008. BMS B-7.6 Fish and Wildlife Management.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye (Ehrlich). 1988. The birders handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc. New York
- Guilfoyle, M.P., Evans, D.E., Fischer, R.A., and Martin, C.O. 2000. Riparian Raptors on USACE Projects: Bald eagle (*Haliaeetus leucocephalus*), EMRRP Technical Notes Collection (ERDC TN-EMRRP-SI-12), U.S. Army Engineer Research and Development Center, Vicksburg, MS. <http://www.wes.army.mil/el/emrrp>
- Hawk Migration Association of North America (HMANA). 2011 Kiptopeke Hawkwatch Results 2011. <http://hmana.org/> Accessed 2011.
- Joint Expeditionary Base, Little Creek (JEBLC). 2008. Christmas Bird Count Data Sheets 1998-2008.
- Joint Expeditionary Base, Little Creek (INRMP). 2010. Integrated Natural Resource Management Plan Update, JEB Little Creek, Norfolk, VA.
- Naval Support Facility Indian Head (NSFIH). 2005. Raptor Electrocution Prevention Study for NSFIH. Indian Head, Maryland.
- U.S. Fish and Wildlife Service (USFWS). 1990. Chesapeake Bay Region Bald Eagle Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Newton Corner, MA.
- U.S. Fish and Wildlife Service (USFWS). 1999. Bald Eagle. In: Multi-Species Recovery Plan for South Florida. U.S. Fish and Wildlife Service, Atlanta, GA. Pp. 237-259.
- U.S. Fish and Wildlife Service (USFWS). 2009. Permits for Eagle Take that is associated with, but not the purpose of, an activity. 50 CFR 22.26.
- U.S. Fish and Wildlife Service (USFWS). 2007. National Bald Eagle Management Guidelines. <http://www.fws.gov/migratorybirds/baldeagle.htm>. Accessed 2010.
- U.S. Navy (Navy). Compliance Guide for Commanding Officers of Navy Installations. 2010.
- U.S. Navy (Navy). The Navy Environmental and Natural Resources Program Manual (5090 1.C) 2007.
- Virginia Department of Game and Inland Fisheries (VDGIF). 2000. Bald Eagle Protection Guidelines for Virginia. Virginia Field Office, Gloucester, VA.
- Virginia Department of Game and Inland Fisheries (VDGIF). 2010. Virginia Fish and Wildlife Information Services website, <http://vafwis.org/fwis/>. Accessed in 2010 and 2011.
- Wallin, D.O., and M.A. Byrd. 1984. Caledon State Park Bald Eagle Study. Department of Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. 1999. Removal of the Chesapeake Bay Bald Eagle from the Federal List of Threatened and Endangered Species: Context and Consequences. White Paper Series. The Center for Conservation Biology. College of William and Mary.

APPENDIX I: NATIVE PLANTS FOR VIRGINIA
COASTAL PLAIN

ABOUT THE NATIVE PLANTS FOR CONSERVATION, RESTORATION AND LANDSCAPING PROJECT

This project is a collaboration between the Virginia Department of Conservation and Recreation and the Virginia Native Plant Society. VNPS chapters across the state helped to fund the 2011 update to this brochure.

The following partners have provided valuable assistance throughout the life of this project:

The Nature Conservancy – Virginia Chapter • Virginia Tech Department of Horticulture • Virginia Department of Agriculture and Consumer Services • Virginia Department of Environmental Quality, Coastal Zone Management Program • Virginia Department of Forestry • Virginia Department of Game and Inland Fisheries • Virginia Department of Transportation



FOR MORE INFORMATION

Virginia Department of Conservation and Recreation
Natural Heritage Program
804-786-7951
www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

FOR A LIST OF NURSERIES THAT PROPAGATE NATIVE SPECIES, CONTACT:

Virginia Native Plant Society
400 Blandy Farm Lane, Unit 2
Boyce, VA 22620
540-837-1600 | vnpsoc@shentel.net
www.vnps.org



FOR A LIST OF NURSERIES IN A PARTICULAR REGION OF VIRGINIA, CONTACT:

The Virginia Nursery and Landscape Association
383 Coal Hollow Road
Christiansburg, VA 24073
540-382-0943 | vnla@verizon.net
To search for species in VNLA member catalogs, visit:
www.vnla.org/search.asp

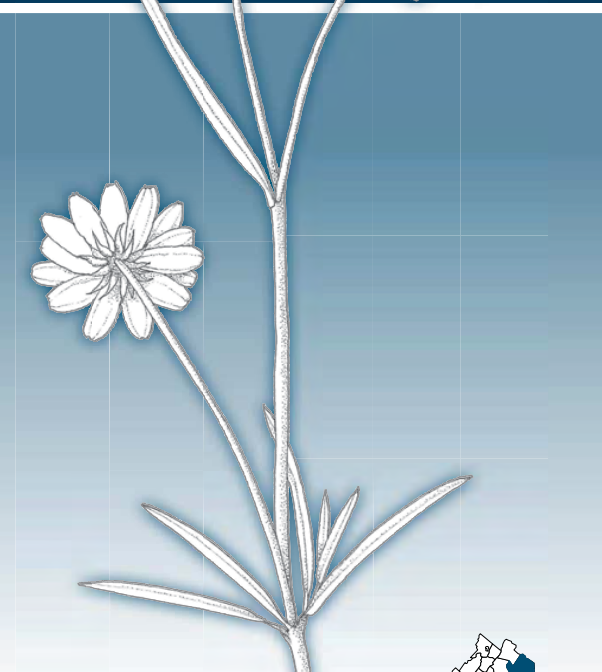
ILLUSTRATIONS COURTESY OF THE FLORA OF VIRGINIA PROJECT.

Illustrators: Lara Gastinger, Roy Fuller and Michael Terry. To learn more, visit:
www.floraofvirginia.org



Native Plants

FOR CONSERVATION,
RESTORATION & LANDSCAPING



VIRGINIA COASTAL PLAIN



WHAT ARE NATIVES?

Native species evolved within specific regions and dispersed throughout their range without known human involvement. They form the primary component of the living landscape and provide food and shelter for native animal species. Native plants co-evolved with native animals over many thousands to millions of years and have formed complex and interdependent relationships. Our native fauna depend on native flora to provide food and cover. Many animals require specific plants for their survival.



BENEFITS OF NATIVE PLANTS

Using native species in landscaping reduces the expense of maintaining cultivated landscapes and minimizes the likelihood of introducing new invasive species. It may provide a few unexpected benefits as well.

Native plants often require less water, fertilizer and pesticide, thus adding fewer chemicals to the landscape and maintaining water quality in nearby rivers and streams. Fewer inputs mean time and money saved for the gardener.

Native plants increase the presence of desirable wildlife, such as birds and butterflies, and provide sanctuaries for these animals as they journey between summer and winter habitats. The natural habitat you create with native plants can become an outdoor classroom for children, or a place for you to find peace and quiet after a busy day.

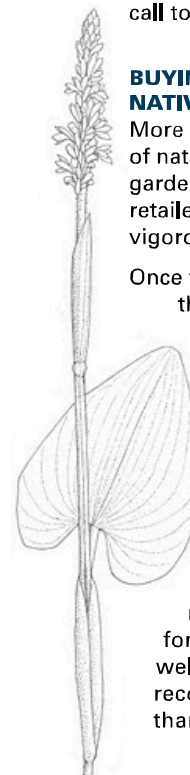
Native plants evoke a strong sense of place and regional character. For example, live oak and magnolia trees are strongly associated with the Deep South. Redwood trees characterize the Pacific Northwest. Saguaro cacti call to mind the deserts of the Southwest.

BUYING AND GROWING NATIVE PLANTS

More gardeners today are discovering the benefits of native plants and requesting them at their local garden centers. Because of this increased demand, retailers are offering an ever-widening selection of vigorous, nursery-propagated natives.

Once you've found a good vendor for native plants, the next step is choosing appropriate plants for a project. One of the greatest benefits of designing with native plants is their adaptation to local conditions. However, it is important to select plants with growth requirements that best match conditions in the area to be planted.

If you're planning a project using native plant species, use the list in this brochure to learn which plants grow in your region of Virginia. Next, study the minimum light and moisture requirements for each species, noting that some plants grow well under a variety of conditions. Many of the recommended species are well-suited to more than one of these categories.



For more information, refer to field guides and publications on local natural history for color, shape, height, bloom times and specific wildlife value of the plants that grow in your region. Visit a nearby park, natural area preserve, forest or wildlife management area to learn about common plant associations, spatial groupings and habitat conditions. For specific recommendations and advice about project design, consult a landscape or garden design specialist with experience in native plants.

WHAT ARE NON-NATIVE PLANTS?

Sometimes referred to as "exotic," "alien," or "non-indigenous," non-native plants are species introduced, intentionally or accidentally, into a new region by humans. Over time, many plants and animals have expanded their ranges slowly and without human assistance. As people began cultivating plants, they brought beneficial and favored species along when they moved into new regions or traded with people in distant lands. Humans thus became a new pathway, enabling many species to move into new locations.

WHAT ARE INVASIVE PLANTS?

Invasive plants are introduced species that cause health, economic or ecological damage in their new range. More than 30,000 species of plants have been introduced to the United States since the time of Columbus. Most were introduced intentionally, and many provide great benefits to society as agricultural crops and landscape ornamentals. Some were introduced accidentally, for example, in ship ballast, in packing material and as seed contaminants. Of these introduced species, fewer than 3,000 have naturalized and become established in the United States outside cultivation. Of the 3,500 plant species in Virginia, more than 800 have been introduced since the founding of Jamestown. The Virginia Department of Conservation and Recreation currently lists more than 100 of these species as invasive.

In the United States, invasive species cause an estimated \$120 billion in annual economic losses, including costs to manage their effects. Annual costs and damages arising from invasive plants alone are estimated at \$34 billion.

NATIVE PLANTS VS. INVASIVE PLANTS

Invasive plants have competitive advantages that allow them to disrupt native plant communities and the wildlife dependent on them. For example, kudzu (*Pueraria montana*) grows very rapidly and overtops forest canopy, thus shading other plant species from the sunlight necessary for their survival. A tall invasive wetland grass, common reed (*Phragmites australis ssp. australis*), invades and dominates marshes, reducing native plant diversity and sometimes eliminating virtually all other species.

Invasive species can marginalize or even cause the loss of native species. With their natural host plants gone, many insects disappear. And since insects are an essential part of the diet of many birds, the effects on the food web become far reaching. Habitats with a high occurrence of invasive plants become a kind of "green desert." Although green and healthy in appearance, far fewer native species of plants and animals are found in such radically altered places.

APPENDIX J: MIGRATORY BIRDS MANAGEMENT

**MEMORANDUM OF UNDERSTANDING
BETWEEN THE**

**U.S. DEPARTMENT OF DEFENSE
AND THE
U.S. FISH AND WILDLIFE SERVICE**

TO PROMOTE THE CONSERVATION OF MIGRATORY BIRDS

This Memorandum of Understanding (MOU) is entered into between the U.S. Department of Defense (DoD) and the U.S. Fish and Wildlife Service (FWS) (hereinafter “the Parties”).

A. Purpose and Scope

This MOU is entered into pursuant to Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (66 FR 3853 [January 17, 2001]). The purpose of this MOU is to promote the conservation of migratory bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations.

This MOU does not address incidental take resulting from military readiness activities or active DoD airfield operations. Military readiness activities are covered by 50 CFR 21.15 (Authorization of take incidental to military readiness activities). Bird-related management activities with a potential to affect airfield operations or safety will be managed according to DoDI 4165.57 and the airfield’s Bird/Wildlife Aircraft Strike Hazards (BASH) Program.

Installation commanders responsible for military airfields will not implement wildlife conservation prescriptions set forth in this MOU if they conclude that such actions will negatively impact military mission or combat capability, or if such action will increase the possibility of aircraft-wildlife strikes. Should installation commanders choose to implement wildlife conservation measures, they must follow BASH guidelines, and consider military mission impacts and elevated risk to aircraft and aircrew.

This MOU specifically pertains to the following categories of DoD activities:

- 1) Natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, hunting, fishing, agricultural outleasing, conservation law enforcement, invasive-weed management, and prescribed burning;¹
- 2) Installation support activities, including, but not limited to, administration, retail sales, food service, health care, water and sewage treatment, supply and storage, education, housing, equipment maintenance, base transportation, laundry and dry cleaning, recreation, and religious activities;
- 3) Operation of industrial activities;

¹ Vegetation management within the airfield environment shall be governed by the installation Integrated Natural Resource Management Plans (INRMP) and associated Bird/Wildlife Aircraft Strike Hazard (BASH) Plan.

- 4) Construction, maintenance, renovation, or demolition of facilities that support the activities described in items 1 through 3; and
- 5) Prevention or abatement of pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

This MOU identifies specific activities where cooperation between the Parties will contribute substantially to the conservation of migratory birds and their habitats. This MOU does not alter or waive any responsibilities of DoD or FWS, as applicable, under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (Eagle Act), and the Endangered Species Act (ESA); nor does it authorize the take of migratory birds.

B. Authorities

The Parties' responsibilities under the MOU are authorized by provisions of the following laws and authorities:

- Alaska National Interest Lands Conservation Act of 1980 (16 U.S.C. 410hh-3233)
- Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544)
- Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds, 2001 (66 FR 3853 [January 17, 2001])
- Fish and Wildlife Act of 1956, as amended (16 U.S.C. 791a *et seq.*)
- Fish and Wildlife Conservation Act of 1980, as amended (16 U.S.C. 2901-2911)
- Fish and Wildlife Coordination Act of 1980, as amended (16 U.S.C. 661-667)
- Migratory Bird Conservation Act of 1929, as amended (16 U.S.C. 715 *et seq.*)
- Migratory Bird Treaty Act, of 1918, as amended (16 U.S.C. 703-711)
- National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347)
- Sikes Act Improvement Act of 1997 (16 U.S.C. 670a-670o)
- Agreements to limit encroachments and other constraints on military training, testing, and operations (10 U.S.C. 2684a)

C. Background

Department of Defense

The DoD mission is to provide for the Nation's defense. DoD's Natural Resources Program works to ensure continued access to land, air, and water resources for realistic military training and testing, while ensuring that the natural and cultural resources entrusted to DoD's care are sustained in a healthy condition.

The DoD is an active participant in international bird conservation partnerships including Partners in Flight (PIF) and the North American Bird Conservation Initiative (NABCI). Through PIF and NABCI, DoD works in partnership with numerous federal and state agencies and nongovernmental organizations to conserve migratory and resident birds and to enhance their survival. Military lands frequently provide some of the best remaining habitat for migratory and resident bird species, and DoD plans to continue supporting bird conservation activities.

Integrated Natural Resources Management Plans (INRMPs) offer a coordinated approach for incorporating habitat conservation efforts into installation management. INRMPs provide significant baseline information that can be used when preparing National Environmental Policy Act (NEPA) documents for all DoD management activities. This linkage helps to ensure that appropriate conservation and mitigation measures are identified in NEPA documents and committed to, when appropriate, in final decision documents.

The DoD develops INRMPs cooperatively with the FWS and appropriate state fish and wildlife agencies. DoD's strategy focuses on inventorying and long-term monitoring to determine changes in migratory bird populations on DoD installations. Effective on-the-ground management may then be applied to those areas identified as having the highest conservation value. DoD's goal is to support military training and testing by providing for no net loss of an installation's military readiness capability and capacity. DoD implements cooperative projects and programs on military lands to benefit the health and well-being of birds and their habitats, when consistent with the military mission, military readiness, and the safety of DoD personnel.

The DoD has a cooperative network of natural resources personnel and others from military installations across the United States that provides technical assistance, including how to incorporate landbird, shorebird, and waterbird habitat management efforts into INRMPs. These bird conservation experts work collaboratively to conserve migratory and resident birds and their habitats on DoD lands.

The DoD implements bird inventories and monitoring programs in numerous ways, including Next Generation Radar (NEXRAD) for studying bird movements in the atmosphere, and maintains an integrated pest management (IPM) program designed to reduce the use of pesticides, herbicides, fungicides, etc. In addition, the management of natural resources on DoD properties benefits migratory birds through efforts such as invasive-species control, habitat enhancement/restoration, water-quality improvement, and wetland conservation.

Fish and Wildlife Service

As a federal agency within the U.S. Department of the Interior, the FWS mission is to work with others to conserve, protect, manage, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The FWS Migratory Bird Program serves as a focal point in the United States for policy development and strategic planning, program implementation, and evaluation of actions designed to conserve migratory birds and their habitats.

The FWS is legally mandated to implement the conservation provisions of the MBTA, which includes responsibilities for managing migratory bird populations, domestic and international coordination, and the development and enforcement of regulations that govern authorized take of migratory birds. The Migratory Bird Conservation Act established the Migratory Bird Conservation Commission to approve land acquisition with Migratory Bird Conservation Funds. The Fish and Wildlife Coordination Act (FWCA) requires consultation under certain circumstances and added provisions to recognize the important contribution of wildlife resources to the Nation. The FWCA requires consideration and coordination of wildlife conservation, including habitat protection, through acquisition, enhancement, and/or management and avoidance and minimization of avian stressors related to federal activities.

The following FWS programs have responsibilities with regards to bird conservation activities:

- 1) The Division of Migratory Bird Management and the Migratory Bird Programs in FWS Regional Offices serve as focal points for policy development and strategic planning. These offices develop and implement monitoring and management initiatives that help maintain healthy populations of migratory birds and their habitats, and provide continued opportunities for citizens to enjoy bird-related recreation.
- 2) The Division of Bird Habitat Conservation is instrumental in supporting habitat conservation partnerships through the administration of bird conservation grant programs and development of Joint Ventures that serve as major vehicles for implementing the various bird conservation plans across the country.
- 3) Ecological Services Field Offices across the country serve as the primary contacts for technical assistance and environmental reviews involving migratory bird issues. The Field Offices coordinate with the Regional Migratory Bird Offices, as necessary, regarding permits and overall migratory bird conservation coordination.
- 4) The Office of Law Enforcement is the principal FWS program that enforces the legal provisions of the MBTA, Eagle Act, ESA, and other laws pertaining to migratory birds.
- 5) The National Wildlife Refuge (NWR) System manages NWRs and Waterfowl Production Areas across the country, many of which were established to protect and conserve migratory birds. NWRs not only protect important bird habitat, but also focus on monitoring migratory bird populations, restoring and maintaining native habitats, and educating the public on recreational and economic benefits of migratory birds.
- 6) The Science Applications program works with other FWS programs and partners to ensure that the necessary science, tools, and capacity are available for planning and implementing the most efficient and effective conservation actions to protect fish and wildlife, including migratory birds. The office facilitates regional self-directed science management partnerships called Landscape Conservation Cooperatives to develop and apply shared science capacity to conservation.

D. Statement of Mutual Interest and Benefit

The Parties have a common interest in the conservation and management of America's natural resources. The Parties agree that migratory birds are important components of biological diversity, and that the conservation of migratory birds will help sustain ecological systems and help meet the public demand for conservation education and outdoor recreation, such as wildlife viewing and hunting opportunities. The Parties also agree that it is important to focus on reducing stressors on bird populations, restore and enhance habitat where actions can benefit specific ecosystems and migratory birds dependent upon them, and recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations. The Parties also agree that while it is the FWS' aim to ensure biologically diverse, thriving habitat for migratory birds away from airfields, it is DoD's aim to ensure flight safety by making airfield environments as unattractive as possible to migratory birds while supporting FWS' efforts away from airfields.

E. Responsibilities of Both Parties

The Parties agree that this MOU shall be implemented to the extent permitted by law and in harmony with evolving requirements of agency missions, subject to the availability of appropriations and budgetary limits. Both Parties shall:

- 1) Support the conservation intent of Executive Order 13186, and the migratory bird conventions by:
 - a) Integrating bird conservation principles, measures, and practices into agency planning and actions; and
 - b) Avoiding or minimizing, to the extent practicable, the exposure of birds and their resources to avian stressors that result in take.
- 2) Emphasize an interdisciplinary, collaborative approach to migratory bird conservation in cooperation with other governments, state and federal agencies, and non-federal partners within the geographic framework of the NABCI Bird Conservation Regions.
- 3) Work to protect, restore, and enhance migratory bird habitats, as practicable, on DoD-managed lands, in ways that do not conflict with or impede military training and testing, by:
 - a) Designing and executing actions to minimize, to the extent practicable and consistent with the military mission, avian stressors on migratory bird populations, including impacts to breeding, migration, or wintering habitats; and by developing and implementing, as appropriate, conservation measures that could reduce the take of migratory birds or enhance the quality of the habitats they use;
 - b) Working to identify, conserve, and manage significant bird conservation sites that occur on DoD-managed lands;
 - c) Preventing or abating pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable; and
 - d) Preventing the introduction and establishment of, and controlling and reducing the spread of existing, non-native invasive species that may be harmful to native flora and fauna, including migratory bird populations, as required by Executive Order 13112 on Invasive Species.
- 4) Work with willing landowners to prevent or minimize the loss or degradation of migratory bird habitats on lands adjacent or near military installation boundaries. This cooperative conservation may include:
 - a) Participating in efforts to identify, protect, and conserve important migratory bird habitats or other significant bird conservation sites and ecological conditions that occur in landscapes or watersheds that may be of conservation value to migratory

birds found on DoD lands, and that also buffer one or more installations from adverse impacts to DoD mission or resource-management activities;

- b) Providing information on migratory bird resources found on DoD lands for partners to include and integrate into their outreach and education materials and activities; and
 - c) Using available authorities to enter into agreements with federal, state, tribal, or other governmental entities, or nongovernmental organizations to conserve and enhance habitats in a manner compatible with military operations.
- 5) Promote collaborative projects such as:
- a) Developing or using existing inventory and monitoring programs, at appropriate scales, with national or regional standardized protocols, to assess the status and trends of bird populations and habitats, including migrating, breeding, and wintering birds;
 - b) Designing management studies and research/monitoring projects using national or regional standardized protocols and programs to identify the habitat conditions needed by applicable species of concern, to understand interrelationships of co-existing species, and to evaluate the effects of management activities on habitats and populations of migratory birds;
 - c) Sharing inventory, monitoring, research, and study data for breeding, migrating, and wintering bird populations and habitats in a timely fashion with national data repositories such as the Avian Knowledge Network, National Point Count Database, and Monitoring Avian Productivity and Survivorship (MAPS);
 - d) Working in conjunction with each other and federal and state agencies to develop reasonable and effective conservation measures for actions that reduce the exposure of birds and their habitats to avian stressors;
 - e) Participating in or promoting the implementation of existing regional or national inventory and monitoring programs such as Breeding Bird Survey (BBS), Christmas Bird Counts, bird atlas projects, or game-bird surveys (e.g., mid-winter waterfowl surveys) on DoD lands where practicable and feasible;
 - f) Using existing partnerships and exploring opportunities for expanding and creating new partnerships to facilitate combined funding for inventory, monitoring, management studies, and research; and
 - g) Improving habitat on lands adjacent to DoD-managed lands through programs such as the DoD Readiness and Environmental Protection Integration and Land and Water Conservation Fund programs.
- 6) Work cooperatively to identify and utilize existing conservation measures to avoid or minimize the effects of avian stressors, and develop new conservation measures as

needed.

- 7) Per Executive Order 13186 (Sec. 3(12)), provide training opportunities to appropriate personnel on responsibilities under the MBTA, the Eagle Act, and other regulations protecting birds, current processes for coordination on bird conservation issues, strategies for properly assessing how actions effect bird populations, and recommended approaches on how to avoid or minimize the exposure of birds and their habitats to avian stressors.
- 8) Participate annually in the interagency Council for the Conservation of Migratory Birds. The duties of the Council include the following:
 - a) Sharing resource information to help conserve and manage migratory birds;
 - b) Fostering partnerships to further the goals of Executive Order 13186;
 - c) Reporting annually on Executive Order accomplishments and recommendations; and
 - d) Selecting an annual recipient of a Presidential Migratory Bird Federal Stewardship Award.
- 9) Promote migratory bird conservation nationally and internationally through activities such as National Public Lands Day and International Migratory Bird Day.

F. Department of Defense Responsibilities

- 1) Follow all migratory bird permitting requirements for intentional take under 50 CFR 21.22 (banding or marking), 21.23 (scientific collecting), 21.26 (special Canada Goose permit), 21.27 (special purposes), or 21.41 (depredation). Though no permit is required to take birds in accordance with 50 CFR 21.43 - 21.47 (depredation orders), follow all regulatory requirements set forth in those sections when applicable.
- 2) Consistent with military mission requirements, encourage incorporation of comprehensive migratory bird management objectives into relevant DoD planning documents, including INRMPs, Integrated Pest Management Plans (IPMPs), Installation Master Plans, NEPA analyses, and other relevant documents. Comprehensive planning efforts for migratory birds include PIF Bird Conservation Plans, the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, North American Waterbird Conservation Plan, and associated regional plans where available.
- 3) Consistent with current and emerging mission requirements, manage military lands and non-military readiness activities in a manner that supports migratory bird conservation, habitat protection, restoration, and enhancement.
- 4) Inventory and monitor bird populations on DoD lands to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts
- 5) In accordance with DoD *INRMP Implementation Manual* (DoDM 4715.03, 2013), work

- cooperatively with FWS and state and fish and wildlife agencies to promote timely development, effective review, and revisions of INRMPs, including any potential revisions to promote the conservation of migratory birds.
- 6) Incorporate conservation measures addressed in regional or state bird conservation plans in the INRMP development process.
 - 7) Consistent with safety and security requirements, allow the FWS and other partners reasonable access to military lands for conducting sampling or survey programs, including but not limited to MAPS, BBS, International Shorebird Survey, game-bird surveys, and breeding bird atlases.
 - 8) Consistent with safety and security requirements and bird conservation responsibilities, support the economic and recreational benefits of bird-related activities by allowing public access to military lands for recreational uses, such as bird watching and other non-consumptive activities.
 - 9) Develop policies and procedures for facilities design that will promote the conservation of migratory bird populations and habitat, including:
 - a) Mitigating the negative impacts of reflective glass in building design by considering building location and orientation with respect to migratory bird areas, and use of other mitigation techniques, such as reducing the amount of reflective glass on buildings;
 - b) Maximizing the use of native landscaping to promote migratory bird habitat, except in areas subject to BASH hazards.
 - c) Turning off interior building lighting at night, especially lighting in offices with exterior windows that face outward to exterior building surfaces that may be visible to migratory or resident birds.
 - 10) Prior to implementing any activity that has, or is likely to have, a measurable negative effect on migratory bird populations:
 - a) Identify the migratory bird species likely to occur in the area of the proposed action, and determine if any species of concern could be affected by the activity;
 - b) Assess and document, through the project planning process (e.g., NEPA), the potential effects of the proposed action on species of concern. Use best available demographic, population, or habitat-association data in the assessment of effects upon species of concern; and
 - c) Engage in early planning and scoping with the FWS to proactively address migratory bird conservation, and to initiate appropriate actions to avoid or minimize the exposure of birds and their habitats to avian stressors that may result in the take of migratory birds.
 - 11) Continue to promote the conservation of migratory birds on military lands, to the extent

permitted by law, subject to the availability of appropriations, within Administration budgetary limits, and where in harmony with DoD missions.

- a) Fire and fuels-management practices. Fire plays an important role in shaping plant and animal communities, and is a valuable tool in restoring habitats altered by decades of fire suppression. Fire management may include fire suppression, fire prevention, fuels treatment, and prescribed burning. Prescribed burning is one of the most effective tools in managing grassland and longleaf pine/wiregrass ecosystems. Fire-management planning efforts will consider the effects of fire management strategies on the conservation of migratory bird populations, and should be combined with monitoring to properly assess fire management on relevant habitats and species.
 - b) Management practices for invasive and aquatic nuisance species. Invasive and aquatic nuisance species are a threat to native plants and wildlife throughout the United States, including on military lands. Efforts to prevent, control, and contain these species must take into account both the impacts from invasive species and the effects of the control efforts on migratory bird populations. Invasive species that can threaten migratory birds and their habitats include, but are not limited to, exotic grasses, trees and weeds, terrestrial and aquatic insects and organisms, non-native birds, and stray and feral cats.
 - c) Communications towers, utilities, and energy development. Increased communications demands, changes in technology, and the development of alternative energy sources have resulted in additional exposure of migratory birds and their resources to avian stressors. DoD will review best practices outlined in FWS Guidance, and consult with FWS as needed when considering the development of these technologies on military lands. Construction of new utility and energy systems and associated infrastructure should avoid or minimize the exposure of birds and their resources to avian stressors. Consideration also may be given to retrofitting existing utilities to reduce impacts. Available guidance includes (but is not limited to):
 - i. Avian Power Line Interaction Committee - *Suggested Practices for Avian Protection on Power Lines* (2006)
 - ii. Avian Power Line Interaction Committee - *Reducing Avian Collisions with Power Lines* (2012)
 - iii. U.S. Fish and Wildlife Service *Land-based Wind Energy Guidelines* (2012)
 - iv. U.S. Fish and Wildlife Service *Guidance on the Siting, Construction, Operation, and Decommissioning of Communication Towers* (2000) and FWS comments to the FCC on towers and lighting (2007)
- 12) To the extent reasonable and practicable, use a best-practices approach for routine maintenance, retrofitting, and management actions to the extent they do not diminish military readiness, including:
- a) Turning out lights in buildings, especially multiple-story buildings, at night,

except where needed for safety or security reasons;

- b) Reducing or eliminating activities that can attract invasive species, including feeding or managing outdoor or feral cats;
- c) Minimizing or eliminating the use of pesticides (e.g., insecticides, herbicides, rodenticides);
- d) Covering open pipes in which birds may be able to enter but not escape (e.g., in-ground pipes, outhouses, roofs);
- e) Minimizing exposure to hazardous chemicals, including covering or removing open pits containing oil or other chemicals; and
- f) Minimizing vegetation removal and manipulation during the breeding season, as practicable and when not in conflict with airfield BASH management.

G. Responsibilities of the Fish and Wildlife Service

- 1) Work with DoD by providing recommendations to minimize the effects of avian stressors on migratory birds from DoD actions.
- 2) Through the Division of Migratory Bird Management, maintain a Web page of permits that provides links to all offices responsible for issuing migratory bird take permits and permit applications.
- 3) Provide essential background information to DoD, when requested, to ensure sound management decisions. This may include information on migratory bird distributions, status, key habitats, conservation guidelines, and risk factors within each BCR. FWS will regularly update its *Birds of Conservation Concern* publication so it can be reliably referenced.
- 4) Work to identify special migratory bird habitats (e.g., nesting, stopover, migration corridors), and the ecological conditions important in those habitats.
- 5) Using the Points of Contact list (Appendix A), the FWS will continue to provide general guidance and information regarding migratory birds and their habitats to DoD, upon request. This guidance includes technical assistance for avoiding or minimizing project-related impacts on migratory birds.
- 6) The Migratory Bird Program will develop and provide FWS guidance to the Ecological Services Field Offices to ensure consistency in the interpretation and implementation of the MBTA as it applies to all federal actions.
- 7) In accordance with FWS Guidelines for Coordination with DoD and Implementation of the 1997 Sikes Act, promote timely and effective review of INRMPs, including any potential recommendations and revisions related to the conservation of migratory birds.
- 8) Review and comment on NEPA and other planning documents forwarded by military

installations.

- 9) Notify installations of any proposed or current actions that may result in a significant take of migratory birds.

H. Dispute Resolution

Preventing potential conflicts or resolving disagreements between the Parties will be attempted first at staff levels and elevated through the respective organizational levels if necessary. If staff level resolution is not possible, the conflict will be addressed through Alternative Dispute Resolution processes.

I. Mutual Agreement

- 1) This MOU will not change or alter requirements associated with the MBTA, Eagle Act, ESA, NEPA, Sikes Act, or other statutes or legal authority. This MOU is intended to provide internal guidance to federal agency staff.
- 2) The discretionary responsibilities established by this MOU may be incorporated into planned DoD actions; however, DoD may not be able to implement these discretionary responsibilities until DoD has successfully included them in formal planning, programming, and budgeting processes. This MOU is intended to be implemented when new actions are initiated as well as when INRMPs, IPMPs, and BASH plans are initiated or revised, and if the MOU's discretionary responsibilities are successfully included in formal planning, programming, and budgeting processes.
- 3) This MOU in no way restricts either Party from participating in similar activities with other public or private agencies, governments, organizations, or individuals.
- 4) This MOU is neither a fiscal nor a funds-obligation document. Any endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the Parties will be handled in accordance with applicable laws, regulations, and procedures, including those for government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties, and shall be independently authorized by appropriate statutory authority.
- 5) The Parties shall schedule periodic meetings to review progress and identify opportunities for advancing the principles of this MOU.
- 6) This MOU is intended to improve the internal management of the executive branch, and does not create any right or benefit, substantive or procedural, separately enforceable as law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.
- 7) Modifications to the MOU's scope shall be made by the Parties' mutual consent, through issuance of a written modification, signed and dated by the Parties, prior to any changes.
- 8) Either Party may terminate this MOU, in whole or in part, at any time before the

expiration date by providing the other Party with a written statement to that effect.

F. Definitions

Action – a program, activity, project, official policy, rule, regulation, or formal plan directly carried out by one of the Parties.

Airfield Environment – UFC 3-260-01 defines what an airfield is and all of its component parts, and defines clearance criteria. DoDI 4165.57 AICUZ describes the acceptable land uses for component parts of the airfield. The Airfield’s BASH Program is responsible for maintaining hazard-free airfields.

Avian Knowledge Network – an international organization of government and non-government institutions focused on understanding the patterns and dynamics of bird populations across the Western Hemisphere (www.avianknowledge.net).

Avian Stressor – any alteration of or addition to the environment that affects birds or their resources.

Bird/Wildlife Aircraft Strike Hazard (BASH) – an actual or potential collision between wildlife (i.e., a bird, mammal, or reptile) and an aircraft (e.g., plane or helicopter).

Breeding Bird Survey (BBS) – a standardized international survey that provides information on population trends of breeding birds, through volunteer observations located along randomly selected roadside routes in the United States, Canada and Mexico (www.mbr-pwrc.usgs.gov/bbs/bbs.html).

Bird Conservation Region (BCR) – a geographic unit used to facilitate bird conservation actions under the North American Bird Conservation Initiative (www.nabci-us.org/bcrs.htm).

Birds of Conservation Concern – a list that is published and periodically updated by the FWS Division of Migratory Bird Management intended to identify the migratory and non-migratory bird species that-- in addition to species already listed under the ESA, proposed or candidate-- represent the FWS’s highest conservation priorities, including ESA candidate species. The most current version of the list, Birds of Conservation Concern 2008, is available at www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

Cantonment Area – the principal built-up area of a DoD installation, typically containing housing, barracks, military organizational areas, and community support infrastructure.

Comprehensive Planning Efforts for Migratory Birds – includes Partners in Flight, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, Western Hemisphere Shorebird Reserve Network, North American Waterbird Conservation Plan, and other partnership planning efforts integrated through the North American Bird Conservation Initiative.

Conservation Measure – any action undertaken to address project-related stressors/impacts that ultimately improve the conservation status of one or more migratory bird species. Conservation measures split into two categories: Ecological/Habitat measures (driven by EO 13186) and Avian

Mortality measures (driven by MBTA). Conservation measures work to avoid or minimize an impact, reduce the impact over time, or rectify or compensate for the impact. Conservation Measures are also referred to as Mitigation, Best Practices, and Best Management Practices.

Conservation Planning – strategic and tactical planning of agency activities for the long-term conservation of migratory birds and their habitats.

Council for the Conservation of Migratory Birds – an interagency council established by the Secretary of the Interior to oversee the implementation of Executive Order 13186.

Ecological Condition – the composition, structure, and processes of ecosystems over time and space. This includes the diversity of plant and animal communities, the productive capacity of ecological systems and species diversity, ecosystem diversity, disturbance processes, soil productivity, water quality and quantity, and air quality. Often referred to in terms of ecosystem health, which is the degree to which ecological factors and their interactions are reasonably complete and functioning for continued resilience, productivity, and renewal of the ecosystem.

Effect (adverse or beneficial) – the biological consequences of an impact or the implementation of a conservation measure. Effects can be adverse (habitat avoidance) or beneficial (improved habitat quality). The effect is determined by the exposure of the bird or resource to the stressor/impact and the response to the impact. Effects may be direct, indirect, or cumulative, and refer to effects from actions or categories of actions on migratory birds, their populations, habitats, ecological conditions, and significant bird conservation sites.

Impact – the combined result of an action/project, all of its associated activities and components, and the stressors (see below) produced by those actions.

Integrated Natural Resources Management Plan (INRMP) – an integrated plan based, to the maximum extent practicable, on ecosystem management that shows the interrelationships of individual components of natural resources management (e.g., fish and wildlife, forestry, land management, outdoor recreation) to military mission requirements and other land use activities affecting an installation's natural resources. INRMPs are required for all DoD installations with significant natural resources, pursuant to the Sikes Act.

International Shorebird Survey – a monitoring program started in 1974 to survey shorebirds (sandpipers, plovers, etc.) across the Western Hemisphere (www.pwrc.usgs.gov/iss/iss.html).

International Migratory Bird Day (IMBD) – IMBD celebrates, brings attention to, and educates people about the migration of nearly 350 species of migratory birds that nest and breed throughout the Western Hemisphere. IMBD is celebrated in Canada, the United States, Mexico, Central and South America, and the Caribbean (<http://birdday.org/birdday>).

Management Action – an activity by a government agency that could cause a positive or negative impact to migratory bird populations or habitats. Conservation measures to mitigate potential activity-related stressors may be required.

Migratory Bird – an individual of any species protected by the Migratory Bird Treaty Act (MBTA) as listed in 50 CFR § 10.13.

Military Readiness Activity – all Armed Forces training and operations that relate to combat, including but not limited to the adequate and realistic testing of military equipment, vehicles, flight operations, weapons, and sensors for proper operation and suitability for use in combat.

Monitoring Avian Productivity and Survivorship (MAPS) – a program that uses the banding of birds during the breeding season to track the changes and patterns in the number of young produced, and the survivorship of adults and young (www.birdpop.org/maps.htm).

National Environmental Policy Act (NEPA) – a federal statute that requires federal agencies to prepare a detailed analysis of the environmental impacts of a proposed action and alternatives, and to include public involvement in the decision making process for major federal actions significantly affecting the quality of the human environment 42 U.S.C. 4321, et seq.

North American Bird Conservation Initiative (NABCI) – a partnership to align the avian conservation community to implement bird conservation through regionally-based, biologically driven, landscape-oriented partnerships across the North American continent. NABCI includes federal agencies of Canada, Mexico and the United States, as well as most landbird, shorebird, waterbird, and waterfowl conservation initiatives (www.nabci-us.org).

North American Waterbird Conservation Plan – a partnership of federal and state government agencies, non-governmental organizations, and private interests focusing on the conservation of waterbirds, primarily including marshbirds and inland, coastal, and pelagic colonial waterbirds (www.waterbirdconservation.org/plans.html). The partnership's vision is that the distribution, diversity, and abundance of breeding, migratory, and nonbreeding waterbirds are sustained throughout the lands and waters of North America, Central America, and the Caribbean.

North American Waterfowl Management Plan – a partnership of federal and state agencies, non-governmental organizations, and private interests focusing on the restoration of waterfowl populations through habitat restoration, protection, and enhancement (<http://birdhabitat.fws.gov/NAWMP/nawmphp.htm>).

Partners in Flight (PIF) – a cooperative partnership of more than 300 partners including federal and state government agencies, non-governmental organizations, conservation groups, foundations, universities, and industry focusing on the conservation of landbirds. DoD was an original signatory to the 1991 PIF Federal Agencies' MOA (www.partnersinflight.org).

Ranges & Training Areas (RTAs) – as defined within each installation's INRMP.

Species of Concern – refers to several categories of birds including: 1) species listed in the periodic report, *Birds of Conservation Concern*, published by the FWS Division of Migratory Bird Management (www.fws.gov/migratorybirds); 2) priority migratory bird species documented in the comprehensive bird conservation plans (North American Waterbird Conservation Plan, United States Shorebird Conservation Plan, Partners in Flight Bird Conservation Plans); 3) species or populations of waterfowl identified as high, or moderately high, continental priority in

the North American Waterfowl Management Plan; 4) listed threatened and endangered bird species in 50 CFR § 17.11; and 5) MBTA-listed gamebirds of management concern, as listed in the *Birds of Management Concern* list (www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BMC.html).

Take – to pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to pursue, hunt, wound, kill, trap, capture or collect (50 CFR § 10.12). The Executive Order 13186 further defines “take” to include intentional take, meaning take that is the purpose of the activity in question, and unintentional (incidental) take, meaning take that results from, but is not the purpose of, the activity in question. Both intentional and unintentional take constitute take as defined by the MBTA. The regulations implementing the Eagle Act define take to mean pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb bald and golden eagles (50 CFR § 22.3).

U.S. Shorebird Conservation Plan – a partnership of federal and state government agencies, non-governmental organizations, and private interests focusing on restoring and protecting stable and self-sustaining populations of all shorebird species (www.shorebirdplan.org).

K. Agreement Contacts and Execution

The principal contacts for this instrument are as follows:

Brad Bortner, Chief
Division of Migratory Bird Management
US Fish and Wildlife Service

L. Peter Boice, Deputy Director
Natural Resources Program
Office of the Secretary of Defense

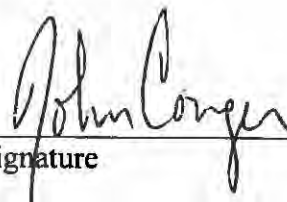
This MOU is executed as of the last date signed below and expires no later than five (5) years thereafter, at which time it is subject to review and renewal, or expiration.

The Parties hereto have executed this agreement as of the date shown below:

Dan Ashe
Director
US Fish and Wildlife Service

John Conger
Acting, Deputy Under Secretary of
Defense (Installations & Environment)
US Department of Defense

 9.5.2014
Signature Date

 7/10/2014
Signature Date

Appendix A: FWS Points of Contact list

Contact Information for Headquarters and Regional U.S. Fish and Wildlife Service Migratory Bird and Ecological Services Offices. For a complete listing of field offices see <http://www.fws.gov/offices/>.

FWS Region	States Covered	Migratory Bird Office	Migratory Bird Permits	Endangered Species
Headquarters		703-358-1714	703-358-1825	703-358-2171
Region 1	Hawaii, Idaho, Oregon, Washington	503-231-6164	503-872-2715	503-231-6151
Region 2	Arizona, New Mexico, Oklahoma Texas	505-248-6875	505-248-7882	505-248-6920
Region 3	Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio Wisconsin	612-713-5473	612-713-5436	612-713-5350
Region 4	Alabama, Arkansas Florida, Georgia Kentucky, Louisiana Mississippi, North Carolina, South Carolina, Tennessee	404-679-7070	404-679-7070	404-679-7140
Region 5	Connecticut, Delaware, Maine Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania Rhode Island, Vermont, Virginia West Virginia	413-253-8643	413-253-8643	413-253-8304
Region 6	Colorado, Kansas Montana, Nebraska North Dakota, South Dakota, Utah Wyoming	303-236-4409	303-236-8171	303-236-4252
Region 7	Alaska	800-368-8890	907-786-3693	907-786-3856
Region 8	California, Nevada	916-414-6464	916-414-6464	916-414-6464

APPENDIX K: POLICY LETTER PREVENTING
FERAL CAT AND DOG POPULATIONS ON NAVY
PROPERTY



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO:

5090

Ser N456M/10595820

10 JAN 2002

From: Chief of Naval Operations

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS
ON NAVY PROPERTY

Ref: (a) SECNAVINST 6401-1A, of 16 Aug 94, Veterinary health services
(b) AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat populations on Military Installations in the United States
(c) OPNAVINST 6250.4b, dtd 27 Aug 1998, Pest Management Programs
(d) Executive Order 13112 of 3 Feb 1999, Invasive Species

1. This letter clarifies the application of reference (a) regarding the prevention of free roaming (also called wild, feral or stray) cat and dog populations on Navy installations. The objective is to prevent injury or disease to Navy personnel, and eliminate adverse impacts on native wildlife. It requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations. Free roaming cats and dogs pose a potential public health threat to personnel on Navy installations, and they pose a threat to wildlife including endangered species and migratory birds.

2. Existing policy at paragraph 4-2c(4) of reference (a) states Dogs, cats, and other privately-owned or stray animals will not be permitted to run at large on military reservations. Consistent with this policy, Navy commands must ensure the humane capture and removal of free roaming cats and dogs. Consistent with this requirement, Trap/Neuter/Release (TNR) programs will no longer be established on Navy land. All existing TNR programs on Navy land must be terminated no later than 1 January 2003.

3. Responsible pet ownership is a key factor in eliminating free roaming cat and dog populations. In consultation with supporting Army Veterinary Office, installations shall implement appropriate pet management measures to preclude establishment

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULATIONS ON NAVY PROPERTY

of feral cat/dog populations, including, but not limited to the following:

Require installation residents to keep and feed pet animals indoors or under close supervision when outdoors (such as on leash and collar or other physical control device - cage, fenced yard etc.).

Encourage neutering or spaying of cats and dogs before they reach reproductive age (exceptions to this policy can be made on a case by case basis as determined by the Installation Commander).

Require routine vaccinations of cats and dogs for rabies and other diseases as required by federal, state and local laws and ordinances. A current vaccination record is required at time of registration of pets.

Require microchipping registration (or other system of pet identification approved by supporting veterinary office) of all pet cats and dogs brought onto installations. Installation residents must register cats and dogs and have pets wear registration or identification tags at all times.

Prohibit the feeding of feral animals on the installation.

Provide educational materials to pet owners regarding installation regulations and general pet management.

Enforce prohibition of abandonment of animals on installations.

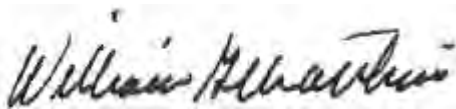
Comply with all humane and animal control regulations at the federal, state and local level (and their equivalents in host nation countries).

Navy installations in Europe that do not have a supporting veterinary office contact 100th Medical Detachment (VA HQ) (011) 49-622-177-2968; for all other locations that do not have a supporting veterinary office the POC is the VETCOM HQ, Commander (210) 221-6522.

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULATIONS ON NAVY PROPERTY

4. Effective prevention, management and elimination of feral cat and dog populations requires close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel to develop and implement an effective and humane program. Reference (b) provides information for preventing free roaming cat populations on military installations. General pest management guidelines are detailed in reference (c). Every effort should be made to work with other federal, state and local agencies to support reference (a) and reference (d) by eliminating free roaming cat and dog populations on Navy land. Navy commands should work with local animal control agencies to determine the best approach for the ultimate disposition of the captured animals. Every effort should be made, if practical, to find homes for adoptable feral cats and dogs.

5. My point of contact on this issue is Mr. Joe Cook, CNO N456M, at (703) 602-5335, or DSN 332-5335.



WILLIAM G. MATTHEIS
Deputy Director, Environmental
Protection, Safety and Occupational
Health Division

Distribution:

CINCLANTFLT (N465)
CINCPACFLT (N465)
COMNAVRESFOR (01E, N46)
CNR (91)
CNET (44)
COMNAVSECGRU (N443)
COMNAVTELCOM (N451)
BUMED (NEGC-EPWR)
COMNAVAIRSYSCOM (AIR.OY)
COMSPAWARSYSCOM (07-1)
COMNAVSUPSYSCOM (4A2, 421)
COMNAVSEASYSYSCOM (SEA 00T)
COMNAVFACECOM (ENV, 09)
CINCUSNAVEUR (N4, N76)
COMSC (NOCEP)
COMNAVMETOCCOM (N13)

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULTIONS ON NAVY PROPERTY

Distribution:

CHBUMED (NEHC-EPWR)
DIRSSP (SP20161)
ONI (411)

Copy to:

OASN (I&E)
OAGC (I&E)
CNC, N44, N46, 09BF
CMC, LFL
COMNAVREG MIDLANT
COMNAVREG SE
NTC GREAT LAKES
COMNAVRESFOR
COMNAVREG SW
COMNAVREG PEARL HARBOR
COMNAVMARIANAS
COMNAVREG NW
CNFJ
CNFK
PACNAVFACENGCOM PEARL HARBOR HI (CODE 23)
LANTNAVFACENGCOM NORFOLK VA (CODE 2032)
SOUTHWESTNAVFACENGCOM SAN DIEGO CA (CODE 03EN)
SOUTHNAVFACENGCON CHARLESTON SC (CODE 064)
ENOFLOACT NE PHILADELPHIA PA (CODE 18)
ENGFLDACT WEST SAN BRUNO CA (CODE 053)
ENGFLDACT CHES WASHINGTON DC (CODE 20E)
ENGFLDACT NW POULSBO WA (CODE 05EC4)
CO PWC GREAT LAKES
CO PWC GUAM
CO PWC JACKSONVILLE
CO PWC NORFOLK
CO PWC PEARL HARBOR
CO PWC PENSACOLA
CO PWC SAN DIEGO
CO PWC SAN FRANSICO BAY
CO PWC WASHINGTON DC
CO PWC YOKOSUKA
CO CEC PORT HUENEME
CO CEC GULFPORT
QESO
MESO
DODVSA/OTSG (Chief Animal Medicine)

Biology and Ecology of Feral, Free-Roaming, and Stray Cats

Chester V. Ogan

USDA Forest Service,
Pacific Southwest Research Station,
Redwood Sciences Laboratory
Arcata, CA95521

Ronald, M. Jurek

California Department of Fish & Game
Wildlife Management Division
1416 9th Street
Sacramento CA 95814

TAXONOMY

Feral cats are the free-roaming offspring of the domestic cat, *Felis catus*. They generally fall into two categories: 1) domestic animals adapted to living on their own in rural and urban areas; or 2) homeless, lost, or abandoned pets that live on their own (Roberto 1995). The cat is a medium-sized carnivore of the family *Felidae* which usually weighs between 3.3 and 4.5 kg and measures between 73 to 79 cm in length (Nowak 1991). The ancestral wild species, the European and African wild cat, *Felis silvestris*, was domesticated around 7,000 years ago, most likely around the Middle East and eastern North Africa. As humans shifted from nomadic life to permanent settlements, agriculture increased and granaries were built, attracting rats and other rodents. Cats were most likely "tamed" to prey on the rats (Newman 1977). In Egypt cats were known to have been domesticated by 2000 B.C. Egyptians revered cats and built statues to commemorate them. Through breeding and isolation the domestic cat has evolved to the point that it is now accepted as a separate species, *Felis catus* (Serpell 1988). In Europe domestic cats still freely interbreed with the European wild cat.

DISTRIBUTION

Feral cats are widely distributed throughout the world, including populations in cold temperate

or sub-polar oceanic islands (Jones 1977). They tend to be concentrated around populated areas where they are turned loose or left to run wild by their "owners", but are also widely distributed in remote locations. Cats probably arrived in North America with the first colonists several hundred years ago. Since that time cats have thrived as pets, unwanted strays, and semi-wild predators (Coleman et al. 1997).

REPRODUCTIVE BIOLOGY

Domestic cats reach reproductive maturity between 7 to 12 months of age. A breeding female, called a queen, can be in estrus as many as five times per year, but usually produces two litters per year. The gestation period lasts 63 to 65 days. The average litter is four kittens (Nowak 1991). In a farm cat study in Illinois, the survival rate was 1.5 kittens per female per year (Warner 1985). Longevity of free-ranging cats is estimated at 4 - 5 years; domestic cats can live from 15 to 17 years as house pets.

HOME RANGE

Cats in rural areas tend to have larger home ranges than cats in urban areas (Dards 1978, Tabor 1981). At Bodega Bay, a study of radio-collared cats has shown that an individual feral cat may range more than one mile (1.4 km) in a single day (Stallcup 1991). Liberg (1980) found a population in rural southern Sweden of 2.5 to

3.3 cats per square kilometer with a home range of 30 to 40 ha. Feral male cats in the Swedish population had home ranges 2 to 4 km across. Home ranges of free-ranging cats in Brooklyn, New York, averaged between 1.7 and 2.6 hectares; where there is a feeding station, free-ranging cats do not keep out other cats (Haspel and Calhoon 1989).

FOOD HABITS

Cats are carnivorous. An adult cat may eat 5 - 8% of its body weight per day, and a female feeding kittens may consume 20% of its own weight (Scott 1976). Subadult cats may consume 9.5% of its weight (Howard 1957). Diet includes insects such as bumblebees and grasshoppers, rodents, amphibians, reptiles, and ground nesting and ground roosting birds which are particularly vulnerable. Cats have been reported to have killed and eaten animals up to 3500 grams, a weight equal to their own (Hill 1997).

Joe Mitchel, University of Virginia, kept a tally of the wildlife kills of his four family cats over 11 months. The total was 104 individuals of 21 species: 6 species of birds, 8 species of mammals, and 7 species of reptiles. Species taken included flying squirrels (*Glaucomys volans*), chipmunks, wrens, and cardinals. Peter Stangel with the Fish and Wildlife Foundation in Washington, D.C. recorded 15 species of birds, mammals, and reptiles killed by his two cats in a four month period where he lived in South Carolina.

CONSERVATION STATUS

Feral cats are not protected or listed by state or federal agencies in California. Estimates based on 1970 U.S. Census data of households claiming cats as pets placed the population of cats "owned" as pets at 30 million (Pet Food Institute 1982). This did not include semi-wild or free ranging cats. Nationwide, approximately 30% of households have cats. In rural areas where free-ranging cats are not usually regarded as pets, approximately 60% of households have cats. In 1972 an estimated 31 million cats lived across the country (American Humane Assoc. 1972). Whit Gibbons, a senior biologist at the

University of Georgia's Savannah River Ecology Laboratory (1996) and Nassar and Mosier (1991) estimated that there are 60 million cats in the United States. According to another estimate, 50 million feral cats live in alleys, lots, abandoned buildings, and parks in the United States (PAWS 1997). George (1974) estimates that one-third of the cats in the United States occur in our rural areas.

Locally, the Arcata Marsh and Wildlife Sanctuary is home to 12 to 15 free-roaming feral cats (Roberto 1995).

HABITAT REQUIREMENTS

Many of the cats are free-roaming domestic pets, returning to human habitation after foraging bouts. Others are wild-living, using abandoned buildings and farm outbuildings as resting areas. Feral cats are found on islands denning rock outcrops and burrows (Jones 1977). In urban parks cats use trees and shrubs as resting and hiding sites. In grassland areas, culverts and hedgerows provide cover for feral cats.

SURVEY TECHNIQUES

Sooted trackplates easily detect cats. Cat tracks can easily be confused with small canids such as kit foxes (*Vulpes macrotis*), grey foxes (*Urocyon cinereoargenteus*), and red foxes (*Vulpes wupes*). The cat track is more rounded than canid tracks (Taylor and Raphael 1988). The small canids may not show the claws. According to Orloff et al. (1993) cat tracks on sooted trackplates can be distinguished by the three lobes on the posterior border of the palm pad and one or two lobes on the anterior border. Since the foot is not as well furred, the palm and toe pads are usually distinct. The anterior portion of the palm pad usually extends to a point halfway through the posterior toe pads, and the posterior toe pads often extend almost halfway through the anterior toe pads. Cats apparently have no hesitation about stepping on trackplates, placing their full weight on the soot, creating clear prints. In contrast, many canids may be hesitant, producing indistinct or blurred prints (Orloff et al. 1993).

MANAGEMENT CONSIDERATIONS

The issues regarding free-ranging cats are really social ones. Cats can be a major factor in the killing of native wildlife including threatened or endangered species, reducing the prey needed for native predators to survive, and spreading diseases. For further discussion of these issues the authors recommend reading Coleman et al. (1997) and Luoma (1977).

Coleman et al. (1997) states that cats, worldwide, may be the second-most leading reason behind habitat destruction for bird species extinction. Nationwide cats are contributing to the endangerment of such species as least terns (*Sterna antillarum*), piping plover (*Choradrius melodus*), and loggerhead shrike (*Lanius ludovicianus*). Marsh rabbits (*Sylvilagus palustris*) in Key West, Florida, have been threatened by predation from domestic cats.

On Anacapa Island, cats have caught and eaten young brown pelicans (*Pelecanus occidentalis*) (Anderson et al. 1989). Along with non-native red foxes, free-roaming feral cats are a major threat to the endangered California clapper rail (*Rallus longirostris obsoletus*) (Frederick 1996, Roberto 1995). In Hawaii feral cats were responsible for the reduction of the Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*) (van Riper 1978).

According to U.S. Fish and Wildlife Service biologist Don Edwards of the San Francisco Bay National Wildlife Refuge, feral cats forage along the tidal sloughs and levees ravaging burrowing owls (*Athene cunicularia*), snowy plovers (*Charadrius alexandrinus*), and salt-marsh harvest mouse (*Reithrodontomys raviventris*) populations - all species at risk.

Recent research (Coleman and Temple 1994) indicates that rural free-ranging cats in Wisconsin may kill between 8 and 217 million birds each year. Reasonable estimates indicate that over 39 million birds are killed annually in that state each year. Nationwide, rural cats probably kill over a billion small mammals and millions of birds each year.

Studies in England and Wisconsin have documented that well-fed domestic cats kill as many prey as feral cats (Churcher and Lawton 1987, Coleman and Temple 1994). Free-roaming cats fed at feeding stations continue to hunt natural prey, according to Scott Craven in Luoma's 1997 Audubon article,

Cat feeding habits may be detrimental to the survival of natural predators. George (1974) studied three cats responsible for eating 18 species of mammalian prey in raptor home-range territories. In a study in rural Illinois between January 1968 and December 1971, rodents accounted for between 82 and 95% of free-ranging cats prey. This area was also hunted by red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), and northern harriers (*Circus cyaneus*). Pearson (1964) recorded the removal of 4200 mice from a 35 acre study plot by six cats. According to Scott Craven, "Anything a cat consumes is one less bit of prey for a native predator."

Cats may transmit diseases to wild animals and humans. Dr. Stan Deresinski (*in* Roberto 1995) listed 21 cat associated infections which can be transmitted to humans. Some free-ranging domestic cats carry rabies and toxoplasmosis which can be easily transmitted to humans (Warfield and Gay 1986). According to Ron Lapham of the Humboldt County Humane Society, cats may be responsible in Humboldt County for an increase in raccoon distemper. Feline distemper (panleukopenia) and an immune deficiency disease may have been spread to the endangered Florida panther (*Felis concolor coryi*) (Roelke, et al. 1993). Feline leukemia virus was documented in a mountain lion (*Felis concolor*) which staggered onto the Sacramento State College campus in 1993 (Jessup et al. 1993). Native wild cats may have an antibody against the feline immunodeficiency virus (FIV).

MITIGATIONS

Controlling cats in urban areas will require the education of cat lovers from the general public as well as from such groups as Stray Cats and TTVAR (Trapped, Tested, Vaccinated, Altered,

and Released) who advocate feeding stations. Controlling the number of free-ranging rural cats primarily will depend on enlisting the help of rural residents who maintain them.

At Stanford University a habitat conservation plan was rewritten to consider the impacts of free-ranging cats on listed species around the campus. Nationally, cat-loving groups are attempting to set up free-roaming cat sanctuaries on public and corporate lands. Conversely, National Park Service's George Washington Memorial Parkway in Virginia implemented a trapping policy to remove feral cats and feeding stations. The National Park Service now has a lawsuit pending by cat-lovers over its trapping policy.

What can we do? The following suggestions are from Coleman et al. (1997).

- Keep only as many pets as you can adequately care for.
- If you have a cat, keep it indoors.
- Declaw your cat
- Neuter your cat and encourage other to do the same.
- Locate bird feeders in sites that do not provide cover for cats to wait in ambush.
- Eliminate sources of food that attract stray cats.
- Don't feed stray cats. Feeding maintains high densities of cats that competes with native wildlife populations.

In addition;

- Trap stray cats and take them to your animal shelter. (Humboldt County Humane Society euthanizes over 200 cats a month.)
- Enforce current laws prohibiting the feeding of wildlife.

The city of Novato in Marin County, California now requires cats to be licensed and implanted with an identifying microchip. Communities can set heavy fines for failure to spay or neuter cats, abandonment of domestic animals, and feeding in public places.

REFERENCES CITED

- American Humane Association. 1972. Animal control survey. American Humane Assoc. Denver, CO.
- Anderson, D.W., J.O. Kieth, G.R. Trapp, F. Gress, and L.A. Moreno. 1989. Introduced small ground predators in California brown pelican colonies. *Colonial Waterbirds* 12(1):98-103.
- Churcher, P.B. and J.H. Law-ton. 1987. Predation by domestic cats in an English village. *J. Zool., London.* 212:439-455.
- Coleman, J.S., S.A. Temple, and S.R. Craven. 1997. Cats and wildlife: a conservation dilemma. Misc. Publications, USDA Cooperative Extension, Univ. of Wisconsin. 6 p.
- Dards, J.L. 1978. Home ranges of feral cats in Portsmouth Dockyard. *Camiv. Genet. Newsl.* 3:242-256.
- Frederick, J.M. 1996. Feral cats: fiends or foe? USDA Animal Damage Specialist. Nov. 1996 2P.
- Gibbons, W. 1996. Domestic cats are a threat to all wildlife. Sept. 16, 1996 editorial column in the newspaper *Athenaeum*. Athens, Georgia. 2 p.
- George, W.G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. *Wilson Bull.* 86:384-396.
- Haspel, C. and R.E. Calhoon. 1989. Home ranges of free-ranging cats (*Felis catus*) in Brooklyn, New York. *Can. J. Zool.* 67:178-181.
- Hill, R., the Honorable Senator. 1997. Media release: Feral cats pose threat to native mammals and birds. Minister for the Environment, Australia. 2 p.
- Howard, W.E. 1957. Amount of food eaten by small carnivores. *J. Mammal.* 38:516-517.

- Jessup, D.A., K.C. Pettan, L.J. Lowenstine, and N.C. Pederson. 1993. Feline leukemia virus infection and renal spirochetosis in free-ranging cougar (*Felis concolor*). *J. Zool. and Wildl. Medicine* 24:73-79.
- Jones, E. 1977. Ecology of the feral cat, *Felis calus* (L.), on Macquarie Island. *Austral. Wildl. Res.* 4:249-262.
- Jurek, R.M. 1994. A bibliography of feral, stray, and free-ranging domestic cats in relation to wildlife conservation. Calif. Dept. Fish and Game, Nongame and Mammal Program Rep. 94-5. 24 p.
- Liberg, O. 1980. Spacing patterns in a population of rural free-roaming domestic cats. *Oikos* 35:336-349.
- Luoma, J.R. 1997. Catfight. *Audubon* 99:84-91.
- Nassar, R. and J. Mosier. 1991. Projections of pet populations from census demographic data. *J. Veterinary Med. Assoc.* 198:1157-1159.
- Newman, C. 1997. Cats: nature's masterpiece. *National Geographic* 191:54-76.
- Nowak, R.M. and J.L. Paradiso. 1983. *Felis catus* (domestic cat). Pages 1068 -1070 *Walker's Mammals of the World*, 5th edition, vol. II. John Hopkins Univ. Press, Baltimore, MD. 1362 p.
- Orloff, S.G., A.W. Flannery, and K.C. Belt. 1993. Identification of San Joaquin kit fox (*Vulpes macrotis mutica*) tracks on aluminum tracking plates. *Calif. Fish and Game* 79:45-53.
- PAWS. 1997. Feral Cats. Ally Cat Allies at <http://www.vv.paws.org/hoh/hohil.html>.
- Pearson, O.P. 1964. Carnivore-mouse predation: an example of its intensity and bioenergetics. *J. Mammal.* 45:177-178.
- Pet Food Institute. 1982. Pet Food information fact sheet. Pet Food Institute, Washington, D.C.
- Roberto, P. 1995. The cat rescue movement vs. wildlife defenders: whose right to live. *Calif. Coast and Ocean* 11:31-40.
- Roelke, M.E., D.J. Forester, E.R. Jacobson, G.V. Kollias, F.W. Scott, M.C. Barr, J.F. Evermann, and E.C. Pirtel. 1993. Seroprevalence of infectious diseases in free-ranging Florida panthers (*Felis concolor coryi*). *J. Wildl. Diseases* 29:36-49.
- Scott, P.P. 1976. The cat. Pages 230 - 284 in UFAW, ed. 1976. *The UFAW handbook on the care and management of laboratory animals* (ed.). Churchill Livingstone: Edinburgh and London.
- Serpell, S.A. 1988. The domestication of the cat. Pages 151-158 in Turner, D.C. and P. Bateson eds. 1988. *The domestic cat: the biology of its behavior*. Cambridge Univ. Press, Cambridge. 222 p.
- Stallcup, R. 1991. Cats: a heavy toll on songbirds, a reversible catastrophe. *Point Reyes Bird Observatory Observer*, 91:8-9.
- Tabor, R. 1981. General biology of feral cats. Pages 5-11 in *The ecology and control of feral cats*. 1981. Proc. Symposium, Sept. 23-24, 1980. Univ. London, Universities Federation for Animal Welfare, Potters Bar, Hertfordshire.
- Taylor, C.A. and M.C. Raphael. 1988. Identification of mammal tracks from sooted track stations in the Pacific Northwest. *Calif. Fish and Game* 74:4-15.
- Van Riper, C. II. 1978. Dark-rumped petrel at Hawaii Volcanoes National Park. *Bird-banding* 49:372.
- Warfield, M.S. and W.I. Gay. 1993. The cat as a research subject. Pages 41-54 in W.I. Gay, ed. *Health benefits of animal research*. Foundation for Biomedical Research, Washington, D.C.
- Warner, R. 1985. Demography and movements of free-ranging cats in rural Illinois. *J. Wildl. Manage.* 49:340-346.

APPENDIX L: MARINE MAMMAL AND SEA
TURTLE MANAGEMENT

MEMORANDUM OF UNDERSTANDING
BETWEEN
JOINT EXPEDITIONARY BASE LITTLE CREEK-FORT STORY (JEBCFS)
AND

U.S. FISH AND WILDLIFE SERVICE, BACK BAY NATIONAL WILDLIFE REFUGE

1. Purpose. This Memorandum of Understanding (MOU) describes procedures for U.S. Fish and Wildlife Service (USFWS), Back Bay National Wildlife Refuge (BBNWR) to perform patrols for sea turtle activity and marine mammal strandings (dead or alive) on the Joint Expeditionary Base Fort Story (JEBFS) side of JEBCFS.

2. Background. Commander, Joint Expeditionary Base Little Creek-Fort Story (JEBCFS) ensures that surveys for nesting sea turtles and marine mammal strandings (dead or alive) are conducted on installation beach front property at JEBFS. This MOU continues previously established turtle patrols, including patrolling for sea turtle and marine mammal strandings. Pursuant to the Sikes Act, 16 U.S.C sections 670a-670f, this MOU supports the Integrated Natural Resources Management Plan (INRMP) of JEBCFS as approved by the installation's Commanding Officer which implements an ecosystem-based conservation and management program that provides for integrated conservation, restoration, and enhancement of natural resources consistent with the various missions supported by JEBCFS, and provides for sustainable, multipurpose use of natural resources subject to safety and security considerations. Management objectives include integrated management of land, fish and wildlife, forest, and outdoor recreation resources, as practicable and consistent with the missions, land use, and operational requirements at JEBCFS. In addition, the MOU between the U.S. Department of Defense and the U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies for Cooperative Integrated Natural Resource Management Program on Military Installations of 29 July 2013 encourages the military services to enter into cooperative agreements to coordinate and implement natural resource management on military installations.

3. Scope. USFWS representatives or volunteer staff will conduct non-intrusive patrols along a portion of beach front property between the JEBFS Gate 8 and the Cape Henry House/Building 734 each morning from 25 May until 31 August annually. However, patrolling may start as early as 15 May in the event that early sea turtle nesting is identified in VA or NC. This effort takes approximately fifteen minutes (Enclosure 1). If items of interest are located, USFWS may be on site for several additional hours.

a. If a nest is present, *in situ* nest management strategies as outlined in the *Virginia Sea Turtle Nesting Handbook* will be

adhered to. USFWS will assist with any nest management measures the base determines they need assistance with. If the base determines a nest is in a sensitive area and has the potential to impact the mission, base representatives and the USFWS (Virginia Field Office) will coordinate with Ruth Boettcher, Virginia Department of Game and Inland Fisheries, to determine a course of action.

b. USFWS will report sea turtle or marine mammal strandings (dead or alive) to the Virginia Aquarium Stranding Team at 757-385-7575; and to the Base Natural Resources at 757-462-5350.

c. USFWS must submit a copy of data collection sheets related to a crawl or nests at JEBFS to the Base Natural Resources staff in an end-of-season annual report via email to sharon.waligora@navy.mil or mail to Sharon Waligora, Naval Facilities Engineering Command, Public Works Department JEBLCFS, 1450 Gator Blvd, Suite 100, Virginia Beach, VA 23459; and contact Base Natural Resources at 757-462-5350 immediately if evidence of a crawl or nesting activity has been identified.

4. Enclosures. Enclosure 1, JEBFS Sea Turtle Patrol Route Map. Enclosure 2, Hold Harmless Agreement for personnel conducting patrols on JEBFS.

5. Responsibilities

a. USFWS responsibilities:

(1) The following persons are allowed access to specified locations (see attached map) at JEBFS solely for the purpose of patrolling and monitoring sea turtle activity and coordinating removal of stranded marine mammals, sea turtles, and sea turtle eggs, if observed:

(a) Ms. Marian Childress (Volunteer) - Performing patrols for USFWS, BBNWR staff.

(b) Ms. Marsha Miller (Volunteer) - Performing patrols for USFWS, BBNWR staff.

(c) Mr. Bruce Haddan (Volunteer) - Performing patrols for USFWS, BBNWR staff.

Access by other individuals must be coordinated with, and approved by, the Installation Commander prior to entry.

(2) USFWS volunteers or representatives will be required to obtain Visitor Passes from the Pass and ID Office.

(3) USFWS volunteers or representatives will notify JEBLCFS Training and Ranges Office (757-422-7101 x231/232/245) upon arrival at JEBFS and when departing the area if during duty hours (between 8:00 AM and 4:30 PM) or the Emergency Communications Center (757-462-4444) if after duty hours. Military operations and training activities take priority over access to the beach areas.

(4) No compensation is authorized to USFWS or its volunteers or representatives to perform this work.

(5) Operators of All Terrain Vehicles (ATVs) must have ATV operator's training prior to commencement of work and wear a helmet while operating an ATV at JEBFS.

(6) No movement over primary dunes, either via ATV, other vehicle, or foot, is authorized.

(7) All volunteers and operators of ATVs must sign a Hold-Harmless Agreement, see Enclosure 2, and will not hold the federal government, United States Navy, JEBLCFS, or their officers, members, agents, and employees, responsible for accidents or injuries. Original signed copies of the Hold-Harmless Agreements will be provided to JEBFS Natural Resources staff prior to commencement of work (Enclosure 2) by mail.

(8) USFWS and its volunteers or representatives understand that the patrolling/work related to this project at JEBFS could be discontinued at any time as directed by the Installation Commander. This includes, but is not limited to: security or safety concerns; military training needs; and changes in mission.

(9) Information on sea turtle activity (to include no observed activity) as well as removal of specimens will be coordinated as stipulated earlier in the last paragraph of the Scope.

(10) The patrol locations at JEB Fort Story are depicted in Enclosure 1, JEB Fort Story Turtle Patrol Route Map. This is the same route used for the previous patrol work performed in 2008-2014.

b. JEBLCFS responsibilities:

(1) Assist USFWS in gaining access to JEBFS.

6. Other Provisions. Nothing in this MOU should be construed in any way to constitute a violation of the Federal Anti-deficiency Act, 31 U.S.C. §1341.

7. Points of Contact (SME)

- a. USFWS
Back Bay National Wildlife Refuge
1324 Sandbridge Road
Wildlife Biologist
Geraldyn Mireles
757-301-7329 x-153
Geraldyn_Mireles@fws.gov
- b. JEBLCFS Environmental Division
Sharon Waligora
757-462-5350
sharon.waligora@navy.mil
- c. USFWS
Virginia Field Office
Assistant Field Office Supervisor
Troy Andersen
804-654-9235
Troy_andersen@fws.gov
- d. Virginia Department of Game and Inland Fisheries
Coastal Terrestrial Biologist
Ruth Boettcher
757-709-0766
Ruth.Boettcher@dgif.virginia.gov

8. Modification and Termination. This MOU may be modified only through the written agreement of all parties. Any party may terminate this MOU. A written notice of termination must be delivered 120 days prior to the termination date in order for such termination to be effective.

9. Effective Date and Term. This MOU is effective when signed by both parties and will remain in effect for a period not to exceed six years or until terminated.

10. Signatures. IN WITNESS WHEREOF, the Parties, by their duly authorized representatives, have affixed their signatures hereto in recognition of their acceptance of the terms and conditions, responsibilities, and obligations set forth herein.

 4/12/16

for DOUG BREWER Deputy Refuge Manager (Date)
Refuge Manager
Back Bay National Wildlife Refuge
U.S. Fish and Wildlife Service

 22 FEB 16

R. L. WILLIAMSON (Date)
Rear Admiral, U.S. Navy
Commander, Navy Region Mid-Atlantic

Memorandum of Understanding
Number N61643-20150910-0312

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Lauren Mowbray, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Lauren Mowbray 6/2/2017
Signature Date

Enclosure (2)

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marsha Joanne Miller, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marsha Joanne Miller
Signature

5/24/17
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, David McDaniel, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

David McDaniel
Signature

5-21-17
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marian R. Childress, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

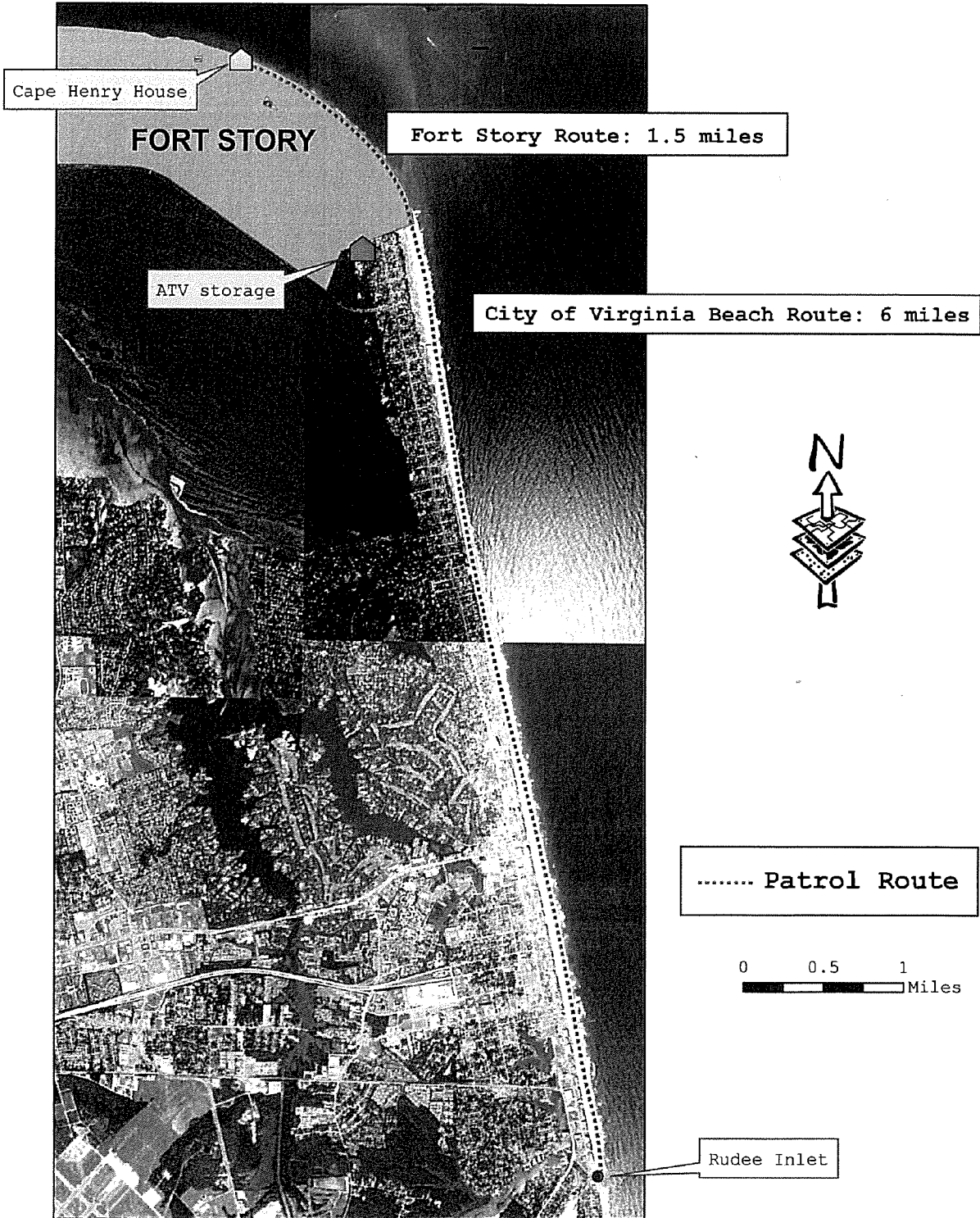
I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marian R. Childress
Signature

5/21/17
Date

Back Bay NWR
Sea Turtle Patrol Volunteer Route



Back Bay NWR GIS Lab

Memorandum of Understanding
Number N61643-20150910-0312

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marian R. Childress, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marian R. Childress
Signature

4/22/16
Date

Enclosure (2)

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Ecin Bates, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Ecin B Bates
Signature

4/15/16
Date

Memorandum of Understanding
Number N61643-20150910-0312

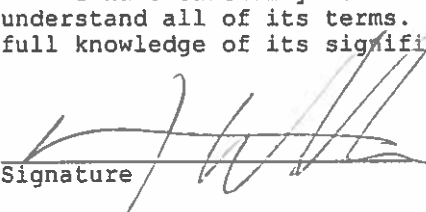
RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, BRUCE HADOM, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Signature



Date

4/12/16

Enclosure (2)

Memorandum of Understanding
Number N61643-20150910-0312

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marsha Miller, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marsha Miller
Signature

4/12/16
Date

Enclosure (2)

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Lauren Mowbray, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Lauren Mowbray
Signature

5/3/2016
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Kathryn Owens, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.


Signature

4/12/16
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Krystle Rodrigue, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.


Signature

15-April-2016
Date

Krystle Rodrigue

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Sarah A. Rose, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Sarah A. Rose
Signature

4/15/16
Date

Enclosure 1
Virginia Marine Science Museum Letter Regarding Bottlenose Dolphin Habitat (1999)



October 15, 1999

Tom McCarthy
Planning Division, Environmental Analysis
U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510

Dear Tom McCarthy,

Thanks for sending a copy of the scoping letter and figures related to the proposed Fort Story Breakwaters and Beach Nourishment project. I forwarded a copy of the Barco *et al* paper which discusses research conducted by the Virginia Marine Science Museum (VMSM) and James Madison University in our study area, which includes Fort Story. We at VMSM have been studying coastal bottlenose dolphins in Virginia Beach since 1989. These efforts have included shore-based, vessel based and aerial surveys in addition to recovery and examination of hundreds of stranded animals. In addition to the Barco paper, we have contributed to many scientific meetings and workshops related to bottlenose dolphin research and conservation (see attached lists). The results of these many years of observation have produced solid evidence of the seasonal importance of Cape Henry waters to mid-Atlantic coastal bottlenose dolphins. While dolphin numbers are not available for many specific regional areas in the mid-Atlantic, our research has documented that hundreds of bottlenose dolphins preferentially utilize the waters around Cape Henry (see attached maps). To our knowledge, dolphin densities recorded at Cape Henry are higher than any other area in the mid-Atlantic. Possibly even more significant, our research has documented compelling evidence of the importance of Cape Henry waters as a nursery area for coastal bottlenose dolphins.

The results of this research lead me to express concern regarding this proposed project as it relates to potential impacts on a bottlenose dolphin critical habitat area. I believe that this potential impact should receive appropriate attention and consideration during the assessment and planning phases of this proposed project. As our research has documented, there are certainly great differences between seasons regarding the utilization of the Cape Henry habitat area by bottlenose dolphins. With very few exceptions, dolphins are not present in Cape Henry waters during winter months. These seasonal variations may parallel similar concerns associated with other species such as sea turtles. These concerns should be carefully assessed, particularly with respect to the time of year of construction activities, as this proposed project is reviewed.

717 General Booth Boulevard, Virginia Beach, Virginia 23451
757-437-6949 or FAX 757-437-4976

Thank you once again for the opportunity to comment on this proposed project and I would welcome any further requests for information from your office.

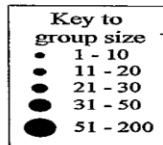
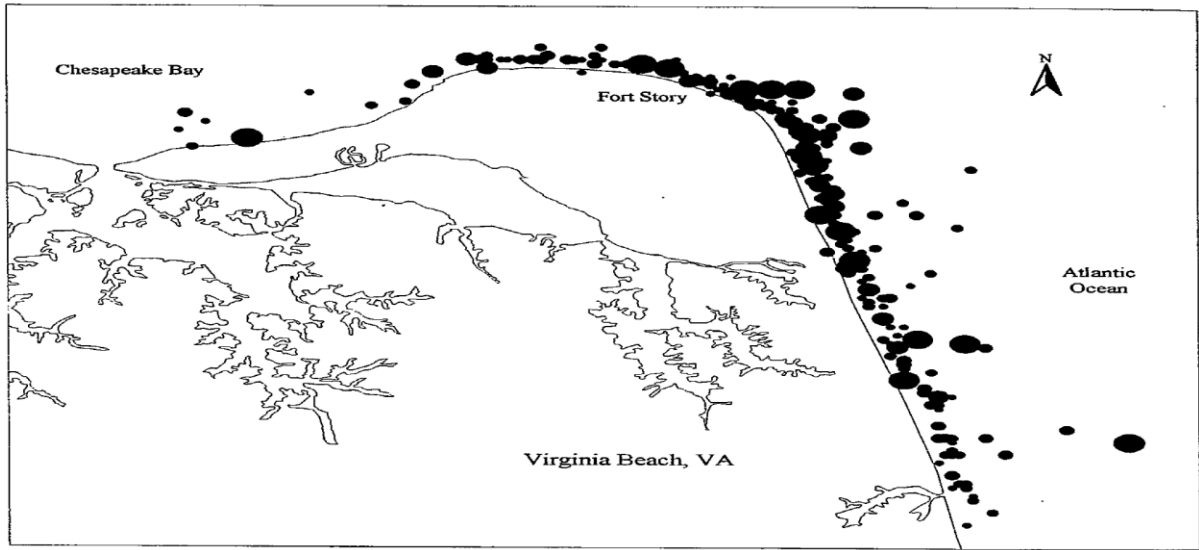
Sincerely,

A handwritten signature in black ink, appearing to read "W. Mark Swingle".

W. Mark Swingle
Curator of VMSM Stranding Center

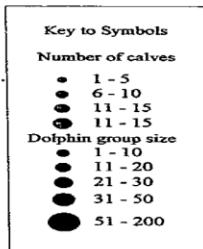
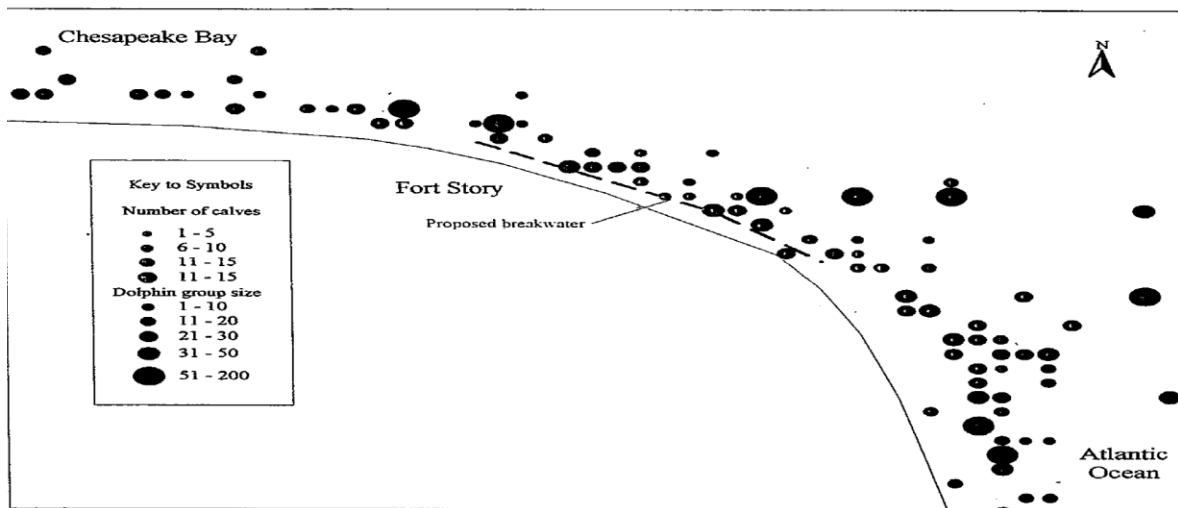
cc C. Mac Rawls, Director

Dolphin Groups Sighted on Research Surveys from 1994-1998 by the Virginia Marine Science Museum



Source = Unpublished VMSM Photo-Identification Data

Dolphin Groups sighted in the vicinity of the proposed breakwater by Virginia Marine Science Museum Research Surveys (1994-1998)



Source = Unpublished VMSM Photo-Identification Data

Biological Assessment

Sea Turtle Management

at

**Joint Expeditionary Base Fort Story,
Virginia Beach, Virginia**

Prepared for

US Fish and Wildlife Service
Virginia Ecological Services
6669 Short Lane
Gloucester, VA 23061

Submitted by

Naval Facilities Engineering Command – MIDLANT



May 2016

TABLE OF CONTENTS

		<u>Page</u>
LIST OF FIGURES		iii
LIST OF TABLES		iii
LIST OF ACRONYMS AND ABBREVIATIONS.....		iv
1.0	INTRODUCTION.....	1
1.1	PURPOSE AND NEED	1
1.2	OBJECTIVES.....	1
1.3	CONSULTATION HISTORY	1
2.0	DESCRIPTION OF THE ACTION AREA AND PROPOSED ACTION.....	3
2.1	ACTION AREA.....	3
2.2	PROPOSED ACTION	3
2.2.1	<i>Sea Turtle Patrols</i>	3
2.2.2	<i>Nest Management</i>	3
2.2.2.1	In Situ Nest Protection and Monitoring.....	3
2.2.2.2	Nest Relocation	8
2.2.2.3	Hatchling Protection	9
2.3	BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES	9
3.0	LISTED SPECIES AND CRITICAL HABITAT IN THE ACTION AREA.....	11
3.1	SPECIES CONSIDERED.....	11
3.2	SPECIES ACCOUNTS.....	13
3.2.1	<i>Leatherback Sea Turtle (Dermochelys coriacea)</i>	13
3.2.1.1	Description.....	13
3.2.1.2	Status	13
3.2.1.3	Threats	13
3.2.1.4	Habitat Associations	13
3.2.1.5	Distribution.....	14
3.2.2	<i>Loggerhead Sea Turtle (Caretta caretta)</i>	14
3.2.2.1	Description.....	14
3.2.2.2	Status	16
3.2.2.3	Threats	17
3.2.2.4	Habitat Associations	17
3.2.2.5	Distribution.....	17
3.2.3	<i>Green Sea Turtle (Chelonia mydas)</i>	18
3.2.3.1	Description.....	18
3.2.3.2	Status	18
3.2.3.3	Threats	18
3.2.3.4	Habitat Associations	21
3.2.3.5	Distribution.....	21
3.2.4	<i>Hawksbill Sea Turtle (Eretmochelys imbricata)</i>	21
3.2.4.1	Description.....	21
3.2.4.2	Status	24
3.2.4.3	Threats	24
3.2.4.4	Habitat Associations	24
3.2.4.5	Distribution.....	24
3.2.5	<i>Kemp's Ridley Sea Turtle (Lepidochelys kempii)</i>	25
3.2.5.1	Description.....	25
3.2.5.2	Status	25
3.2.5.3	Threats	25
3.2.5.4	Habitat Associations	27
3.2.5.5	Distribution.....	27

4.0	ENVIRONMENTAL BASELINE OF AFFECTED AREA.....	31
4.1	BEACH AND DUNE DISTURBANCE	31
4.2	PREVIOUS SEA TURTLE MANAGEMENT ACTIONS.....	31
4.3	LIGHTING SURVEY	31
	4.3.1 <i>Methodology</i>	32
	4.3.2 <i>Results</i>	32
5.0	EFFECTS OF THE ACTION.....	35
5.1	NEST RELOCATION	35
	5.1.1 <i>Movement-Induced Mortality</i>	35
	5.1.2 <i>Adverse Changes to Embryonic Development and Hatching Success</i>	35
5.2	CUMULATIVE EFFECTS.....	36
6.0	DETERMINATION OF EFFECTS.....	39
7.0	REFERENCES.....	41

APPENDICES

Appendix A	Memorandum of Understanding between Joint Expeditionary Base Little Creek-Fort Story and United States Fish and Wildlife Service, Back Bay National Wildlife Refuge
Appendix B	Final Report, Lighting Surveys for Sea Turtle Nest Management, Joint Expeditionary Base Fort Story, Virginia Beach, Virginia
Appendix C	Sea Turtle Data Sources
Appendix D	Construction and Placement of Predator-proof Nest Cages

LIST OF FIGURES

	<u>Page</u>
Figure 1. Location of Joint Expeditionary Base Fort Story	4
Figure 2. Joint Expeditionary Base Fort Story Action Area (east).....	5
Figure 3. Joint Expeditionary Base Fort Story Action Area (west)	6
Figure 4. Joint Expeditionary Base Fort Story Sea Turtle Management Action Area	7
Figure 5. Example of a predator-proof sea turtle egg chamber enclosure.....	8
Figure 6. Sighting, stranding, and incidental fisheries bycatch records of the leatherback turtle near the Action Area. Source data: Refer to Appendix C.	15
Figure 7. Sighting, stranding, and incidental fisheries bycatch records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.	19
Figure 8. False crawl and nesting records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.	20
Figure 9. Sighting, stranding, and incidental fisheries bycatch records of the green turtle near the Action Area. Source data: Refer to Appendix C.	22
Figure 10. Nests and false crawls of the green turtle near the Action Area. Source data: Refer to Appendix C.....	23
Figure 11. Sighting, stranding, and incidental fisheries bycatch records of the hawksbill turtle near the Action Area. Source data: Refer to Appendix C.	26
Figure 12. Sighting, stranding, and incidental fisheries bycatch records of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C.	29
Figure 13. Nests and false crawls of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C.....	30

LIST OF TABLES

	<u>Page</u>
Table 1 Federally listed sea turtle species.....	11

This page intentionally left blank

LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
ac	acre(s)
BA	biological assessment
BBNWR	Back Bay National Wildlife Refuge
CETAP	Cetacean and Turtle Assessment Program
CFR	Code of Federal Register
cm	centimeter(s)
CZM	coastal zone management
DoD	Department of Defense
DoDI	Department of Defense Instructions
DoDM	Department of Defense Manual
DoN	Department of the Navy
DPA	Dune Protection Area
DPS	distinct population segment
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
FR	Federal Register
ft	foot (feet)
ha	hectare(s)
INRMP	Integrated Natural Resources Management Plan
in	inch(es)
JEBFS	Joint Expeditionary Base Fort Story
JEBLCFS	Joint Expeditionary Base Little Creek-Fort Story
JLOTS	Joint Logistics Over-The-Shore
kg	kilogram(s)
km	kilometer(s)
lb	pound(s)
MATS	Mid-Atlantic Tursiops Surveys
m	meter(s)
mi	mile(s)
MOU	Memorandum of Understanding
NARWC	North Atlantic Right Whale Consortium
NAVFAC MIDLANT	Naval Facilities Engineering Command Mid-Atlantic Region
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
SEFSC	Southeast Fisheries Science Center
SST	sea surface temperature
STSSN	Sea Turtle Stranding and Salvage Network
SWOT	State of the World's Sea Turtles
T&E	threatened and endangered
TEWG	Turtle Expert Working Group
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USVI	United States Virgin Islands
VAST	Virginia Aquarium Stranding Team
VDGIF	Virginia Department of Game and Inland Fisheries
VIMS	Virginia Institute of Marine Science

This page intentionally left blank

1.0 INTRODUCTION

1.1 PURPOSE AND NEED

The purpose of this Biological Assessment (BA) is to address the effect of sea turtle nest and stranding management and relocation at Joint Expeditionary Base Fort Story (JEBFS) on federally listed species and designated critical habitat under the jurisdiction of the United States Fish and Wildlife Service (USFWS). The United States (US) Navy proposes to implement a nesting sea turtle management strategy to comply with legal mandates in Section 7 of the Endangered Species Act (ESA) of 1973 as amended (16 US Code [USC] 1531 et seq) in accordance with 32 Code of Federal Regulations (CFR) Part 190 – Department of Defense (DoD) Natural Resources Management Program; 16 USC §670a et seq. – Sikes Act, as amended; DoD Instruction (DoDI) 4715.03 – Natural Resources Conservation Program; DoD Manual (DoDM) 4715.03 – Integrated Natural Resources Management Plan (INRMP) Implementation Manual; Chief of Naval Operations Operating Instruction 5090.1D – Environmental Readiness Program; and Chief of Naval Operations Operating Manual 5090.1.

The proposed action involves nesting and stranded sea turtle management at JEBFS in Virginia Beach, Virginia. These actions have the potential to impact the following ESA-listed species which are known to occur in or near the Action Area: loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). No critical habitat for these sea turtle species has been designated in or near the Action Area.

The purpose of the proposed action is to ensure consistency with the installation's military mission and to support "no net loss" in military mission capability for the installation lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on the installation. The nesting sea turtle management plan at JEBFS is a component of the INRMP. In accordance with DoD policy on natural resources conservation programs, the INRMP must work to guarantee DoD's continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of natural resources and the ecosystem services they provide (DoDI 4715.03). The INRMP must also ensure the natural resources conservation program and military operations are integrated and consistent with Navy policy on stewardship and all legal requirements concerning natural resources.

1.2 OBJECTIVES

This BA provides the information necessary for compliance with Section 7 of the ESA. Section 7 assures that, through consultation (or conferencing for proposed species) with the appropriate federal agency, federal actions do not jeopardize the continued existence of any federally threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat. The objective of this BA is to determine how the turtle management actions may affect threatened and endangered (T&E) species and ensure that management decisions and actions associated with the implementation of the proposed actions do not place any T&E species in jeopardy of extinction.

1.3 CONSULTATION HISTORY

Early coordination and pre-consultation with the USFWS was conducted during a series of site visits, meetings, and phone conversations. The following is a list of relevant consultations and meetings between Naval Facilities Engineering Command Mid-Atlantic Region (NAVFAC MIDLANT), JEBFS, and the USFWS, Gloucester, Virginia Field Office specifically for sea turtle management:

1. USFWS, Back Bay National Wildlife Refuge (BBNWR), and JEBFS. Memorandum of Understanding (MOU; Number 50092-20120511-181) between BBNWR, USFWS, and Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS). 2012.
2. USFWS and BBNWR. Biological Opinion issued on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia within all sea turtle nesting areas including

the beaches of BBNWR, the Virginia Beach resort area, Fort Story, the City of Sandbridge, and False Cape State Park. 13 July 2011.

3. USFWS and JEBFS. Coordination on the JEBFS INRMP that included management objectives for sea turtles. 12 October 2012.
4. Meeting between USFWS and NAVFAC MIDLANT. The USFWS notified NAVFAC MIDLANT at this time of the changes to sea turtle management strategy in the state of Virginia for the continued monitoring and managing loggerhead sea turtle nests. 17 October 2014.
5. JEBCFS and USFWS BBNWR. MOU (N61643-20150910-0312) between JEBCFS and USFWS. BBNWR. 2016.

2.0 DESCRIPTION OF THE ACTION AREA AND PROPOSED ACTION

2.1 ACTION AREA

JEBFS is located in the Tidewater area of southeastern Virginia at Cape Henry within the City of Virginia Beach (Figure 1). This installation is situated at the mouth of the Chesapeake Bay at the Bay's juncture with the Atlantic Ocean. JEBFS encompasses approximately 142 hectares (ha) (350 acres [ac]); the Action Area includes 7.87 kilometers (km) (4.89 miles [mi]) of shoreline which includes 65 ha (160 ac) of sand beaches and dune habitat (Figures 2 and 3). A 31-ha (76-ac) Dune Protection Area (DPA) is also located on JEBFS and includes primary and secondary dunes and dune fields (Department of the Navy [DoN] 2013). Portions of the JEBFS beaches are designated as training areas; these sites are used for testing equipment and training exercises. The Action Area consists of approximately 2.4 km (1.5 mi) of beach on the eastern side of the base between Gate 8 and the Cape Henry House/Building 734 (Figure 4).

2.2 PROPOSED ACTION

The proposed actions for sea turtle patrols and nest and stranding management are defined in the 2016 MOU between JEBCFS and USFWS BBNWR (Appendix A; JEBCFS and USFWS 2016). The MOU procedures include

- USFWS conducting patrols within the Action Area to locate turtle crawls and turtle nests;
- reporting and coordinating actions for stranded sea turtles with USFWS, Virginia Department of Game and Inland Fisheries (VDGIF), and the Virginia Aquarium Stranding Team (VAST);
- nest management strategies listed in the Virginia Sea Turtle Nest Handbook will be followed if a nest is located; and
- if the base determines a nest is located in a sensitive area and has the potential to impact the mission, base representatives and the USFWS will coordinate with the VDGIF to determine the best course of action.

2.2.1 *Sea Turtle Patrols*

Representatives from USFWS BBNWR or volunteer staff will conduct non-intrusive patrols along a portion of beach front property between the JEBFS Gate 8 and the Cape Henry House/Building 734 each morning from 25 May until 31 August annually (Figure 4). Patrolling may start as early as 15 May in the event that early sea turtle nesting is identified in Virginia or North Carolina. Patrol personnel will report all sea turtle or marine mammal strandings (dead or alive) to the VAST and the Base Environmental office.

2.2.2 *Nest Management*

If a nest is present, in situ nest management strategies will be followed in accordance with the 2015 Virginia Sea Turtle Nesting Handbook (VDGIF 2015) and are summarized below.

2.2.2.1 In Situ Nest Protection and Monitoring

Nests left in situ will be managed in accordance with the 2015 Virginia Sea Turtle Nesting Handbook. Nests will be marked with stakes, flagging, and signs that identify the site as a sea turtle nest. Stakes would be placed at each corner of the nest 91 – 102 centimeters (cm; 36 – 40 inches [in]) from nest center and encircled with flagging to preclude them from being run over or disturbed. A predator enclosure (Figure 5) will be placed on the nest as described in Appendix D. In areas in which vehicular traffic may impact a nest, a 3- to 8-meter (m; 10- to 25-foot [ft]) buffer zone should be established on all sides of the nest during incubation. Prior to hatchling emergence, a 15-m (50-ft)-wide corridor would be established from the nest to the ocean and kept free of vehicle traffic from at least a half hour before sunset to dawn until emergence and the nest has been excavated. If the nest is near a bright light source, the light should be turned off or shaded around the time of expected emergence. Nests will be monitored daily near the hatching window in

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

order to determine their success. At the end of the hatching window, when all anticipated hatching is expected to be completed, permitted persons will excavate the nest in accordance with the procedures outlined in the 2015 Virginia Sea Turtle Nesting Handbook to quantify the hatching success.

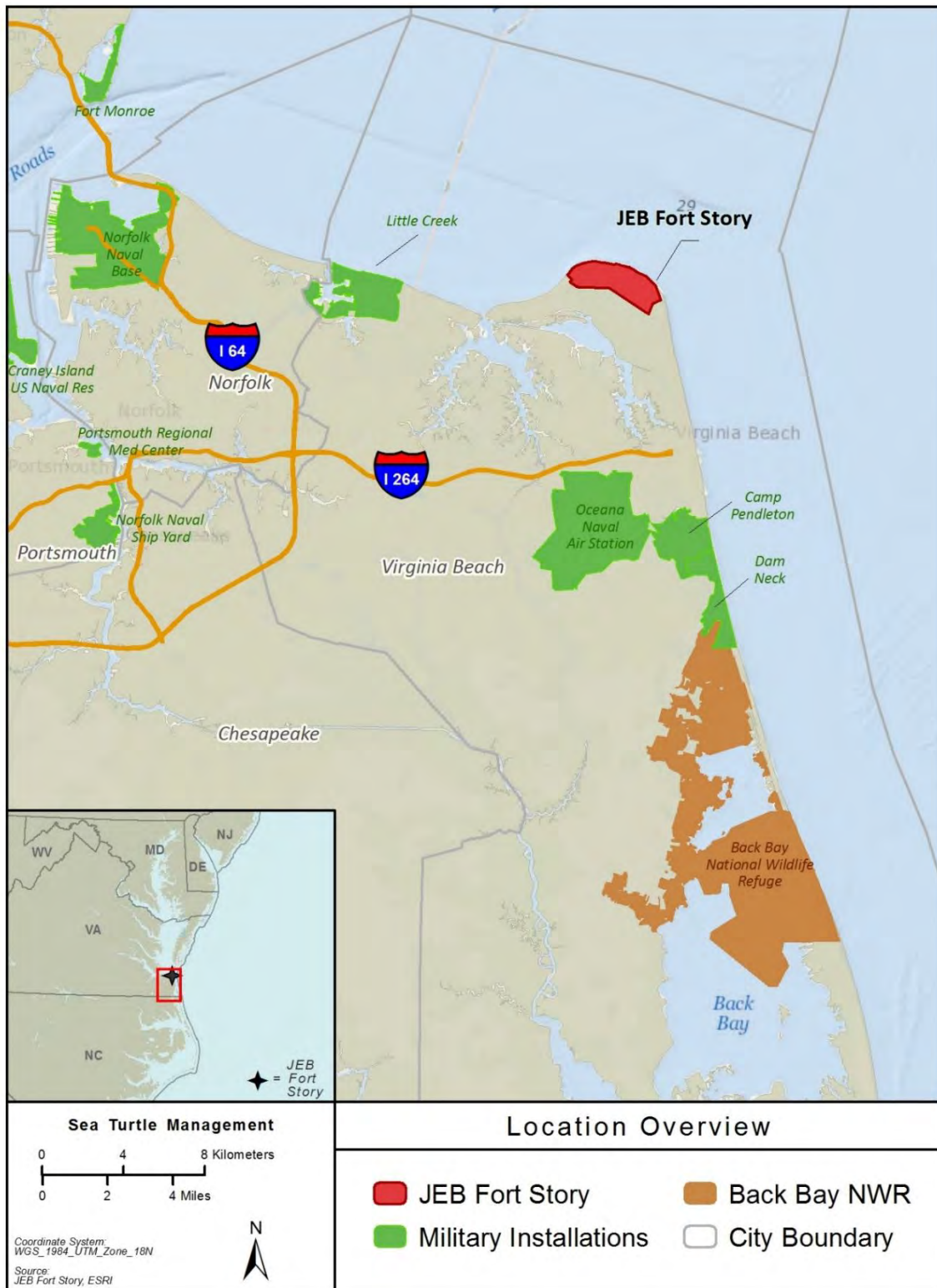


Figure 1. Location of Joint Expeditionary Base Fort Story

Biological Assessment at Joint Expeditionary Base Fort Story Sea Turtle Management



Figure 2. Joint Expeditionary Base Fort Story Action Area (east)

Biological Assessment at Joint Expeditionary Base Fort Story Sea Turtle Management

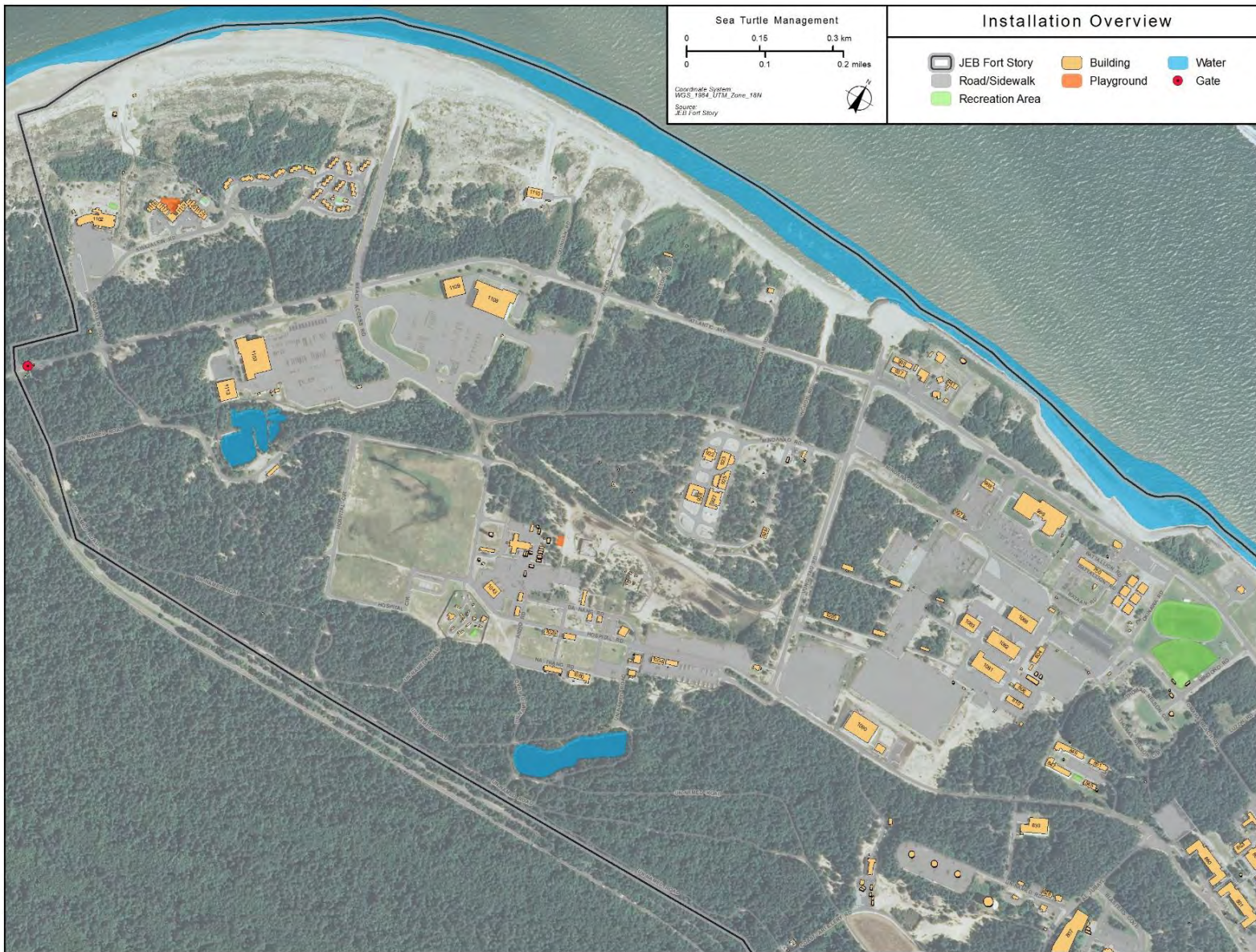


Figure 3. Joint Expeditionary Base Fort Story Action Area (west)



Figure 4. Joint Expeditionary Base Fort Story Sea Turtle Management Action Area

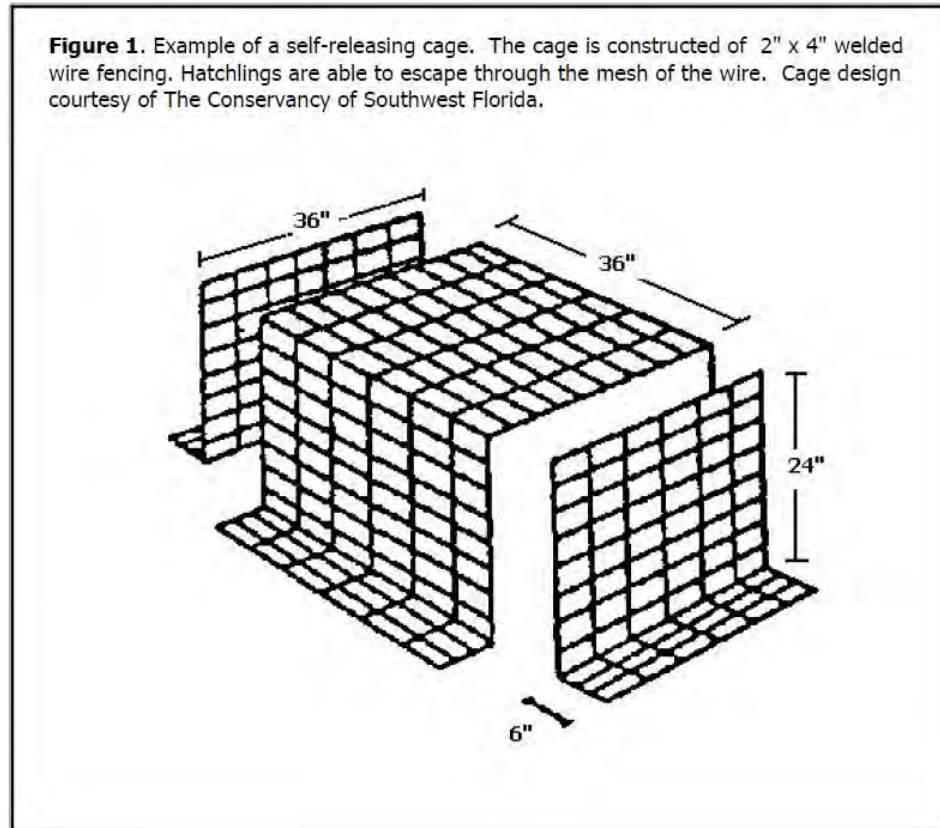


Figure 5. Example of a predator-proof sea turtle egg chamber enclosure

2.2.2.2 Nest Relocation

Nest relocation is considered as a last resort in instances where the nest is located in a sensitive area and has the potential to impact the mission. In areas with heavy foot or vehicular traffic, the nests would typically be marked for avoidance. For human activities, a nest should only be moved for unusual, but lawfully conducted, activities that pose a serious threat, such as mission-related training. Consideration may also be given to relocate nests that are located below the estimated mean high tide line (as established by wrack lines and referenced to tidal conditions). If a nest is below the mean high tide line, it would be relocated above the mean high tide line to an area that is relatively free of vegetation (to preclude roots encroaching into nest chambers) and in close proximity to the original nest location or the closest adjacent suitable beach. In these instances, a base representative will consult with the USFWS Virginia Field Office and the VDGIF to discuss potential mitigation measures that may include relocation. If the nest is to be relocated, permitted individuals will relocate the nest in accordance with the procedures outlined in the 2015 Virginia Sea Turtle Nesting Handbook (VDGIF 2015).

All attempts would be made to relocate the nest within 6 hours after eggs are laid to reduce the potential for movement-induced mortality. Care will be taken to ensure the eggs are not rotated during handling and movement. Nests would be excavated by hand without the use of digging tools. During nest excavation and handling, the eggs would remain shaded. Once located, eggs are placed in a rigid container(s) with 5 to 8 cm (2 to 3 in) of moist sand from the nest in the bottom. Once all the eggs have been collected they would be covered with 5 to 8 cm (2 to 3 in) of moist sand from the nest.

At the new site, responders would dig a hole with a rounded bottom with the same dimensions and depth as the original nest. The eggs would be placed in the new nest while maintaining each egg's original orientation. The new nest would be covered with moist sand excavated from the new egg chamber to the upper level of the surrounding moist sand. Dry sand would not be allowed to enter the nest chamber. Once

the nest chamber is buried, the sand is gently patted by hand and covered with dry sand. Nests are marked as discussed in Section 2.2.2.1 for in situ nest protection and monitoring.

2.2.2.3 Hatchling Protection

The protection of hatchlings and nest excavation will be accomplished in accordance with 2015 Virginia Sea Turtle Nesting Handbook (VDGIF 2015). Nest excavations will be accomplished by permitted individuals. Excavations would occur a minimum of 72 hours after a mass emergence (boil) or 80 days after laying, whichever comes first; however, if a nest has been subjected to tidal inundation, excessive rainfall, or cold fronts, excavation would not occur until 90 days after laying or 5 days after first emergence. If a nest exhibits an emergence of a few hatchlings each night over a 3-day period, excavation would not occur until 5 days after the first emergence. Any hatchlings that become disoriented by artificial lighting would be taken to a darker portion of the beach for release.

2.3 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

The proposed action provides a nesting sea turtle management strategy for the Action Area that includes measures that would be implemented by the Navy to avoid, reduce, and offset potential adverse direct effects to the leatherback, loggerhead, Kemp's ridley, green, and hawksbill sea turtles. The proposed action includes regular patrols of the Action Area to identify the presence of sea turtles on land; documenting the occurrence, and protect and monitor turtles and turtle nests; and coordination with permitted biologists to move nests if deemed necessary. The Navy would implement these best management practices and protective measures during all compliance activities. In addition to active beach patrols, the Navy has conducted lighting surveys in areas near the beach and dunes to identify the light sources reaching the beach (Appendix B). Common recommendations for mitigating effects of light visible on the beach include

- removing or turning off unnecessary light sources causing light pollution on the beach;
- minimizing lighting from outdoor sources by realigning, modifying, repositioning, or shielding fixtures to keep light from reaching the beach;
- minimizing lighting from indoor sources by turning off unnecessary lights, repositioning fixtures, and using tinting or opaque curtains or blinds;
- replacing certain fixtures with others that produce less light pollution;
- reducing the wattage or changing the type of bulb to a type that is less disruptive to sea turtles; and
- creating natural light screens to block light from reaching the beach.

This page intentionally left blank

3.0 LISTED SPECIES AND CRITICAL HABITAT IN THE ACTION AREA

3.1 SPECIES CONSIDERED

The following ESA-listed sea turtle species are known to occur in Virginia’s waters, including the Chesapeake Bay: the leatherback, loggerhead, Kemp’s ridley, green, and hawksbill turtles (Table 1). Based on known distributions and habitat associations, these five species may occur in the Action Area and may be affected by the proposed actions. The loggerhead and green turtles are listed as threatened under the ESA, while the leatherback, hawksbill, and Kemp’s ridley turtles are designated as endangered. Critical habitat has not been designated in Virginia for any species of sea turtle; therefore, no critical habitat is located in or near the Action Area.

Table 1. Federally listed sea turtle species

	Scientific Name	ESA Status
Order Testudines, Suborder Cryptodira		
Family Cheloniidae		
Loggerhead turtle	<i>Caretta caretta</i>	Threatened ¹
Green turtle	<i>Chelonia mydas</i>	Threatened ²
Hawksbill turtle	<i>Eretmochelys imbricata</i>	Endangered
Kemp’s ridley turtle	<i>Lepidochelys kempii</i>	Endangered
Family Dermochelyidae		
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered

¹ Four distinct population segments (DPSs) of the loggerhead turtle are designated as threatened, while five DPSs are designated as endangered under the Endangered Species Act (ESA). The Northwest Atlantic Ocean DPS, which occurs in Virginia, is designated as threatened.

² Although this species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle are listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations.

Sea turtles occur throughout Virginia’s coastal waters, in the entire main-stem Chesapeake Bay, and 8 to 16 km (5 to 10 mi) up the tributaries. Some individual turtles may travel beyond the 8-km (5-mi) tributary limit into fresher waters (Lutcavage and Musick 1985; Byles 1988; Musick 1988; Mansfield 2006; DoN 2009). Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December (Byles 1988; Keinath 1993; Coles 1999). Sea turtle occurrence in the Chesapeake Bay is based on seasonal temperature fluctuations (Byles 1988; Musick 1988; Keinath 1993; Coles 1999; Mansfield 2006). Based on aerial and stranding data, turtles migrate into the Bay during the spring when sea surface temperatures (SSTs) warm to approximately 18 degrees Celsius (64 degrees Fahrenheit [°F]) (Lutcavage and Musick 1985; Keinath et al. 1987; Byles 1988; Musick 1988; Keinath 1993; Coles 1999). Southern migrations to winter habitats south of Cape Hatteras, North Carolina, are typically triggered when SSTs drop below 20°C (68°F) in the fall (Mansfield et al. 2009).

Most of the sea turtles found in the Chesapeake Bay are either immature loggerhead or Kemp’s ridley turtles utilizing the bay as a seasonal foraging ground (Lutcavage and Musick 1985; Musick 1988). The Bay is considered an important developmental habitat for juvenile loggerhead turtles (Musick and Limpus 1997; Mansfield et al. 2009). Leatherback and green turtles occur less frequently, and hawksbill turtles are considered extremely rare in Virginia waters. Only three hawksbills have been recorded in the Bay (Keinath et al. 1991; Virginia Institute of Marine Science [VIMS] 2008; Barco and Swingle 2014).

Sea turtle nesting habitat in Virginia includes beaches along the Atlantic side of the Eastern Shore and beaches south of the Chesapeake Bay mouth from the Virginia Beach oceanfront to the Virginia/North Carolina border. Nesting occurs during the spring and summer months, particularly June, July, and August (VDGIF data). The loggerhead is the only turtle species that nests regularly on Virginia beaches; approximately 5 to 15 nests are reported annually along the ocean-facing beaches (Barco and Swingle

2014). Based on VDGIF nesting data between 2000 and 2014, the dates of the earliest and latest reported loggerhead nest in Virginia were 15 May 2006 and 2 September 2013, respectively. Only two Kemp's ridley nests have been recorded in Virginia: one on Dam Neck Naval Base in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (Boettcher 2015). One green turtle nest was recorded in southeastern Virginia in August 2005 (Boettcher 2015).

Although the majority of stranding records in Virginia are of juvenile loggerhead and Kemp's ridley turtles, leatherback, green, and hawksbill turtles have also stranded here based on the comprehensive database of sea turtle strandings dating to 1991 (Barco and Swingle 2014). Between 2001 and 2013, over 2,800 loggerhead turtles and 500 Kemp's ridley turtles stranded in Virginia (Barco and Swingle 2014). Most of the turtles stranded on Virginia beaches were moderately to severely decomposed individuals; therefore, evidence of illness or human-induced mortality is difficult to impossible to determine. Potential causes of death include propeller strikes, ingested fishing gear, cold stunning, and net entanglement (Mansfield et al. 2002a; Mansfield et al. 2002b; Mansfield 2006). Virginia's turtles have also been known to interact with some fishing gear and commercial vessels such as pound nets, pot gears, larger mesh gillnets, longline and trawling gear, and hopper dredges (Mansfield 2006). In Virginia, sea turtles are susceptible to mortality from the Virginia pound net fishery (Lutcavage and Musick 1985). Offshore the mid-Atlantic coast, loggerheads and leatherbacks are caught as bycatch in the pelagic longline fishery (Garrison and Richards 2004). Loggerheads, in particular, appear to be affected by vessels in Virginia waters and rarely survive the trauma from propeller strikes (Barco and Swingle 2014).

Both natural and anthropogenic stressors continue to affect sea turtles and their nesting and marine habitats throughout their ranges. General human-related threats common to sea turtles in estuarine and marine environments include fisheries bycatch, illegal harvesting, vessel strikes, construction and development, marine debris ingestion or entanglement, noise pollution, power generation activities (e.g., intake into the cooling systems of power plants), oil and gas activities, military activities, and environmental contamination (Lutcavage et al. 1997; National Marine Fisheries Service [NMFS] and USFWS 2008; Hamann et al. 2010; NMFS et al. 2011; NMFS and USFWS 2013a; NMFS and USFWS 2013b).

Anthropogenic stressors to sea turtles in the terrestrial nesting environment include beach cleaning, beach nourishment, shoreline armoring, coastal development and construction, recreational beach equipment, debris, beach driving, artificial lighting, nest relocation, and military activities (Witherington and Martin 2003; Turtle Expert Working Group [TEWG] 2007; NMFS and USFWS 2008; Hamann et al. 2010; NMFS et al. 2011; NMFS and USFWS 2013a; NMFS and USFWS 2013b). Many of these stressors may directly impact hatchling or adult turtles on beaches or indirectly affect them via the loss or degradation of nesting habitat. In addition, the illegal harvesting of sea turtles and their eggs continues to threaten sea turtle species, particularly in regions outside the US (Dow et al. 2007). Of all the anthropogenic activities that cause sea turtle mortality, shrimp trawling is thought to be the most detrimental to the recovery of sea turtle populations (NMFS and USFWS 2008).

Climate change is also considered an anthropogenic factor that affects sea turtle habitat and biology through increased temperatures, sea level rise, ocean acidification, changes in precipitation and circulation patterns, and increased cyclonic activity (Poloczanska et al. 2009; Hamann et al. 2010; NMFS and USFWS 2013b). Sea level rise threatens all nesting beaches, particularly since portions of the southeast US and Caribbean are known to be highly vulnerable to sea level rise (Melillo et al. 2014). Sea turtles are particularly vulnerable to climate change because of their sensitivity to environmental temperatures (Hawkes et al. 2009; Fossette et al. 2012). Rising water temperatures will lead to shifts in the range and abundance of algae, plankton, and fish which could affect sea turtle prey distribution and abundance (NMFS and USFWS 2013b). In addition, rising air temperatures may skew natural sex ratios of embryos (NMFS and USFWS 2013b). Although some sea turtles species and populations, such as northwest Atlantic leatherbacks, may be more resilient to climate change than others, nonclimate-related threats, including fisheries bycatch and coastal development, will influence the resilience of sea turtles to climate change (Fuentes et al. 2013).

Natural stressors that directly affect sea turtles include disease and predation, particularly predation on eggs and hatchlings (Eckert et al. 2012). Tsunamis can cause encroachment and erosion of nesting habitat and increased debris in the marine habitat (NMFS and USFWS 2013b).

3.2 SPECIES ACCOUNTS

3.2.1 *Leatherback Sea Turtle (Dermochelys coriacea)*

3.2.1.1 Description

The leatherback turtle is the largest living sea turtle; adults average between 200 and 700 kilograms (kg) (440 and 1,543 pounds [lb]) with carapace lengths ranging from 119 to 176 cm (47 to 69 in) (NMFS and USFWS 1992). The leatherback's carapace lacks the outer layer of horny scutes possessed by all other sea turtle species and is composed of a flexible layer of dermal bones underlying tough, oily connective tissue and smooth skin. The body is barrel-shaped and tapered to the rear with seven longitudinal dorsal ridges, and it is almost completely black with variable spotting. All adults possess a unique pink spot on the dorsal surface of their head. Scientists use this marking to identify specific individuals (McDonald and Dutton 1996).

3.2.1.2 Status

Leatherback turtles are listed as endangered under the ESA (35 Federal Register [FR] 6069). Critical habitat for Atlantic leatherbacks is designated in the Caribbean at Sandy Point, St. Croix, US Virgin Islands (USVI) (NMFS 1979). The most recent abundance estimates for adult leatherbacks range from 34,000 to 94,000 individuals in North Atlantic waters (NMFS and USFWS 2007; TEWG 2007). Based on the latest assessment of the Atlantic leatherback population, leatherbacks are significantly increasing at most nesting beaches in the Atlantic (TEWG 2007). In Florida, where leatherback nesting was once considered rare, the number of nests has been increasing by approximately 10 percent per year since 1979 (Stewart et al. 2011). Determining the definitive causes of these observed increases is difficult although researchers suggest that improved nest monitoring and protection and variable ocean climates may be contributing to these population changes (Stewart et al. 2011). Populations nesting in Culebra, Puerto Rico, and St. Croix, USVI, also appear to be increasing due to heightened protection and monitoring of the nesting habitat over the past 20 years (Hillis-Starr et al. 1998; Fleming 2001; Thompson et al. 2001; Dutton et al. 2005).

3.2.1.3 Threats

Both natural and anthropogenic stressors continue to affect leatherbacks and their nesting and marine habitats (NMFS and USFWS 2013b). Natural stressors that directly affect leatherbacks include disease and predation, particularly predation on eggs and hatchlings (Eckert et al. 2012). Tsunamis can cause encroachment and erosion of nesting habitat and increased debris in the marine habitat (NMFS and USFWS 2013b). Anthropogenic threats to leatherback turtles are generally related to fisheries interactions, marine debris ingestion, poaching, and boat strikes (TEWG 2007). Climate change is also considered an anthropogenic factor that will affect leatherback habitat and biology (NMFS and USFWS 2013b). Rising water temperatures will lead to shifts in the range and abundance of algae, plankton, and fish which could affect leatherback prey distribution and abundance (NMFS and USFWS 2013b). In addition, rising air temperatures may skew natural sex ratios of embryos, and sea level rise may lead to loss of nesting habitat (NMFS and USFWS 2013b). According to Fuentes et al. (2013), the northwest Atlantic leatherbacks may be the most resilient sea turtle management unit to climate change. They may be able to mitigate the effects of long-term climate change due to their migratory nature, relatively weak fidelity to nesting beaches, individual nesting preferences, and spatial nesting strategies (e.g., tendency to place some nests in the cooler wash-over zone of beaches) (Dutton et al. 1999; Kamel and Mrosovsky 2004); however, nonclimate-related threats, such as fisheries bycatch and coastal development, will influence the resilience of sea turtles to climate change (Fuentes et al. 2013).

3.2.1.4 Habitat Associations

Late juvenile and adult leatherback turtles are known to range from mid-ocean to continental shelf and nearshore waters (Schroeder and Thompson 1987; Shoop and Kenney 1992; Grant and Ferrell 1993; Dodge et al. 2014). Juvenile and adult foraging habitats include both coastal feeding areas in temperate waters and offshore feeding areas in tropical waters (Eckert and Abreu-Grobois 2001). Adults may also

feed in cold waters at high latitudes (James et al. 2006a). Leatherbacks foraging in the western North Atlantic prefer waters from 16°C to 18°C (60.8°F to 64.4°F) (Thompson et al. 2001; James et al. 2006b); their lower thermal limit is in SSTs between 10°C and 12°C (50.0°F and 53.6°F) (Witt et al. 2007). Leatherback nesting beach habitat is generally associated with deep water, strong waves, and oceanic currents, but shallow waters near mud banks are also utilized for nesting (TEWG 2007).

3.2.1.5 Distribution

A regular, seasonal occurrence of leatherbacks is known along the northeast US Atlantic coast. In the late winter and early spring, leatherbacks are distributed primarily in tropical latitudes (Stewart and Johnson 2006); survey data show that around this time of year, individuals begin to move north along the North American Atlantic coast. By February and March, the majority of leatherbacks found in US Atlantic waters are distributed off northeast Florida. This movement continues through April and May when leatherbacks begin to occur in large numbers off the coasts of Georgia and the Carolinas (NMFS 1995, 2000). Leatherbacks become more numerous off the mid-Atlantic and southern New England coasts in late spring and early summer, and by late summer and early fall, they may be found in the waters off eastern Canada (Cetacean and Turtle Assessment Program [CETAP] 1982; Shoop and Kenney 1992; Thompson et al. 2001; Dodge et al. 2014).

Leatherback nesting occurs on isolated mainland beaches in tropical and temperate oceans (NMFS and USFWS 1992) and to a lesser degree on some islands, such as the Greater and Lesser Antilles. In the US, the densest nesting is on the Atlantic coast of Florida (Stewart and Johnson 2006). Sporadic nesting occurs in Georgia, South Carolina, and North Carolina (Rabon et al. 2003).

Leatherbacks occur off Virginia year round; peak occurrence is during the spring and summer (April through September) based on sighting and stranding data (Barco and Swingle 2014) (Figure 6). Between 2001 and 2013, a total of 92 leatherbacks stranded in Virginia (Barco and Swingle 2014). Leatherbacks typically strand on Virginia's ocean-facing beaches but also occasionally in the mid-Chesapeake Bay (Figure 6). Leatherback strandings in the Chesapeake Bay area peak during the months of May and July (Barnard et al. 1989), which suggests peak abundances during this time of year although few leatherbacks are observed in the Chesapeake Bay during any given year. Live leatherbacks have been reported in the upper Chesapeake Bay and in the Severn River in the Mobjack Bay system (Musick 1988; Keinath and Musick 1990).

Occurrence in the Joint Expeditionary Base Fort Story Action Area

Leatherback turtles have been recorded in or near the JEBFS Action Area throughout the year except during winter (Figure 6). Strandings have been recorded in the Action Area during spring and summer when leatherback occurrence peaks off Virginia (Figure 6). Sightings have been recorded just off the coast of the Action Area during summer (Figure 6). No leatherback nests or false crawls have been documented in the Action Area; however, due to the known nesting of other turtle species at JEBFS (VDGIF and Navy data) and the sporadic nesting of leatherbacks just south of Virginia along the coast of North Carolina (Rabon et al. 2003), leatherback turtles may nest at this installation.

3.2.2 *Loggerhead Sea Turtle (Caretta caretta)*

3.2.2.1 Description

The loggerhead turtle is a large, hard-shelled sea turtle named for its proportionately large head and powerful jaws. Adult loggerheads weigh between 100 and 150 kg (220 and 331 lb) with average carapace lengths ranging from 90 to 95 cm (35 to 37 in) (Dodd 1988; NMFS and USFWS 1991b). Adult loggerheads usually possess a reddish-brown carapace with scutes that are bordered with yellow (NMFS and USFWS 1991b).

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

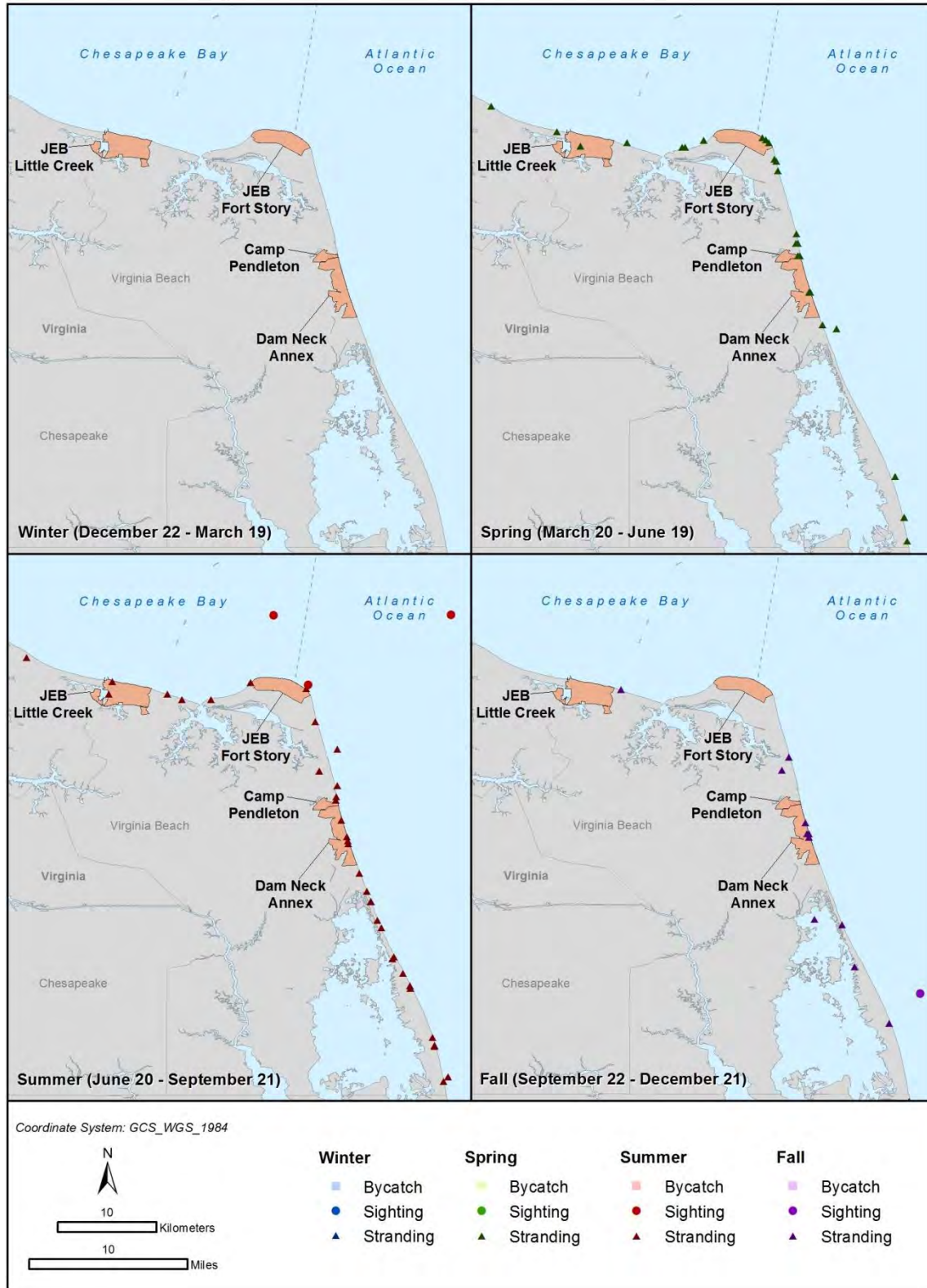


Figure 6. Sighting, stranding, and incidental fisheries bycatch records of the leatherback turtle near the Action Area. Source data: Refer to Appendix C.

3.2.2.2 Status

The loggerhead sea turtle comprises nine DPSs. The Northwest Atlantic Ocean DPS occurs in Virginia and is designated as threatened under the ESA (USFWS and NMFS 2011). Five recovery units (nesting subpopulations) are identified in the Northwest Atlantic: (1) Northern - Florida/Georgia border to southern Virginia; (2) Peninsular Florida – Florida/Georgia border south through Pinellas County, Florida (excluding Key West); (3) Dry Tortugas – islands west of Key West, Florida; (4) Northern Gulf of Mexico - Franklin County, Florida west through Texas; and (5) Greater Caribbean – Mexico through French Guiana, The Bahamas, and Lesser/Greater Antilles (NMFS and USFWS 2008, 2011). The Peninsular Florida population represents approximately 87 percent of all nesting effort in the Northwest Atlantic Ocean DPS (Ehrhart et al. 2003). Although overall nesting had significantly declined in the Northwest Atlantic Ocean DPS, nesting data from 2008 through 2010 show a more positive trend (USFWS and NMFS 2011).

The loggerhead is the most abundant sea turtle occurring in US waters. The most recent preliminary abundance estimate of loggerheads in US continental shelf waters was approximately 588,000 individuals and was generated from aerial survey data recorded between Cape Canaveral, Florida, and the mouth of the Gulf of St. Lawrence in 2010 (Northeast Fisheries Science Center [NEFSC] and Southeast Fisheries Science Center [SEFSC] 2011). The most recent estimate of adult females in the Northwest Atlantic Ocean DPS is 30,000 (USFWS and NMFS 2011). Regional estimates of loggerhead abundance in coastal ocean waters of Virginia were recently generated from aerial surveys conducted in 2011 and 2012 from the Convention on the International Regulations for Preventing Collision at Sea line to approximately 50 km (31 mi) offshore between Ship Shoal Inlet and the Virginia/North Carolina border (Barco and Swingle 2014). Loggerhead abundance was 26,674 in the spring (May/June); 19,004 in the summer (July/August); and 5,443 in the fall (September/October); however, this fall estimate was based on only one survey and is likely an underestimate (Barco and Swingle 2014).

Critical habitat for the Northwest Atlantic Ocean DPS was recently designated for terrestrial and marine areas in the Atlantic and Gulf of Mexico (NMFS 2014; USFWS 2014). The USFWS-designated terrestrial critical habitat areas include 88 nesting beaches in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi (USFWS 2014). These critical habitat areas include a total of 38 units encompassing 393.7 km (244.6 mi) of the Atlantic Ocean shoreline designated for the Northern Recovery Unit: 8 units in North Carolina, 22 in South Carolina, and 8 in Georgia. These units comprise approximately 86 percent of the documented nesting within the recovery unit (USFWS 2014). Although the extreme northern nesting range of this DPS is important to the conservation and recovery of loggerhead turtles, no areas in Virginia and Delaware were designated as critical habitat due to the low number of nests in these states (USFWS 2014).

The National Oceanic and Atmospheric Administration (NOAA)-designated marine critical habitat for the Northwest Atlantic Ocean DPS includes some nearshore reproductive areas directly offshore of nesting beaches from North Carolina through Mississippi, winter habitat in North Carolina, breeding habitat in Florida, constricted migratory corridors in North Carolina and Florida, and *Sargassum* habitat in the western Gulf of Mexico and in US waters within the Gulf Stream in the Atlantic Ocean (NMFS 2014). The nearshore reproductive areas are adjacent to high-density nesting beaches used by hatchlings egressing to the open-water environment and by nesting females transiting between the beach and open water during the nesting season and extend 1.6 km (1.0 mi) offshore. The winter habitat in North Carolina includes warm-water habitats between Cape Hatteras and Cape Fear near the western edge of the Gulf Stream (between the 20- and 100-m isobaths) that are used by a high concentration of juveniles and adults during the winter months. The constricted migratory corridor off North Carolina consists of waters between 36°N and Cape Lookout from the edge of the Outer Banks barrier islands to the 200-m isobath. This corridor overlaps with the northern portion of winter habitat off North Carolina and serves as a migratory pathway for loggerheads transiting to neritic foraging areas in the north and back to winter, foraging, and/or nesting areas in the south. The majority of loggerheads pass through this migratory corridor in the spring (April to June) and fall (September to November), but loggerheads are also present in this area from April through November (NMFS 2014).

3.2.2.3 Threats

Loggerhead turtles face the same general natural and anthropogenic threats of other sea turtles as mentioned previously. The primary threats to the Northwest Atlantic population extend throughout the terrestrial and marine habitats and include bottom trawl, pelagic longline, demersal longline, and demersal large mesh gillnet fisheries; legal and illegal harvesting; vessel strikes; beach armoring; beach erosion; marine debris; oil pollution; light pollution; and predation by native and exotic species (NMFS and USFWS 2008).

3.2.2.4 Habitat Associations

Loggerheads occur worldwide in habitats ranging from coastal estuaries, bays, and lagoons to pelagic waters (Dodd 1988). Neonate loggerheads are oceanic and rarely occupy continental shelf waters. Neonates recently tagged in the western North Atlantic moved throughout the Gulf Stream and into the Sargasso Sea, probably to take advantage of *Sargassum* habitats which provide a thermal environment that supports growth (Mansfield et al. 2014). Older, larger juveniles are oceanic but also utilize neritic environments (Witzell 2002; McClellan and Read 2007; TEWG 2009). Late juveniles and adult loggerheads most often occur on the continental shelf and along the shelf break of the US Atlantic and Gulf coasts as well as in coastal estuaries and bays (CETAP 1982; Shoop and Kenney 1992). Subadult and adult loggerhead turtles tend to inhabit deeper offshore feeding areas along the western Atlantic coast from mid-Florida to New Jersey and most likely forage on benthic prey (Hopkins-Murphy et al. 2003; Roberts et al. 2005; Hawkes et al. 2007).

Typical loggerhead nesting beaches tend to be sandy, wide, open beaches backed by low dunes and fronted by a flat, sandy approach from the ocean (Miller et al. 2003). Loggerheads typically nest on beaches close to reef formations and adjacent to warm temperature currents (Dodd 1988; TEWG 2000). Nesting beaches often face the open ocean or are situated along narrow bays (NMFS and USFWS 1991b). Nest site selection tends to depend more on beach slope and width than temperature, moisture, or salinity (Wood and Bjorndal 2000).

3.2.2.5 Distribution

In the US North Atlantic, loggerhead turtles commonly occur in shelf waters as far north as the New York Bight (CETAP 1982; Shoop and Kenney 1992). Loggerhead distribution along the US Atlantic coast is strongly seasonal and is dictated primarily by SSTs. Loggerheads are associated with SSTs between 13°C and 28°C (55.5°F and 82.4°F) (Mrosovsky 1980); they tend to become lethargic in SSTs below 15°C (59°F) and may become incapacitated ("cold-stunned") at temperatures below 10°C (50°F) (Schwartz 1978; Mrosovsky 1980). Loggerheads occur north of Cape Hatteras primarily in late spring through early fall (May and October) with a peak occurrence in June; however, sightings are recorded in mid-Atlantic and northeast waters throughout the year (CETAP 1982; Lutcavage and Musick 1985; Shoop and Kenney 1992; DoN 2008a, 2008b). During the summer, loggerheads may be found regularly in shelf waters from Delaware Bay to Hudson Canyon, including Long Island Sound and Cape Cod Bay (Burke et al. 1991; Shoop and Kenney 1992; Prescott 2000; University of Delaware Sea Grant 2000). As SSTs decrease in the winter, most individuals move south of Cape Hatteras to overwinter (Epperly et al. 1995c; Mitchell et al. 2002; Hawkes et al. 2011). From November to April, loggerheads are primarily found off the coast of southern North Carolina in the South Atlantic Bight (Griffin et al. 2013); however, stranding and sighting data indicate that not all loggerheads leave mid-Atlantic and New England waters during the winter (Burke et al. 1991) (Figure 7).

Loggerhead nesting beaches are distributed throughout warm, temperate, and subtropical regions (between 40°N and 40°S) with some scattered nesting in the tropics (The State of the World's Sea Turtles [SWOT] Team 2007). Loggerheads are the only marine turtles that nest predominantly outside of the tropics (Ehrhart et al. 2003). Along the US east coast, loggerheads regularly nest from southeastern Florida to Virginia, and occasional nests have been recorded in Maryland, Delaware, and New Jersey (Graham 1973; Brandner 1983; Musick 1988; NMFS and USFWS 1991b; USFWS 2014). Adult loggerheads exhibit strong site fidelity to nesting beaches and typically return to their natal beaches or nearby areas to nest (Addison

1996; Comer 2002). Intra-seasonal nesting patterns for females vary; some females may nest only once a season while others may nest several times (Webster and Cook 2001). Although nesting has been recorded in May and September, most loggerhead nesting in Virginia occurs in June, July, and August (VDGIF data) (Figure 8). Between 2010 and 2014, annual loggerhead nests in Virginia ranged from 2 to 16 (VDGIF and Navy data).

Occurrence in the Joint Expeditionary Base Fort Story Action Area

Loggerhead turtles have been recorded in and near the JEBFS Action Area throughout the year (Figure 7). A total of 143 strandings have been recorded in the Action Area; the majority of these records were during spring, summer, and fall (Figure 7). Based on VDGIF data from 1970 through 2014, loggerhead false crawls have been recorded on JEBFS during August 1996, June 2002, and July 2002 (note that these records are not included in Figure 8 because exact coordinates were not recorded). Loggerhead nests were recently documented on the installation on 13 June 2013, 9 August 2013, and 23 July 2014 (Figure 8). Two turtle nests were also recorded on 8 September and 13 July 2013, but could not be identified to species (Navy data). Of the 161 records of sea turtle nests in Virginia from 1970 through 2014, almost all (157) were loggerhead turtles (VDGIF data); therefore, these two unidentified nests were likely loggerhead turtle nests.

3.2.3 *Green Sea Turtle (Chelonia mydas)*

3.2.3.1 Description

Named for the color of their fat, green turtles are the largest of the hard-shelled sea turtles. Adult green turtles commonly weigh over 100 kg (220 lb) and are greater than 100 cm (39 in) in length (NMFS and USFWS 1991a). Hatchlings have distinct countershading: black on the dorsal surface and mostly cream white on the ventral surface (Witherington et al. 2006). Adult carapaces range in color from solid black to gray, yellow, green, and brown in starburst or irregular patterns; the plastron is a much lighter yellow to white (NMFS and USFWS 1991a). Green turtles in the Atlantic exhibit a slower growth rate than Pacific green turtles (Bjorndal et al. 2000).

3.2.3.2 Status

The green turtle is currently designated as threatened under the ESA with the Florida and Mexican Pacific coast nesting populations listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a current conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations. The NMFS and USFWS recently proposed to remove the current range-wide listing for the green turtle and list 11 DPSs under the ESA (NMFS and USFWS 2015). Based on this proposed rule, eight DPSs would be listed as threatened, and the remaining three DPSs would be designated as endangered. If this ruling is approved, the green turtles occurring in Virginia would be considered part of the threatened North Atlantic DPS (NMFS and USFWS 2015). Recent population estimates for green turtles in the western North Atlantic are not available. Over the past 5 years (2010-2014), the number of green turtle nests in Florida averaged 16,064 annually (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute 2015). The only designated critical habitat for this species is in Puerto Rico (NMFS 1998).

3.2.3.3 Threats

Threats to green turtles in the North Atlantic include destruction or modification of habitat; overutilization for commercial, recreational, scientific, or educational purposes; disease; predation; incidental bycatch in fishing gear; dredging; vessel strikes; climate change and natural disasters; contaminants; and marine debris (Hirama 2007; McClellan and Read 2009; NMFS and USFWS 2015). Green turtle nesting habitat is specifically threatened by coastal development, coastal armoring, beachfront lighting, erosion, sand extraction, and vehicle and pedestrian traffic on nesting beaches (Lutcavage et al. 1997; Witherington and Martin 2003; Witherington et al. 2006).

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

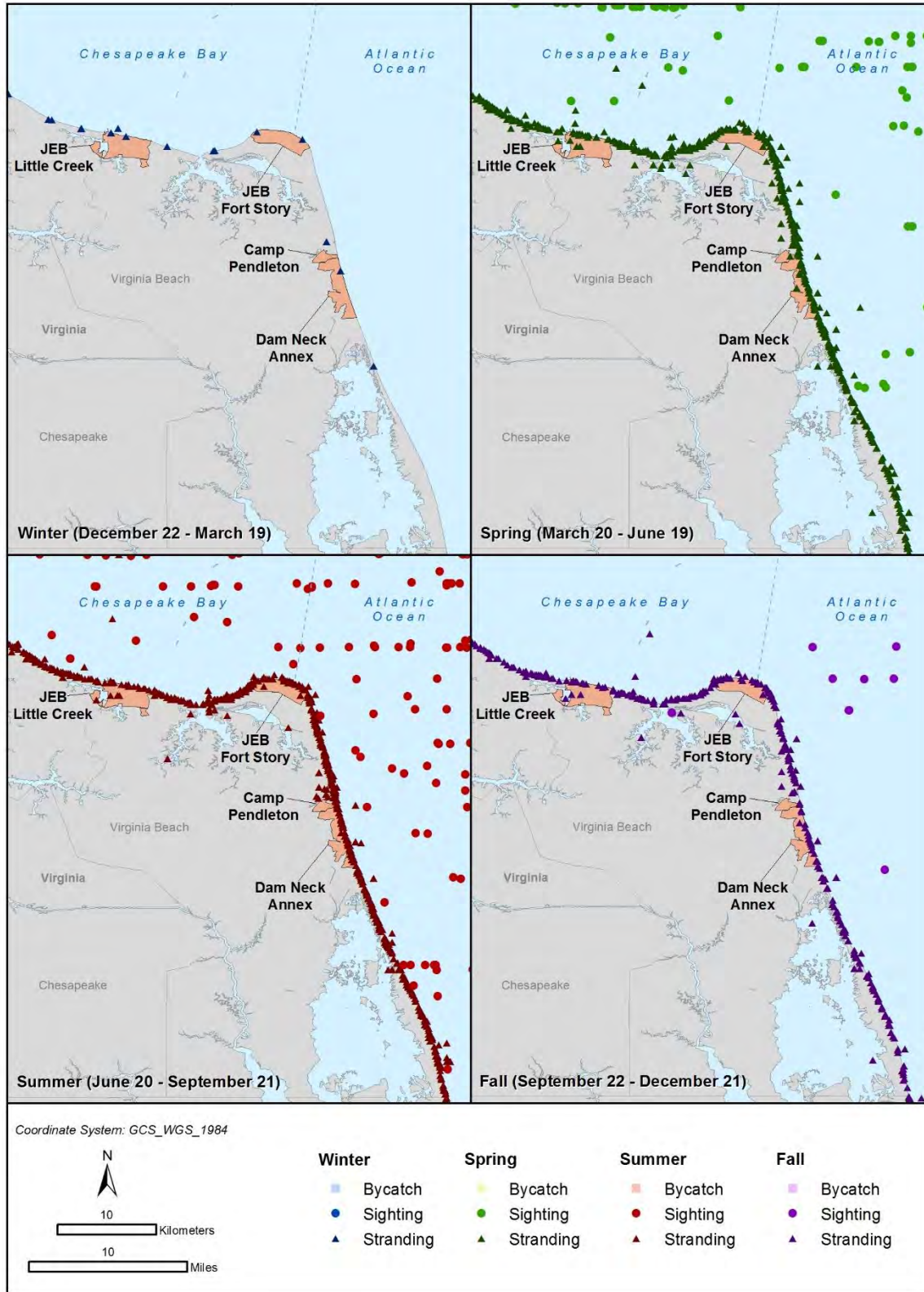


Figure 7. Sighting, stranding, and incidental fisheries bycatch records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

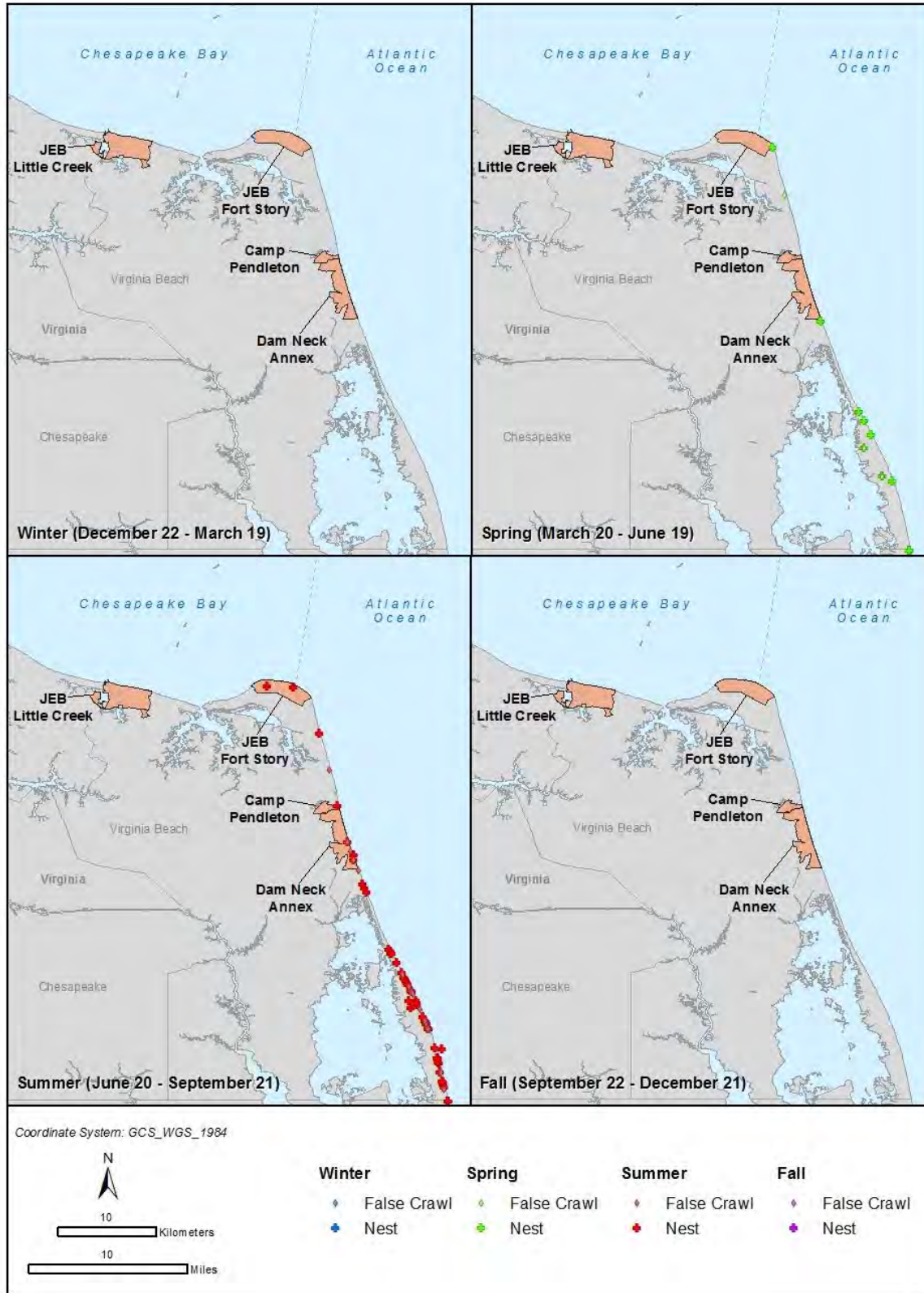


Figure 8. False crawl and nesting records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.

3.2.3.4 Habitat Associations

Post-hatchling and early-juvenile green turtles reside in convergence zones in the open ocean (Carr 1987; Witherington et al. 2012). Once green turtles reach a carapace length of 20 to 25 cm (8 to 10 in), they migrate to shallow, nearshore areas (<50 m [164 ft] in depth) where they spend the majority of their lives as late juveniles and adults. The optimal developmental habitats for late juveniles and foraging adults are warm, shallow waters (3 to 5 m [10 to 16 ft] in depth) with an abundance of subaquatic vegetation and also areas in close proximity to nearshore reefs or rocky areas (Holloway-Adkins and Provanca 2005; Witherington et al. 2006). Green turtles primarily nest on sandy oceanic beaches of mainland shorelines, barrier islands, volcanic islands, and atolls (Witherington et al. 2006). Nesting habitat at Tortuguero Beach, Costa Rica, the largest remaining green turtle rookery in the Atlantic, is associated with more heavily vegetated portions of the beach (Hirth and Samson 1987). In Florida, green turtles seem to prefer nesting on barrier-island beaches that are susceptible to high wave energy and have coarse sands, steep slopes, and prominent foredunes. These beaches also have minimal artificial lighting (Witherington et al. 2006).

3.2.3.5 Distribution

Along the US east coast, green turtles are found as far north as Massachusetts (NMFS and USFWS 1991a). Juvenile green turtles utilize estuarine waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds as summer developmental habitat (Epperly et al. 1995a, 1995b; Musick and Limpus 1997). As adults, green turtles are restricted to more southern latitudes (Epperly et al. 1995b) and are only occasionally found north of Florida. During nonbreeding periods, adults and juvenile distributions may overlap in coastal feeding areas (Hirth 1997).

Green turtles nest on both island and continental beaches between 30°N and 30°S (Witherington et al. 2006). The major Atlantic nesting colonies are located at Ascension Island (in the South Atlantic Ocean), at Aves Island (in the Caribbean Sea, west of Guadeloupe), and on the beaches of Costa Rica and Suriname (NMFS and USFWS 1991a). Although Florida is near the northern extent of the green turtle's Atlantic nesting range, it hosts a significant proportion of green turtle nesting (Witherington et al. 2006). Approximately 99 percent of the green turtle nesting in Florida occurs on the Atlantic coast with Brevard through Broward Counties hosting the greatest nesting activity (Meylan et al. 1995; Witherington et al. 2006). There are scattered nesting records in Georgia and the Carolinas (Peterson et al. 1985; Schwartz 1989; NMFS and USFWS 1991a). Green turtle nesting in North Carolina has been documented at Onslow Beach, Caswell Beach, Bald Head Island, and near Cape Hatteras (Schwartz 1989). The first ever green turtle nest in Virginia was documented in 2005 at Sandbridge Beach just north of USFWS BBNWR; this nest was subsequently relocated to USFWS BBNWR (USFWS 2005; Boettcher 2015).

Occurrence in the Joint Expeditionary Base Fort Story Action Area

Green turtles have been recorded in Virginia throughout the year (Figure 9). Strandings have been documented in the Action Area during summer and fall and just west of this region in winter (Figure 9). No green turtle nests or false crawls have been recorded in the Action Area, but nests may be expected at this installation based on known green turtle nesting in southeastern Virginia (Figure 10) and nearby North Carolina and the nesting of other turtle species in this Action Area (Schwartz 1989).

3.2.4 *Hawksbill Sea Turtle (Eretmochelys imbricata)*

3.2.4.1 Description

The hawksbill turtle is a small- to medium-sized sea turtle. Adults typically weigh around 80 kg (176 lb) with carapace lengths ranging from 65 to 90 cm (26 to 35 in) (Witzell 1983; NMFS and USFWS 1993). The carapace is often brown or amber with irregularly radiating streaks of yellow, orange, black, and reddish-brown. Hawksbills are distinguished from other sea turtles by their hawk-like beaks, posteriorly overlapping carapace scutes, and two pairs of claws on their flippers (NMFS and USFWS 1993).

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

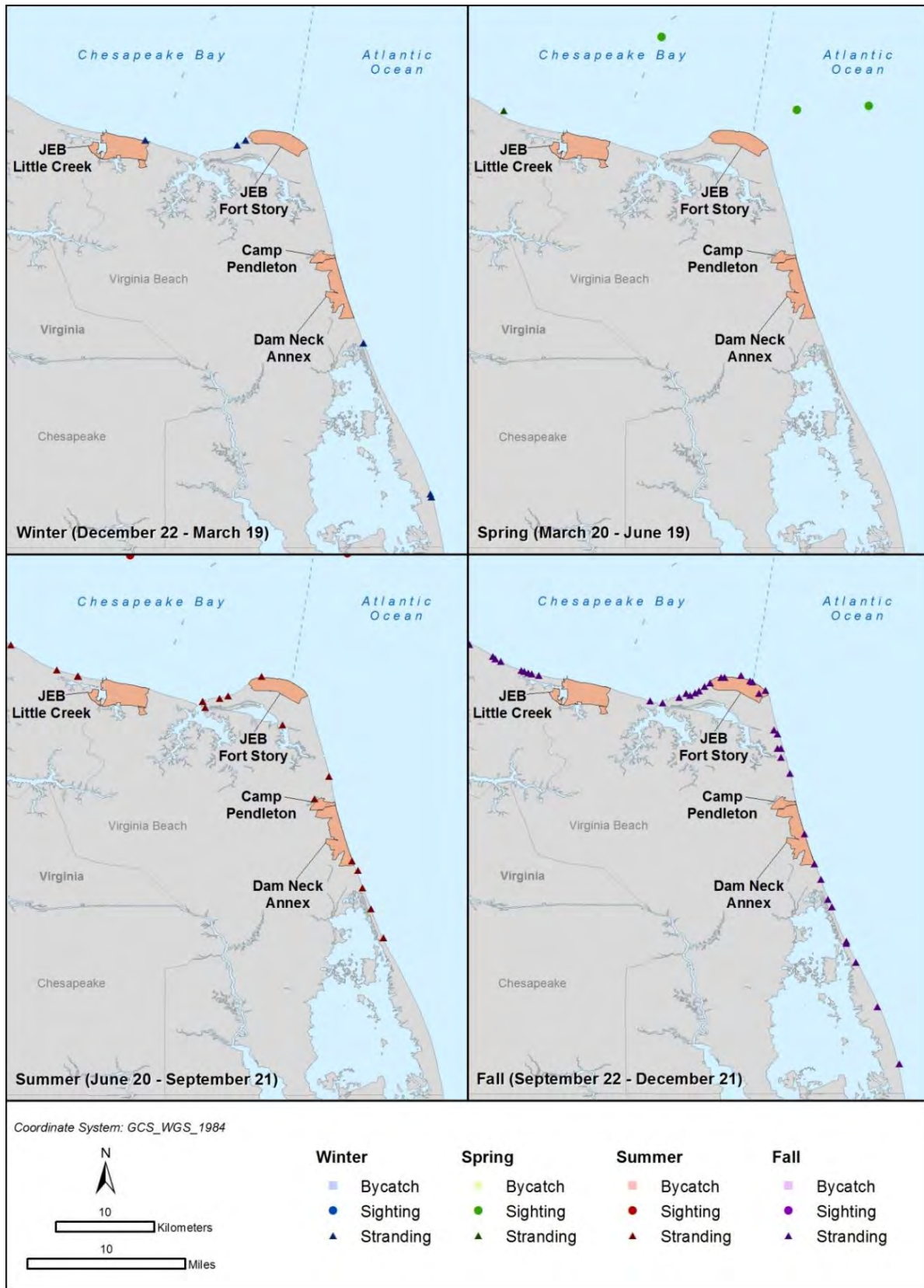


Figure 9. Sighting, stranding, and incidental fisheries bycatch records of the green turtle near the Action Area. Source data: Refer to Appendix C.

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**



Figure 10. Nests and false crawls of the green turtle near the Action Area. Source data: Refer to Appendix C.

3.2.4.2 Status

The hawksbill turtle is designated as endangered under the ESA. This species is second only to the Kemp's ridley in terms of endangerment (NMFS and USFWS 1993; Bass 1994). The most recent estimate of hawksbill abundance in the Atlantic Ocean was 3,626 to 6,108 nesting females per season based on historical and recent estimates of nesting colonies from around the Atlantic Basin (NMFS and USFWS 2013a). Critical habitat for this species is designated on Mona and Monito Islands in Puerto Rico (NMFS 1998). One of the two most important nesting populations in the US is located on Mona Island and is increasing. The other important US nesting population is on Buck Island Reef National Monument in the USVI and is also increasing (NMFS and USFWS 2013a).

3.2.4.3 Threats

Impacts to hawksbill nesting and marine habitats are increasing and include construction, beach armoring and renourishment, artificial lighting, and sand extraction (NMFS and USFWS 2013a). Throughout the Western Atlantic and Caribbean, hawksbill nesting and foraging habitat has been lost to beach development, sand mining, lights, and pollution (Mortimer and Donnelly 2008). Because hawksbills prefer to nest under vegetation (Horrocks and Scott 1991; Kamel and Delcroix 2009), they are particularly impacted by beachfront development and clearing of dune vegetation (Mortimer and Donnelly 2008). In addition to impacts from coastal development, anthropogenic threats to hawksbill turtles include poaching, the tortoiseshell trade, degradation of coral reefs, ingestion and entanglement in marine debris, oil spills, other contaminants, and incidental capture in commercial and artisanal fisheries. Climate change and associated factors like sea level rise are emerging and are major threats to the conservation and recovery of hawksbills. Warmer sea temperatures are expected to impact coral reefs, which serve as important foraging habitats for hawksbill turtles. Sea level rise threatens nesting beaches (Mortimer and Donnelly 2008; NMFS and USFWS 2013a). Vessel strikes are also a threat to hawksbills, particularly in the southeast US (NMFS and USFWS 2013a).

3.2.4.4 Habitat Associations

As post-hatchlings and small juveniles, hawksbill turtles inhabit oceanic waters where they are sometimes associated with driftlines and floating patches of *Sargassum* (Parker 1995; Witherington et al. 2012). The developmental habitats for juvenile benthic-stage hawksbills are the same as the primary feeding grounds for adults; they include tropical, nearshore waters associated with coral reefs, hard bottoms, cliff-wall habitats with soft corals and invertebrates, or estuaries with mangroves (Musick and Limpus 1997; Diez et al. 2003). Coral reefs are optimal habitat for juveniles, subadults, and adults (NMFS and USFWS 1993; Diez et al. 2003). Late juveniles generally reside on shallow reefs less than 18 m (59 ft) deep; however, as they mature into adults, hawksbills move to deeper habitats and may forage to depths greater than 90 m (295 ft). Benthic-stage hawksbills are seldom found in waters beyond the continental or insular shelf unless they are transiting between distant foraging or nesting grounds (NMFS and USFWS 1993). Although hawksbills exhibit a wide tolerance for nesting substrate type, they prefer to nest under vegetation on beaches with low wave energy and steep slopes (Horrocks and Scott 1991; Kamel and Delcroix 2009).

3.2.4.5 Distribution

In the western Atlantic Ocean, this species is found throughout the Gulf of Mexico, the Greater and Lesser Antilles, and southern Florida, as well as along the mainland of Central America south to Brazil (NMFS and USFWS 1993). The hawksbill is rare north of Florida (Lee and Palmer 1981; Keinath et al. 1991; Parker 1995; Plotkin 1995; USFWS 2001). Small hawksbills have stranded as far north as Cape Cod, Massachusetts (NMFS 2006).

The largest nesting aggregation in the Caribbean occurs along the Yucatán Peninsula, Mexico (NMFS and USFWS 1993). Other small, yet important, nesting assemblages are found in Belize, Nicaragua, Panama, Venezuela, Cuba, Antigua, and the Grenadines (NMFS and USFWS 1993). Within the continental US, hawksbill nesting is rare and is restricted to beaches in southern Florida and the Florida Keys (Dodd 1995).

Nesting has been documented at Jupiter Island, Biscayne National Monument, and the Canaveral National Seashore on the eastern Florida coast (Lund 1985).

Hawksbill turtles are considered extralimital to the Chesapeake Bay area (DoN 2009). The first verified account of a hawksbill turtle in the Bay occurred in November 1991, when a commercial fisherman caught a juvenile hawksbill at the mouth of the James River; the turtle was later released in Florida (Keinath et al. 1991). Since then, two additional sightings of hawksbill sea turtles have been reported in the Chesapeake Bay: one in December 2000 and one in November 2004 (VIMS 2008). These individuals were also juveniles and were both cold-stunned. Another hawksbill stranded along the coast of Virginia north of the mouth of the Chesapeake Bay (Barco and Swingle 2014) (Figure 11).

Occurrence in the Joint Expeditionary Base Fort Story Action Area

Hawksbill strandings have been recorded in southeastern Virginia (Figure 11); however, this species has not been recorded in the Action Area. Hawksbill turtles typically nest in tropical areas and are not known to nest in Virginia; therefore, hawksbills are not expected to nest on the beaches of JEBFS.

3.2.5 Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

3.2.5.1 Description

The Kemp's ridley is the smallest sea turtle species, reaching approximately 60 to 70 cm (24 to 28 in) straight carapace length and weighing around 45 kg (99 lb) (USFWS and NMFS 1992; Gulko and Eckert 2004). The carapace is round to somewhat heart shaped and changes from the gray-black color of hatchlings to a pale olive-gray color of adults (Marquez-M. 1994).

3.2.5.2 Status

The Kemp's ridley turtle is designated as endangered under the ESA (35 FR 18319). Once considered the most endangered sea turtle species, the Kemp's ridley turtle has experienced a consistent increase in nesting numbers since the lowest recorded nest count of 702 nests in 1985 (Heppell et al. 2005). From 2005 through 2010, approximately 5,500 females were estimated to be nesting at all monitored beaches in the Gulf of Mexico. In 2011 and 2012, the preliminary estimates of nests observed at the primary nesting beaches in Mexico were 19,368 and 20,197, respectively (Gallaway et al. 2013). Based on a predicted annual growth rate of 12 to 16 percent, this population may grow to 10,000 nesting females in Mexico by 2015 (Heppell et al. 2005). No critical habitat has been designated for this species.

3.2.5.3 Threats

The decline of this species is primarily due to human activities, particularly the direct harvest of adults and eggs and incidental capture in commercial fishing operations. The resurgence in nesting numbers over the last few decades is largely due to efforts to protect females and hatchlings on nesting beaches and reductions in fisheries-related mortality resulting from the use of Turtle Excluder Devices in the US and Mexican trawl fisheries (Heppell et al. 2005). In the northeast US, cold-stunning events are common for this species; 1,084 immature Kemp's ridleys were cold-stunned between 1994 and 2006 (NMFS et al. 2011). Additional threats to Kemp's ridley turtles include construction, beach nourishment, predation, artificial lighting, diseases, climate change, vessel strikes, dredging, and pollution (NMFS et al. 2011; Gallaway et al. 2013). Because the Gulf of Mexico is an area of high-density offshore oil exploration and extraction, chronic, low-level spills and occasional massive spills, such as the Deepwater Horizon oil spill incident in 2010, may impact Kemp's ridley turtles at sea and on nesting beaches in the Gulf. Although short-term impacts were minimized via coordinated response efforts, the long-term effects of this 2010 disaster on Kemp's ridley turtle are not yet known (NMFS et al. 2011).

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

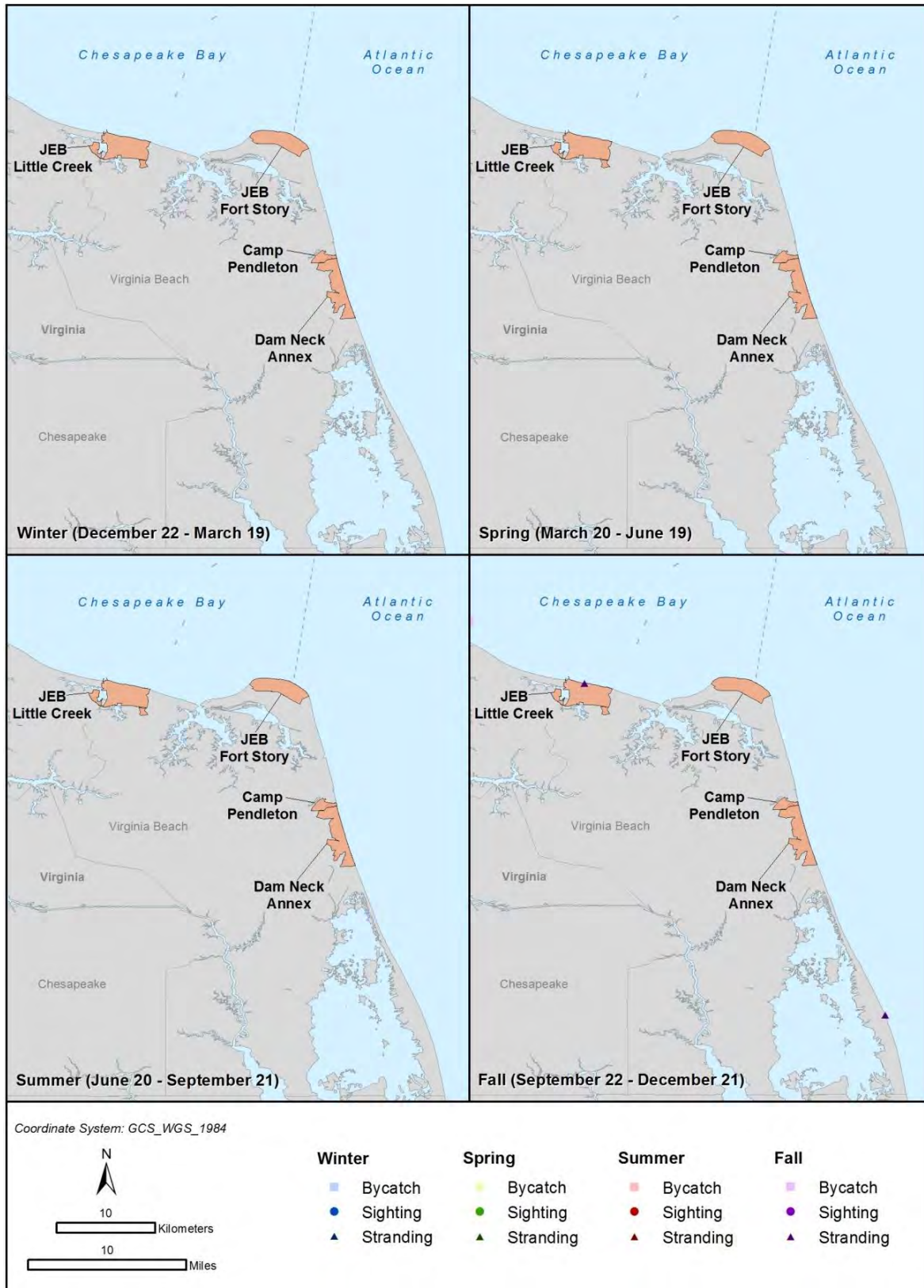


Figure 11. Sighting, stranding, and incidental fisheries bycatch records of the hawksbill turtle near the Action Area. Source data: Refer to Appendix C.

3.2.5.4 Habitat Associations

Kemp's ridley turtles inhabit open-ocean and *Sargassum* habitats of the North Atlantic Ocean as post-hatchlings and small juveniles (Manzella et al. 1991; Witherington et al. 2012). Large juveniles and adults move to benthic, nearshore feeding grounds along the US Atlantic and Gulf coasts (Morreale and Standora 2005). Habitats frequently utilized include warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters where their preferred prey occurs (Lutcavage and Musick 1985; Landry and Costa 1999; Seney and Musick 2005). Their most suitable habitats are less than 10 m (33 ft) deep with SSTs between 22°C and 32°C (72°F and 90°F) (Coyne et al. 2000). Seagrass beds, mud bottom, and live bottom are important developmental habitats (Schmid and Barichivich 2006). Postnesting Kemp's ridleys travel along coastal corridors generally shallower than 50 m (164 ft) (Morreale et al. 2007). Nesting habitat is typically sandy ocean beaches. The beach at Rancho Nuevo, Mexico, where a majority of nests are laid, is formed by low dunes and isolated on the land side by shallow coastal lagoons with several narrow cuts that open during the rainy season forming estuaries or temporary sand bars (Marquez-M. 1994). Kemp's ridleys typically nest just beyond the high tide line in front of the first dune, on the windward slope, or on top of the dune (Marquez-M. 1994).

3.2.5.5 Distribution

The Kemp's ridley range is restricted to the North Atlantic Ocean (Marquez-M. 1994). Oceanic transport of hatchling Kemp's ridleys is controlled primarily by hydrography in the Gulf of Mexico (Collard 1990). Upon leaving the nesting beach of Rancho Nuevo, hatchling Kemp's ridleys enter the Mexican Current and are swept eastward into the northern Gulf of Mexico (Musick and Limpus 1997). Many juveniles are retained in the northern Gulf until they migrate inshore to demersal habitat. Others may be carried south from the northern Gulf into the Loop Current where they are swept into the Florida Current and, subsequently, the Gulf Stream (Musick and Limpus 1997). Once they reach a size of approximately 20 to 30 cm (8 to 12 in) or at least 2 years of age, they actively migrate to neritic developmental habitats along the US Atlantic Coast (Musick and Limpus 1997). Adults are largely confined to the Gulf of Mexico with moderate numbers along the eastern US coast as far north as Nova Scotia (Lazell 1980; Morreale et al. 1992).

Kemp's ridleys occur in waters off North Carolina from April through October and in Virginia in May through November (Morreale and Standora 2005). Some juveniles may migrate as far north as New York and New England, arriving in these areas around June and leaving to travel south in early October (Morreale and Standora 2005). During the winter, they migrate south to warmer waters off Florida (Marquez-M. 1994). They typically migrate within the nearshore waters along the mid-Atlantic coast (Morreale and Standora 2005; Morreale et al. 2007); juveniles and adults often travel inshore of the 18-m isobath (Renaud and Williams 2005). Individuals are known to overwinter south of Cape Hatteras although the majority of Kemp's ridley turtles stay in Florida near Cape Canaveral during the winter (Henwood and Ogren 1987). Individuals that overwinter off southern North Carolina may subsequently move into warmer waters (e.g., Gulf Stream or areas off South Carolina) during mid-winter (Renaud 1995; Morreale and Standora 2005). For example, an individual tagged in Beaufort, North Carolina in 1989 remained in Onslow Bay during the winter and moved into the Gulf Stream when temperatures cooled close to shore in January 1990 (Renaud 1995). Kemp's ridleys utilize the Chesapeake Bay and coastal Virginia waters, in particular, as summer developmental habitat (Lutcavage and Musick 1985). Individuals may prefer the shallow seagrass habitats in the Chesapeake Bay and adjacent waters due to the presence of their preferred prey, the blue crab, in this region (Lutcavage and Musick 1985; Keinath et al. 1994). The Kemp's ridley turtle is the second most common sea turtle species that strands in Virginia; they average 39 strandings per year with a peak in June and in the fall (Barco and Swingle 2014) (Figure 12).

Nesting occurs primarily on a single nesting beach at Rancho Nuevo on the eastern coast of Mexico (USFWS and NMFS 1992) with a few additional nests in Texas, Florida, South Carolina, and North Carolina (Meylan et al. 1990; Weber 1995; Godfrey 1996; Foote and Mueller 2002). Kemp's ridley nesting in Virginia is extremely rare. Only two Kemp's ridley nests have been recorded in Virginia: one on Dam Neck Naval Base in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (Boettcher 2015) (Figure 13).

Occurrence in the Joint Expeditionary Base Fort Story Action Area

Kemp's ridley turtles have been recorded in southeastern Virginia throughout the year (Figure 12). Numerous strandings have been recorded in the JEBFS Action Area during spring, summer, and fall (Figure 12). No Kemp's ridley turtle nests or false crawls have been recorded on this installation (Figure 13); however, based on previous Kemp's ridley turtle nesting in Virginia (Boettcher 2015) and nearby North Carolina (National Park Service 2013; Seaturtle.org 2014) and the nesting of other turtle species at this installation, Kemp's ridley turtles may nest in the JEBFS Action Area.

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

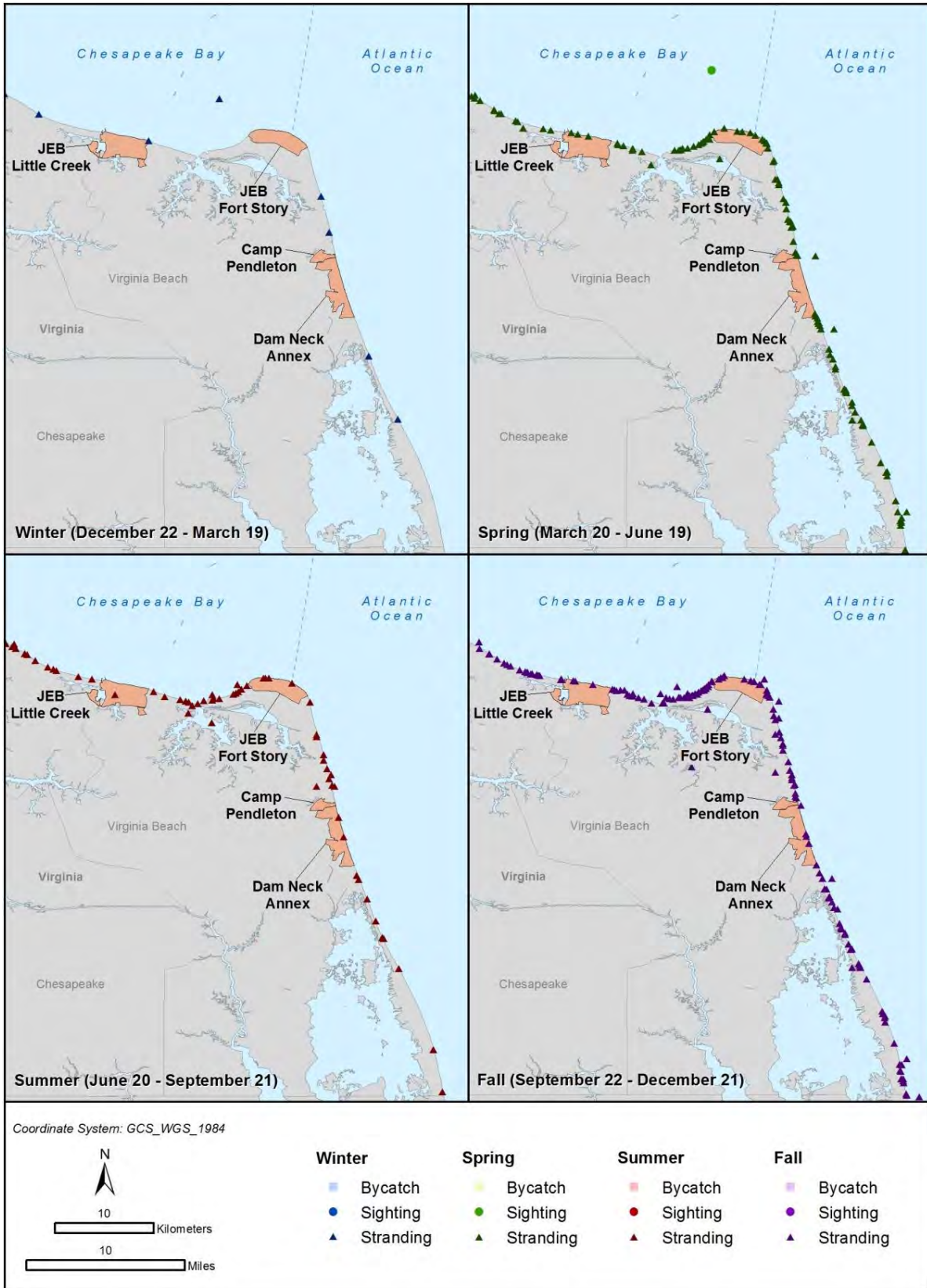


Figure 12. Sighting, stranding, and incidental fisheries bycatch records of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C.

**Biological Assessment at Joint Expeditionary Base Fort Story
Sea Turtle Management**

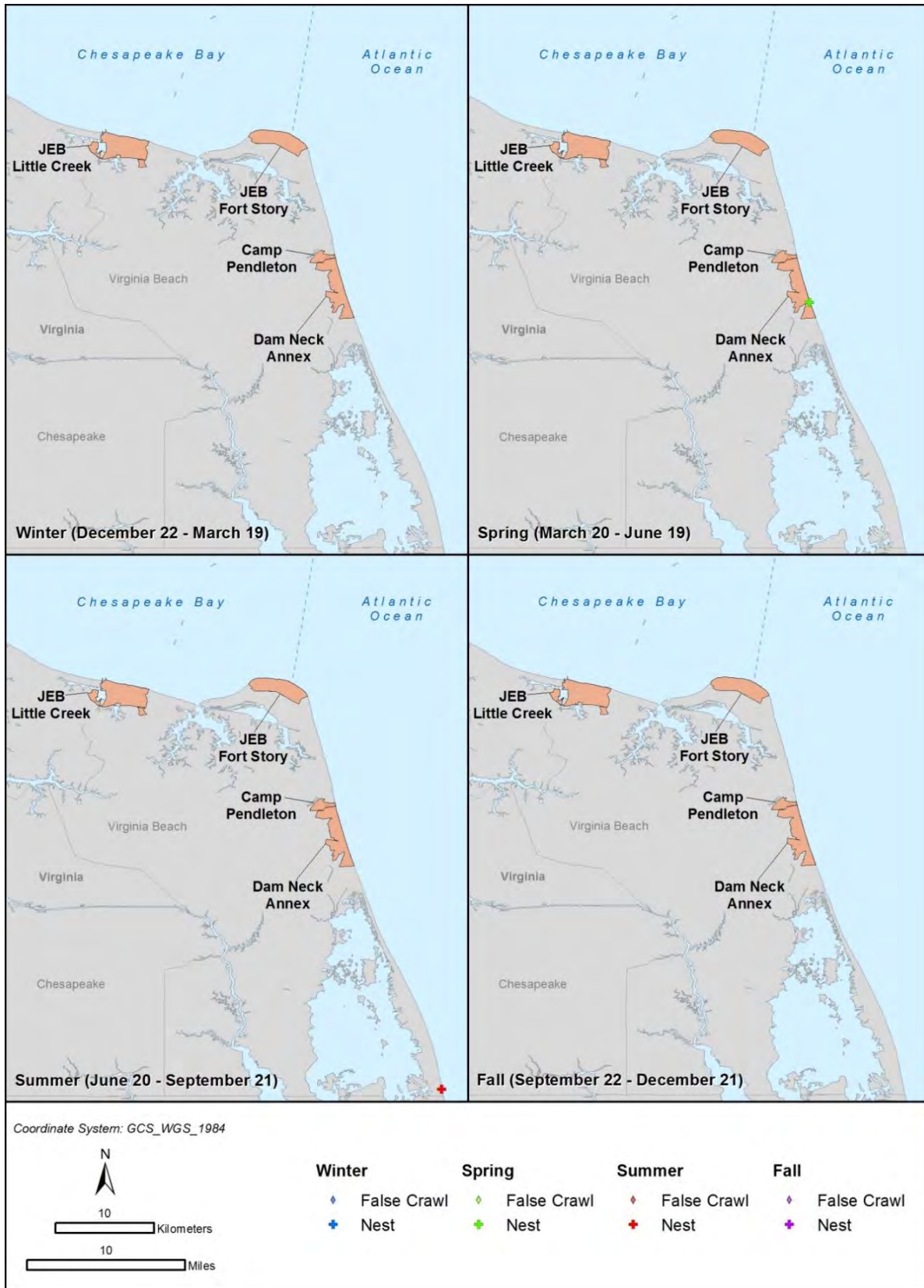


Figure 13. Nests and false crawls of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C.

4.0 ENVIRONMENTAL BASELINE OF AFFECTED AREA

4.1 BEACH AND DUNE DISTURBANCE

The JEBFS facilities, including the Action Area, are used to support the mission of providing joint service, Navy, and Army Logistical training (DoN 2013). The unique features of JEBFS, including the dunes, beach, surf, deepwater ship anchorage, variable tide conditions, natural terrain, and maritime forests, provide an ideal setting for amphibious operations and training for Joint Logistics Over-The-Shore (JLOTS) and Transportation Corps units of active and reserve Army forces. JEBFS facilities are used by command tenets of the installation as well as commands stationed at other installations. The lands, beach, and sea training areas are used extensively by the United States Marine Corps Training and Advisory Group to train students from all branches of the military and foreign military units in the reconnaissance military occupational specialty. The Navy Explosive Ordnance Disposal (EOD) Training and Evaluation Unit Two conducts specialized EOD training in the areas of diving, demolition, helicopter insertion/extraction, and parachute extraction.

The beaches at JEBFS are used year round for training (DoN 2013). Utah Beaches 1 and 2 and Omaha Beach on the west end of the installation are used for amphibious training, JLOTS exercises, and equipment testing. Inchon Beach on the east end of the installation is used for cargo handling training and the training on the installation of the Tactical Marine Terminal. The beaches at JEBFS are also used for recreational purposes. The beach cottages and year-round campground along the beach are popular attractions for military personnel and their families. In addition, the City of Virginia Beach has a renewable lease with JEBFS for use of the beach area on the eastern end of the installation. The coastal primary and secondary dunes are classified as sensitive areas and are restricted from recreational use.

The ocean, beach, and dune environments are a critical component of the JEBFS mission and need to remain intact to maintain a realistic training environment. The multitude of training operations occurring at this installation has the potential to alter the conditions of these environments, specifically the dunes, through loss of vegetation and habitat (DoN 2013). In 2012, an ecological assessment and dune restoration survey identified 31 ha (76 ac) of dune habitat as a DPA with recommendations for specific management practices (DoN 2013, 2012). Most of the primary and secondary dunes at JEBFS are intact and vegetated although several breaks in the dunes have been created for vehicular and pedestrian access. Beach and dune conservation efforts at JEBFS include utilizing sand fences and discarded Christmas trees to facilitate dune formation and planting native dune vegetation to reduce erosion and increase sand accretion. Future efforts include limiting disturbance from training and other traffic within DPAs and other conservation areas, closing unnecessary access roads, and continuing efforts to rebuild the primary and secondary dunes through the installation of sand fencing and planting of native beach dune vegetation (DoN 2013).

4.2 PREVIOUS SEA TURTLE MANAGEMENT ACTIONS

In 2010, JEBLCFS and USFWS BBNWR signed a MOU which stipulated that USFWS BBNWR volunteers would patrol JEBFS beaches starting at Gate 8 and ending at the Cape Henry House/Building 734 (USFWS 2010). These patrols would occur daily between 1 June and 31 August each year. If a sea turtle nest is located during these patrols, it will either be left in situ or moved by USFWS BBNWR biologists in accordance with the specifications in the USFWS's Biological Opinion issued to USFWS BBNWR in 2011 (USFWS 2011b).

4.3 LIGHTING SURVEY

Artificial illumination on or near the beaches of JEBFS can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991; Witherington 1992; Witherington and Martin 2003; Tuxbury and Salmon 2005; Brei et al. 2014; Rivas et al. 2015). Lighting surveys following the USFWS protocols and guidelines recommended in the Florida Marine Research Institute's technical report (Witherington and Martin 2003) were conducted from April to

September 2015 to identify artificial lighting sources that emit light that is visible from the beach of this installation (DoN 2015). The lighting survey report from the surveys can be found in Appendix B.

4.3.1 Methodology

Lighting surveys included both daytime and nighttime surveys that were conducted within the pre-nesting season, the nesting season, and the post-nesting/hatching season. (DoN 2015). Daytime surveys allowed the surveyors to familiarize themselves with the areas to be surveyed at night and identify the likely sources of light to be investigated at night. Nighttime surveys were conducted to document light sources that are visible on JEBFS beaches with the potential to impact sea turtles and classify them as either direct or indirect light sources. The pre-nesting season survey collected the baseline data of light sources with a direct, indirect, or potential to impact sea turtles. The remaining surveys conducted during the nesting season and the post-nesting/hatching season documented any changes or additions to light sources not identified during the pre-nesting or other follow-up surveys.

Prior to the first surveys, desktop analyses were conducted to identify potential light sources on the installation and create a map for use during surveys. The map was used by the surveyors to orient themselves while on the beach and assist in locating light sources. Daytime surveys occurred on 2 April 2015 along the beach face and behind the rear dunes. If allowed, photographs of potential light sources were taken for referral purposes and for inclusion in the survey reports.

The pre-nesting season nighttime surveys were conducted on 18 April 2015. These surveys occurred within 2 to 14 days following a full moon and were started after 2100 hours as specified in the USFWS protocols. Nighttime surveys consisted of at least two surveyors walking the beach at night along the water line in the swash zone. Both direct and indirect light sources were identified. Identification included the classification of the type of light source and global positioning system coordinates or map location of the actual light source. Survey forms were completed to document building number, parking area, or other identifiers of the location on the installation. The number of lights, type, color and potential disruption (as reviewed in Witherington and Martin [2003]) were also recorded.

Nesting season surveys were conducted on 14 June and 11 July 2015 to document any changes or additions to light sources. These dates complied with the phase of the moon and time specified in the USFWS protocols. Maps generated from the pre-nesting nighttime survey data were used to identify new and changed impacts. The beach was surveyed first and then followed by the survey behind the dunes to locate light sources identified from the beach. All light sources that were identified were documented.

The post-nesting/hatching season survey was conducted on 13 September within the phase of the moon and time specified in USFWS protocols. This survey was consistent with other surveys, beginning on the beach and followed by the inland survey to locate and document light sources not identified in previous surveys.

4.3.2 Results

JEBFS has artificial lighting that reaches the beach both directly and indirectly. A total of 131 direct, indirect, and potential light sources were visible from the beaches on JEBFS. Most of the artificial light (65 light sources) on JEBFS had an indirect impact on the beach because they either constituted a glow that could be seen above the dunes or illuminated structures, such as building walls, which were visible from the beach. An additional 48 light sources were also identified as having a direct impact on the beach. In addition, 18 light sources not on during the survey were categorized as either "Direct-if on" or "Indirect-if on". Those classified as "Direct-if on" were not on at the time of nighttime surveys, but the fixtures could be seen from the beach. Those classified as "Indirect-if on" were not on during the nighttime surveys and were classified due to factors such as their height and proximity to the beach, their location near similar light sources that were classified as indirect, and the fact that they would likely illuminate structures that were visible from the beach. The majority of light sources identified at JEBFS were elevated fixtures such as perimeter, street, parking lot, and stadium lighting around sports fields that rise above the dunes and/or scatter light over a

wide area. Other sources included wall-mounted area and flood lights located on upper levels of buildings and areas of concentrated light sources that created localized sky glow.

The majority of light sources identified (82) have high-pressure sodium lights with a gold-peach color that is considered to be highly disruptive to sea turtles (Witherington and Martin 2003). An additional 15 lights were identified as having or likely to have white, broad-spectrum lamps that are considered to be extremely disruptive to sea turtles. Within JEBFS, the light source identified most as producing the light that directly and indirectly impacts the beach are street lights located along Atlantic Avenue. General recommendations from the lighting survey report (DoN 2016) are included in this BA in Section 2.3 above and specific recommendations are included in the survey report (Appendix B).

This page intentionally left blank

5.0 EFFECTS OF THE ACTION

5.1 NEST RELOCATION

Nest relocation is a management technique used to protect nests that may be destroyed by environmental factors, such as erosion or repeated tidal inundation, or permitted human activities, such as military training activities, recreational uses, and beach nourishment during the nesting season. The relocation of eggs can be an effective conservation method for sea turtle populations where clutches would otherwise be lost and where populations require intervention (Pintus et al. 2009); however, nest relocation should only be conducted as a last resort if the nest is presumably doomed and only in cases where in situ protection is not possible, because relocation may cause negative impacts to eggs and hatchlings (Wyneken et al. 1988; Mortimer 1999; NMFS and USFWS 2008; Sieg et al. 2011). While it has been reported in the southeastern US that no significant differences were detected between the hatch and emergence success of in situ and relocated loggerhead clutches (Bimbi 2009; McElroy 2009), other studies suggest relocated sea turtle nests had significantly lower hatch and emergence success than in situ nests (Eckert and Eckert 1990; Herrera 2006; Pintus et al. 2009; Sieg et al. 2011; Revuelta et al. 2014). Nest relocations can result in movement-induced mortality of embryos and adverse changes to embryonic development and hatching success due to changes in the egg chamber environment. The proposed nest relocation has the potential to affect sea turtles in the Action Area. The potential direct and indirect effects of nest relocations on sea turtles are discussed below.

5.1.1 *Movement-Induced Mortality*

Nest relocating that is unnecessary or improperly executed can result in movement-induced mortality of embryos (Limpus et al. 1979). The manipulation of eggs during extraction, transport, and relocation of clutches exposes the eggs to rotational or vibrational movements which can negatively affect embryonic development and directly damage the eggs. Egg mortality increases with more severe handling and longer intervals between oviposition and movement (Miller and Limpus 1983). The embryonic membranes of older eggs are easily torn if the eggs are rotated or jarred (Mortimer 1999). Traditional protocols for nest relocation suggest that eggs should be moved within 12 hours of deposition (Limpus et al. 1979; Mortimer 1999); however, more recent studies of translocated loggerhead turtle nests indicate that careful (avoiding egg rotation) delayed translocation up to 96 hours after the eggs are laid does not negatively affect hatching success, incubation period, or hatchling size and mass (Abella et al. 2007). Movement-induced mortality may also be reduced via short-term cold exposure which slows or suspends development in turtles; cooling the eggs to 10°C to 14°C (50°F to 57°F) immediately following laying has been shown to prevent movement-induced mortality of loggerhead turtle embryos during the first 72 hours of incubation (Miller and Limpus 1983).

5.1.2 *Adverse Changes to Embryonic Development and Hatching Success*

Embryonic development and hatching success are influenced by the environmental conditions of the nest. Even though strict measures may be taken to develop suitable relocated nests, man-made nests may be of poorer quality compared to natural turtle nests and are likely to have different features than those chosen by the nesting female (Pintus et al. 2009). Compared to natural nests, relocated nests may have different substrate characteristics, such as grain size, density, compaction, organic content, and color, which may alter the nest environment leading to adverse effects on embryonic development and hatching success, particularly hatchling fitness and the natural sex ratios of embryos (Crain et al. 1995; Fisher et al. 2014; Revuelta et al. 2014). Embryos are vulnerable to extremes in three main environmental factors: moisture (including substrate humidity and salinity), gas exchange, and temperature (Ackerman 1980, 1997; Miller and Limpus 1983; Mortimer 1990; Georges et al. 1994; Carthy et al. 2003).

Nests relocated into sand that is deficient in oxygen or moisture can lead to embryo mortality and the reduced behavioral competence of hatchlings. Eggs absorb water vapor from the surrounding sand soon after oviposition and increase in weight. Maintaining this initial mass is critical; eggs cannot survive to hatching if they lose more than 40 percent of this initial mass (Miller et al. 2003). Weight changes in the eggs are influenced by the hydrologic conditions of the beach, including salt and organic material and

substrate (Ackerman 1997). Optimum moisture levels are necessary for healthy embryo development and hatching success. Embryos exposed to wet conditions during development have longer incubation periods and grow to larger hatchling size than those exposed to drier conditions; however, high moisture levels can destroy entire clutches (McGehee 1990). The rate and growth of embryos is also related to the respiratory gas exchange between the eggs and the surrounding beach (Ackerman 1980). Gas diffusion is influenced by the water content and particle size of the sand (Ackerman 1980; Miller et al. 2003). Oxygen demand is higher near the end of incubation than during early developmental stages; therefore, inundation of the nest near the end of incubation could destroy the entire clutch (Miller et al. 2003). Maximum growth and hatching success occur when the respiratory environment of the clutch is similar to the oxygen levels of a natural nest. In addition, females build their nests in a way that equalizes gas exchange for all the eggs in the clutch; therefore, nest relocation must include measures to recreate as closely as possible the environment of the original nest (Ackerman 1980).

In addition to changes in the oxygen and moisture content, relocated nests may have different thermal conditions than in situ nests (Bimbi 2009; Pintus et al. 2009; Tuttle and Rostal 2010). This change in the overall temperature regime of the nest can cause skewed sex ratios (Morreale et al. 1982; Godfrey et al. 1997; Pintus et al. 2009; Sieg et al. 2011). Differences in sand type and shading of turtle nests affect the thermal environment of the embryos. In addition, changes in metabolic heating of the clutch can affect sex ratios (Broderick et al. 2001; Sieg et al. 2011). Metabolic heating is the difference between the sand temperature and the egg clutch incubation temperature due to metabolizing embryos and is influenced by clutch size, position in the nest, and number of live versus decomposing embryos (Broderick et al. 2001). Incubation temperature has significant developmental effects on sea turtles, including affecting sexual differentiation and also affecting traits, such as locomotor abilities, that influence survival (Fisher et al. 2014). Sexual differentiation of sea turtle embryos is determined by egg incubation temperature, usually during the middle third of development (Limpus et al. 1985). Within fluctuating beach temperatures, the sex is determined by the proportion of development at a temperature and not by the duration of exposure to the temperature (Georges et al. 1994). The pivotal temperature varies between populations within a species (Limpus et al. 1985). In loggerhead turtles, the pivotal temperature is around 29°C (84°F) (Mrosovsky 1988; Wibbels 2003). According to LeBlanc et al. (2012), temperatures at or below 26°C (79°F) produce 100 percent males, temperatures at or above 30.5°C (86.9°F) produce 100 percent females, and temperatures falling between this range produce mixed sex ratios. Temperature also affects success of the clutch with high incubation temperatures causing an increase in embryonic mortality (Ackerman 1997; Broderick et al. 2001; Godley et al. 2001). Turtle embryos generally survive mean incubation temperatures up to 35°C (95°F), but leatherback and olive ridley (*Lepidochelys olivacea*) turtle embryos may be less tolerant of high incubation temperatures than green and loggerhead turtle embryos (Howard et al. 2014).

Hatchling sex ratios are important because they represent the pools from which future sex ratios will arise (TEWG 2009); therefore, any shifts in hatchling sex ratios can affect future generations of turtles if changes are extreme enough to impact productivity (TEWG 2009). The potential effects of clutch relocation at a population level are unknown but could be profound, particularly if fewer males are produced (Pintus et al. 2009). The largest US nesting subpopulation of loggerheads in Florida is known to produce mostly female hatchlings (TEWG 2009); however, beaches north of Florida seem to be important for the production and recruitment of male turtles into the overall western North Atlantic population (LeBlanc et al. 2012). For example, even during the warmest nesting seasons, more males were produced from nests in Georgia than nests farther south of this region (LeBlanc et al. 2012). Proper conservation techniques in this region should be implemented to facilitate the necessary recruitment of male loggerhead turtles into the overall western North Atlantic population (LeBlanc et al. 2012).

5.2 CUMULATIVE EFFECTS

Cumulative effects are those effects to ESA-listed species of future state, local, and/or private actions that are reasonably certain to occur on or near the Action Area. Future federal actions that are not related to the proposed action are not considered because they require separate Section 7 consultation.

Cumulative effects of actions likely to impact sea turtles on or near the Action Area include continued development of beaches adjacent to JEBFS and vessel interactions. Continued coastal development and

the chronic pollution associated with development threaten sea turtles worldwide. Coastal development and urbanized coastal areas introduce threats to sea turtles and their habitats such as direct mortality, destruction of nesting beaches, light pollution, alteration of nearshore habitat, sedimentation, eutrophication, and the introduction of heavy metals and other contaminants (Horrocks and Scott 1991; Lutcavage et al. 1997; Witherington and Martin 2003; Witherington et al. 2006; Mortimer and Donnelly 2008; Kamel and Delcroix 2009; NMFS et al. 2011; Gallaway et al. 2013). All of these threats have the potential to affect sea turtles in the vicinity of JEBFS. In areas of high human population with a high volume of recreational and commercial boat traffic and active coastal ports, such as the Virginia Beach area, propeller strikes and vessel collisions pose a significant threat to sea turtles (NMFS 2009).

This page intentionally left blank

6.0 DETERMINATION OF EFFECTS

A determination of may affect but not likely to adversely affect has been made for the leatherback and hawksbill sea turtles from the implementation of the procedures specified in the 2016 MOU between JEBLCFS and USFWS BBNWR. As discussed in Section 3.2.1.5 and 3.2.4.5, leatherback and hawksbill sea turtles have been recorded in the waters off of JEBFS, but no nests of either species have been documented on Virginia beaches. Leatherback sea turtles primarily nest on isolated mainland beaches in tropical and temperate oceans (NMFS and USFWS 1992) and to a lesser degree on some islands, such as the Greater and Lesser Antilles. The densest nesting on the US Atlantic coast occurs in Florida (Stewart and Johnson 2006) with sporadic nesting in Georgia, South Carolina, and North Carolina (Rabon et al. 2003). Reports of hawksbill sea turtles in the waters off the Virginia coast are rare with only four recorded sightings since 1991 (see Section 3.2.4.5). Hawksbill sea turtles primarily nest in the Caribbean along the Yucatán Peninsula, Mexico; smaller nesting assemblages are found in Belize, Nicaragua, Panama, Venezuela, Cuba, Antigua, and the Grenadines (NMFS and USFWS 1993). While hawksbill sea turtles are found in Virginia waters and strandings have been documented on Virginia beaches, nesting along the continental US is restricted to southern Florida and the Florida Keys (Dodd 1995).

Based on the known potential impacts of nest relocation and the previous confirmed records of nests on Virginia beaches, it is determined that the proposed action may affect and is likely to adversely affect the loggerhead, green, and Kemp's ridley sea turtles. All three of these species are documented as having previously nested on Virginia beaches, and loggerhead sea turtles have nested on JEBFS beaches. A total of three confirmed loggerhead nests were recorded on JEBFS: two in 2013 and one in 2014. Although the conservation measures to be implemented (see Section 2.2) do include the monitoring of nesting sea turtles and nests, nest protection, and careful protocols for nest relocations to increase the potential for successful nesting and hatching of sea turtles over that of not taking any management actions, relocation of turtle nests does pose the potential for nest failure and may cause incidental takes of these turtle species. Based on this determination, JEBLCFS requests initiation of formal consultation pursuant to Section 7 of the ESA.

This page intentionally left blank

7.0 REFERENCES

- Abella, E., A. Marco, and L. F. López-Jurado. 2007. Success of delayed translocation of loggerhead turtle nests. *Journal of Wildlife Management* 71(7):2290–2296.
- Ackerman, R. A. 1980. Physiological and ecological aspects of gas exchange by sea turtle eggs. *American Zoologist* 20(3):575-583.
- Ackerman, R. A. 1997. The nest environment and the embryonic development of sea turtles. Pages 83-106 in Lutz, P.L. and J.A. Musick, eds. *The biology of sea turtles*. Boca Raton, Florida: CRC Press.
- Addison, D. S. 1996. *Caretta caretta* (loggerhead sea turtle) nesting frequency. *Herpetological Review* 27(2):76.
- Barco, S. G. and W. M. Swingle. 2014. Sea turtle species in the coastal waters of Virginia: Analysis of stranding and survey data. Virginia Aquarium Foundation Scientific Report # 2014-07b. Prepared for the Virginia Department of Mines, Minerals, and Energy by Virginia Aquarium & Marine Science Center Foundation.
- Barnard, D. E., J. A. Keinath, and J. A. Musick. 1989. Distribution of ridley, green, and leatherback turtles in Chesapeake Bay and adjacent waters. Pages 201-203 in Eckert, S. A., K. L. Eckert, and T. H. Richardson, eds. *Proceedings of the Ninth Annual Workshop on Sea Turtle Conservation and Biology*. NOAA Technical Memorandum NMFS-SEFC-232.
- Bass, A. L. 1994. Population structure of hawksbill rookeries in the Caribbean and western Atlantic. Page 17 in Bjorndal, K. A., A. B. Bolten, D. A. Johnson, and P. J. Eliazar, eds. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-351.
- Bimbi, M. K. 2009. Effects of relocation and environmental factors on loggerhead sea turtle (*Caretta caretta*) nests on Cape Island. Master's thesis, College of Charleston, Charleston, South Carolina, USA.
- Bjorndal, K. A., A. B. Bolten, and M. Y. Chaloupka. 2000. Green turtle somatic growth model: Evidence for density dependence. *Ecological Applications* 10(1):269-282.
- Boettcher, R. 2015. Personal communication via email between Ms. Ruth Boettcher, Virginia Department of Game and Inland Fisheries, and Ms. Amy Whitt, Azura Consulting, 6 March 2015.
- Brandner, R. L. 1983. A sea turtle nesting at Island Beach State Park, Ocean County, New Jersey. *Herpetological Review* 14(4):110.
- Brei, M., A. Pérez-Barahona, and E. Strobl. 2014. Environmental pollution and biodiversity: Light pollution and sea turtles in the Caribbean. *Journal of Economic Literature* Q57.
- Broderick, A. C., B. J. Godley, and G. C. Hays. 2001. Metabolic heating and the prediction of sex ratios for green turtles (*Chelonia mydas*). *Physiological and Biochemical Zoology* 74(2):161–170.
- Burke, V. J., E. A. Standora, and S. J. Morreale. 1991. Factors affecting strandings of cold-stunned juvenile Kemp's ridley and loggerhead sea turtles in Long Island, New York. *Copeia* 1991(4):1136-1138.
- Byles, R. A. 1988. Behavior and ecology of sea turtles from Chesapeake Bay, Virginia. Ph.D. dissertation, College of William and Mary in Virginia.
- Carr, A. 1987. New perspectives on the pelagic stage of sea turtle development. *Conservation Biology* 1(2):103-121.
- Carthy, R. R., A. M. Foley, and Y. Matsuzawa. 2003. Incubation environment of loggerhead turtle nests: Effects on hatching success and hatchling characteristics. Pages 144-153 in Bolten, A.B. and B.E. Witherington, eds. *Loggerhead sea turtles*. Washington, DC: Smithsonian Institution Press.
- Cetacean and Turtle Assessment Program (CETAP). 1982. Characterization of marine mammals and turtles in the Mid- and North Atlantic areas of the US Outer Continental Shelf- Final report of the Cetacean and Turtle Assessment Program. Prepared for United States Bureau of Land Management, Washington, DC by Cetacean and Turtle Assessment Program, University of Rhode Island, Graduate School of Oceanography, Kingston, Rhode Island. Contract AA551-CT8-48.
- Coles, W. C. 1999. Aspects of the biology of sea turtles in the mid-Atlantic region. Ph.D. dissertation, College of William and Mary in Virginia.
- Collard, S. B. 1990. The influence of oceanographic features in post-hatchling sea turtle distribution and dispersion in the pelagic environment. Pages 111-114 in Richardson, T.H., J.I. Richardson, and M. Donnelly, eds. *Proceedings of the Tenth Annual Workshop on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFC-278.
- Comer, K. E. 2002. Habitat suitability index models for nesting sea turtles at the US Naval Station Guantanamo Bay, Cuba. Master's thesis, San Diego State University.

- Coyne, M. S., M. E. Monaco, and A. M. Landry, Jr. 2000. Kemp's ridley habitat suitability index model. Page 60 in Abreu-Grobois, F.A., R. Briseño-Dueñas, R. Márquez-Millán, and L. Sarti-Martínez, eds. Proceedings of the Eighteenth International Sea Turtle Symposium. NOAA Technical Memorandum NMFS-SEFSC-436.
- Crain, D. A., A. B. Bolten, and K. A. Bjorndal. 1995. Effects of beach nourishment on sea turtles: Review and research initiatives. *Restoration Ecology* 3:95-104.
- Diez, C. E., X. Vélez-Zuazo, and R. P. Van Dam. 2003. Hawksbill turtles in seagrass beds. *Marine Turtle Newsletter* 102:8-10.
- Dodd, C. K. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). Biological Report 88(14). Washington, DC: United States Fish and Wildlife Service.
- Dodd, C. K. 1995. Marine turtles in the southeast. Pages 121-123 in LaRoe, E. T., G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, eds. Our living resources - A report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems. Washington, DC: National Biological Service.
- Dodge, K. L., B. Galuardi, T. J. Miller, and M. E. Lutcavage. 2014. Leatherback turtle movements, dive behavior, and habitat characteristics in ecoregions of the Northwest Atlantic Ocean. *PLoS ONE* 9(3):e91726.
- Department of the Navy (DoN). 2008a. Marine resources assessment update for the Virginia Capes (VACAPES) operating area. Final report. Contract number N62470-02-D-9997, CTO 0056 Norfolk, Virginia: Atlantic Division, Naval Facilities Engineering Command. Prepared by Geo-Marine, Inc., Plano, Texas.
- Department of the Navy (DoN). 2008b. Marine resources assessment update for the Cherry Point operating area. Final report. Contract number N62470-02-D-9997, CTO 0056 Norfolk, Virginia: Atlantic Division, Naval Facilities Engineering Command. Prepared by Geo-Marine, Inc., Plano, Texas.
- Department of the Navy (DoN). 2009. Marine resources assessment for the Chesapeake Bay. Final report. Prepared for Department of the Navy, United States Fleet Forces Command, Norfolk, Virginia by Geo-Marine, Inc., Hampton, Virginia.
- Department of Navy DoN (). 2012. Ecological assessment and restoration report, dune ecological assessment project, Joint Expeditionary Base Little Creek – Fort Story. Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia by Tetra Tech, Arlington, Virginia.
- Department of the Navy (DoN). 2013. Integrated natural resources management plan, Joint Expeditionary Base Fort Story, Virginia Beach, Virginia. Naval Facilities Engineering Command, Atlantic Division by Tetra Tech, Arlington, Virginia.
- Department of the Navy (DoN). 2016. Lighting surveys for sea turtle nest management, Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia. Final report. Naval Facilities Engineering Command, Mid-Atlantic Region. GMI-AECOM Joint Venture, Springfield, Virginia.
- Dow, W., K. Eckert, M. Palmer, and P. Kramer. 2007. An atlas of sea turtle nesting habitat for the Wider Caribbean Region. WIDECASST Technical Report No. 6 Beaufort, North Carolina: The Wider Caribbean Sea Turtle Conservation Network and The Nature Conservancy.
- Dutton, D. L., P. H. Dutton, M. Chaloupka, and R. H. Boulon. 2005. Increase of a Caribbean leatherback turtle *Dermochelys coriacea* nesting population linked to long-term nest protection. *Biological Conservation* 126:186-194.
- Dutton, P. H., B. W. Bowen, D. W. Owens, A. Barragan, and S. K. Davis. 1999. Global phylogeography of the leatherback turtle (*Dermochelys coriacea*). *Journal of Zoology, London* 248:397-409.
- Eckert, K. L. and S. A. Eckert. 1990. Embryo mortality and hatch success in in situ and translocated leatherback sea turtle *Dermochelys coriacea* eggs. *Biological Conservation* 53:37-46.
- Eckert, K. L. and F. A. Abreu-Grobois, eds. 2001. Proceedings: Marine turtle conservation in the Wider Caribbean Region: A dialogue for effective regional management. Santo Domingo, Dominican Republic.
- Eckert, K. L., B. P. Wallace, J. G. Frazier, S. A. Eckert, and P. C. H. Pritchard. 2012. Synopsis of the biological data on the leatherback sea turtle (*Dermochelys coriacea*). Biological Technical Publication BTP-R4015-2012. Washington, DC
- Ehrhart, L. M., D. A. Bagley, and W. E. Redfoot. 2003. Loggerhead turtles in the Atlantic Ocean: Geographic distribution, abundance, and population status. Pages 157-174 in Bolten, A.B. and B.E. Witherington, eds. *Loggerhead sea turtles*. Washington, DC: Smithsonian Institution Press.

- Epperly, S. P., J. Braun, and A. J. Chester. 1995a. Aerial surveys for sea turtles in North Carolina inshore waters. *Fishery Bulletin* 93:254-261.
- Epperly, S. P., J. Braun, and A. Veishlow. 1995b. Sea turtles in North Carolina waters. *Conservation Biology* 9:384-394.
- Epperly, S. P., J. Braun, A. J. Chester, F. A. Cross, J. V. Merriner, and P. A. Tester. 1995c. Winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery. *Bulletin of Marine Science* 56:547-568.
- Fisher, L. R., M. H. Godfrey, and D. W. Owens. 2014. Incubation temperature effects on hatchling performance in the loggerhead sea turtle (*Caretta caretta*). *PLoS ONE* 9(12):e114880.
- Fleming, E. H. 2001. *Swimming against the tide: Recent surveys of exploitation, trade, and management of marine turtles in the northern Caribbean*. Washington, DC: TRAFFIC North America.
- Foote, J. J. and T. L. Mueller. 2002. Two Kemp's ridley (*Lepidochelys kempii*) nests on the central Gulf coast of Sarasota County Florida (USA). Pages 252-253 in Mosier, A., A. Foley, and B. Brost, eds. *Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-477.
- Fossette, S., G. Schofield, M. K. S. Lilley, A. C. Gleiss, and G. C. Hays. 2012. Acceleration data reveal the energy management strategy of a marine ectotherm during reproduction. *Functional Ecology* 26:324-333.
- Fuentes, M. M. P. B., D. A. Pike, A. Dimatteo, and B. P. Wallace. 2013. Resilience of marine turtle regional management units to climate change. *Global Change Biology* 19:1399-1406.
- Florida Fish and Wildlife Conservation Commission and Fish and Wildlife Research Institute. 2015. Green turtle nesting data 2010-2014, Statewide Nesting Beach Survey Program database. Available <http://myfwc.com/research/wildlife/sea-turtles/nesting/green-turtle/>.
- Gallaway, B. J., C. W. Caillouet Jr., P. T. Plotkin, W. J. Gazey, J. G. Cole, and S. W. Raborn. 2013. Kemp's ridley stock assessment project. Final report. Prepared for Gulf States Marine Fisheries Commission, Ocean Springs, Mississippi.
- Garrison, L. P. and P. M. Richards. 2004. Estimated bycatch of marine mammals and turtles in the US Atlantic pelagic longline fleet during 2003. NOAA Technical Memorandum NMFS-SEFSC-527:1-57.
- Georges, A., C. Limpus, and R. Stoutjesdijk. 1994. Hatchling sex in the marine turtle *Caretta caretta* is determined by proportion of development at a temperature, not daily duration of exposure. *Journal of Experimental Zoology* 270:432-444.
- Godfrey, D. 1996. Divine intervention? Kemp's ridley nests on Volusia County Beach. *Velador (Caribbean Conservation Corporation Newsletter)* (Summer):1-2.
- Godfrey, M. H., R. Barreto, and N. Mrosovsky. 1997. Metabolically-generated heat of developing eggs and its potential effect on sex ratio of sea turtle hatchlings. *Herpetology* 31(4):616-619.
- Godley, B. J., A. C. Broderick, J. R. Downie, F. Glen, J. D. Houghton, I. Kirkwood, S. Reece, and G. C. Hays. 2001. Thermal conditions in nests of loggerhead turtles: Further evidence suggesting female skewed sex ratios of hatchling production in the Mediterranean. *Journal of Experimental Marine Biology and Ecology* 263:45-63.
- Graham, S. 1973. The first record of *Caretta caretta caretta* nesting on a Maryland beach. *Bulletin Maryland Herpetological Society* 9(2):24-26.
- Grant, G. S. and D. Ferrell. 1993. Leatherback turtle, *Dermochelys coriacea* (Reptilia: Dermochelidae): Notes on near-shore feeding behavior and association with cobia. *Brimleyana* 19:77-81.
- Griffin, D., S. Murphy, M. Frick, A. Broderick, J. Coker, M. Coyne, M. Dodd, M. Godfrey, B. Godley, L. Hawkes, T. Murphy, K. Williams, and M. Witt. 2013. Foraging habitats and migration corridors utilized by a recovering subpopulation of adult female loggerhead sea turtles: Implications for conservation. *Marine Biology* 160(12):3071-3086.
- Gulko, D. A. and K. L. Eckert. 2004. *Sea turtles: An ecological guide*. Honolulu, Hawaii: Mutual Publishing.
- Hamann, M., M. H. Godfrey, J. A. Seminoff, K. Arthur, P. C. R. Barata, K. A. Bjorndal, A. B. Bolten, A. C. Broderick, L. M. Campbell, C. Carreras, P. Casale, M. Chaloupka, S. K. F. Chan, M. S. Coyne, L. B. Crowder, C. E. Diez, P. H. Dutton, S. P. Epperly, N. N. FitzSimmons, A. Formia, M. Girondot, G. C. Hays, I. S. Cheng, Y. Kaska, R. Lewison, J. A. Mortimer, W. J. Nichols, R. D. Reina, K. Shanker, J. R. Spotila, J. Tomás, B. P. Wallace, T. M. Work, J. Zbinden, and B. J. Godley. 2010. Global research priorities for sea turtles: Informing management and conservation in the 21st century. *Endangered Species Research* 11(3):245-269.

- Hawkes, L. A., A. C. Broderick, M. H. Godfrey, and B. J. Godley. 2009. Climate change and marine turtles. *Endangered Species Research* 7:137-154.
- Hawkes, L. A., A. C. Broderick, M. S. Coyne, M. H. Godfrey, and B. J. Godley. 2007. Only some like it hot-Quantifying the environmental niche of the loggerhead sea turtle. *Diversity and Distributions* 13:447-457.
- Hawkes, L. A., M. J. Witt, A. C. Broderick, J. W. Coker, M. S. Coyne, M. Dodd, M. G. Frick, M. H. Godfrey, D. B. Griffin, S. R. Murphy, T. M. Murphy, K. L. Williams, and B. J. Godley. 2011. Home on the range: Spatial ecology of loggerhead turtles in Atlantic waters of the USA. *Diversity and Distributions* 17(4):624-640.
- Henwood, T. A. and L. H. Ogren. 1987. Distribution and migrations of immature Kemp's ridley turtles (*Lepidochelys kempi*) and green turtles (*Chelonia mydas*) off Florida, Georgia, and South Carolina. *Northeast Gulf Science* 9(2):153-159.
- Heppell, S. S., D. T. Crouse, L. B. Crowder, S. Epperly, W. Gabriel, T. Henwood, R. Marquez, and N. Thompson. 2005. A population model to estimate recovery time, population size, and management impacts on Kemp's ridleys. *Chelonian Conservation and Biology* 4:767-773.
- Herrera, A. E. 2006. The effects of nest management methods on sex ratio and hatching success of leatherback turtles (*Dermochelys coriacea*). Unpublished manuscript.
- Hillis-Starr, Z. M., R. Boulon, and M. Evans. 1998. Sea turtles of the Virgin Islands and Puerto Rico. Pages 334-337 in Mac, M.J., P.A. Opler, C.E. Pucket Haecker, and P.D. Doran, eds. *Status and trends of the nation's biological resources*. Reston, Virginia: United States Geological Survey.
- Hirama, S., and L. Ehrhart. 2007. Description, prevalence, and severity of green turtle fibropapillomatosis in three developmental habitats on the east coast of Florida. *Florida Scientist* 70(4):435-448.
- Hirth, H. F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). *Biological Report* 97(1). Washington, DC: United States Fish and Wildlife Service.
- Hirth, H. F. and D. A. Samson. 1987. Nesting behavior of green turtles (*Chelonia mydas*) at Tortuguero, Costa Rica. *Caribbean Journal of Science* 23(3-4):374-379.
- Holloway-Adkins, K. and J. Provancha. 2005. Abundance and foraging activity of marine turtles using nearshore rock resources along the mid reach of Brevard County, Florida. Prepared for Olsen Associates, Inc., Jacksonville, Florida by Dynamac Corporation, Cape Canaveral, Florida.
- Hopkins-Murphy, S. R., D. W. Owens, and T. M. Murphy. 2003. Ecology of immature loggerheads on foraging grounds and adults in interesting habitat in the eastern United States. Pages 79-92 in Bolten, A.B. and B.E. Witherington, eds. *Loggerhead sea turtles*. Washington, DC: Smithsonian Institution Press.
- Horrocks, J. A. and N. M. Scott. 1991. Nest site location and nest success in the hawksbill turtle *Eretmochelys imbricata* in Barbados, West Indies. *Marine Ecology Progress Series* 69:1-8.
- Howard, R., I. Bell, and D. A. Pike. 2014. Thermal tolerances of sea turtle embryos: Current understanding and future directions. *Endangered Species Research* 26:75-86.
- James, M. C., J. Davenport, and G. C. Hays. 2006a. Expanded thermal niche for a diving vertebrate: A leatherback turtle diving into near-freezing water. *Journal of Experimental Marine Biology and Ecology* 335:221-226.
- James, M. C., S. A. Sherrill-Mix, K. Martin, and R. A. Myers. 2006b. Canadian waters provide critical foraging habitat for leatherback sea turtles. *Biological Conservation* 133:347-357.
- Joint Expeditionary Base Little Creek – Fort Story and United States Fish and Wildlife Service (JEBLCFS & USFWS). 2015. Memorandum of Understanding between Joint Expeditionary Base Little Creek – Fort Story and US Fish and Wildlife Service, Back Bay National Wildlife Refuge.
- Kamel, S. J. and N. Mrosovsky. 2004. Nest site selection in leatherbacks, *Dermochelys coriacea*: Individual patterns and their consequences. *Animal Behaviour* 68:357-366.
- Kamel, S. J. and E. Delcroix. 2009. Nesting ecology of the hawksbill turtle, *Eretmochelys imbricata*, in Guadeloupe, French West Indies from 2000–07. *Journal of Herpetology* 43(3):367–376.
- Keinath, J. A. 1993. Movements and behavior of wild and head-started sea turtles. Ph.D. dissertation, College of William and Mary in Virginia.
- Keinath, J. A. and J. A. Musick. 1990. *Dermochelys coriacea* (leatherback sea turtle). *Migration*. *Herpetological Review* 21:92.
- Keinath, J. A., J. A. Musick, and R. A. Byles. 1987. Aspects of the biology of Virginia's sea turtles: 1979-1986. *Virginia Journal of Science* 38(4):329-336.

- Keinath, J. A., J. A. Musick, and W. M. Swingle. 1991. First verified record of the hawksbill sea turtle (*Eretmochelys imbricata*) in Virginia waters. *Catesbeiana* 11(2):35-38.
- Keinath, J. A., D. E. Barnard, J. A. Musick, and B. A. Bell. 1994. Kemp's ridley sea turtles from Virginia waters. Pages 70-73 in Bjorndal, K. A., A. B. Bolten, D. A. Johnson, and P. J. Eliazar, eds. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-351.
- Landry, A. M., Jr. and D. Costa. 1999. Status of sea turtle stocks in the Gulf of Mexico with emphasis on the Kemp's ridley. Pages 248-268 in Kumpf, H., K. Steidinger, and K. Sherman, eds. *The Gulf of Mexico large marine ecosystem: Assessment, sustainability, and management*. Malden, Massachusetts: Blackwell Science.
- Lazell, J. D., Jr. 1980. New England waters: Critical habitat for marine turtles. *Copeia* 1980(2):290-295.
- LeBlanc, A. M., K. K. Drake, K. L. Williams, M. G. Frick, T. Wibbels, and D. C. Rostal. 2012. Nest temperatures and hatchling sex ratios from loggerhead turtle nests incubated under natural field conditions in Georgia, United States. *Chelonian Conservation and Biology* 11(1):108-116.
- Lee, D. S. and W. M. Palmer. 1981. Records of leatherback turtles, *Dermochelys coriacea* (Linnaeus), and other marine turtles in North Carolina waters. *Brimleyana* 5:95-106.
- Limpus, C. J., V. Baker, and J. D. Miller. 1979. Movement induced mortality of loggerhead eggs. *Herpetologica* 35(4):335-338.
- Limpus, C. J., P. Reed, and J. D. Miller. 1985. Temperature dependent sex determination in Queensland sea turtles: Intraspecific variation in *Caretta caretta*. Pages 343-351 in Grigg, G., R. Shine, and H. Ehmman, eds. *Biology of Australian Frogs and Reptiles*. Sydney, Australia: Surrey Beatty and Sons.
- Lund, P. F. 1985. Hawksbill turtle (*Eretmochelys imbricata*) nesting on the east coast of Florida. *Journal of Herpetology* 19(1):164-166.
- Lutcavage, M. and J. A. Musick. 1985. Aspects of the biology of sea turtles in Virginia. *Copeia* 1985(2):449-456.
- Lutcavage, M. E., P. Plotkin, B. Witherington, and P. L. Lutz. 1997. Human impacts on sea turtle survival. Pages 387-409 in Lutz, P.L. and J.A. Musick, eds. *The biology of sea turtles*. Boca Raton, Florida: CRC Press.
- Mansfield, K. L. 2006. Sources of mortality, movements and behavior of sea turtles in Virginia. Ph.D. diss, College of William and Mary in Virginia.
- Mansfield, K. L., E. E. Seney, and J. A. Musick. 2002a. An evaluation of sea turtle abundances, mortalities and fisheries interactions in the Chesapeake Bay, Virginia 2001. Prepared for National Marine Fisheries Service, Gloucester, Massachusetts and Commercial Fishing Advisory Board, Virginia Marine Resources Commission, Newport News, Virginia by Virginia Institute of Marine Science, Gloucester Point, Virginia.
- Mansfield, K. L., E. E. Seney, M. A. Fagan, J. A. Musick, K. L. Frisch, and A. E. Knowles. 2002b. An evaluation of interactions between sea turtles and poundnet leaders in the Chesapeake Bay, Virginia. Prepared for National Marine Fisheries Service, Gloucester, Massachusetts by Virginia Institute of Marine Science, Gloucester Point, Virginia.
- Mansfield, K. L., V. S. Saba, J. A. Keinath, and J. A. Musick. 2009. Satellite tracking reveals a dichotomy in migration strategies among juvenile loggerhead turtles in the Northwest Atlantic. *Marine Biology* 156:2555-2570.
- Mansfield, K. L., J. Wyneken, W. P. Porter, and J. Luo. 2014. First satellite tracks of neonate sea turtles redefine the 'lost years' oceanic niche. *Proceedings of the Royal Society B* 281:20133039.
- Manzella, S., J. Williams, B. Schroeder, and W. Teas. 1991. Juvenile head-started Kemp's ridleys found in floating grass mats. *Marine Turtle Newsletter* 52:5-6.
- Marquez-M., R., compiler. 1994. Synopsis of biological data on the Kemp's ridley turtle, *Lepidochelys kempii* (Garman, 1880). NOAA Technical Memorandum NMFS-SEFSC-343:1-91.
- McClellan, C. M. and A. J. Read. 2007. Complexity and variation in loggerhead sea turtle life history. *Biology Letters* 3:592-594. doi:510.1098/rsbl.2007.0355.
- McClellan, C. M. and A. J. Read. 2009. Confronting the gauntlet: Understanding incidental capture of green turtles through fine-scale movement studies. *Endangered Species Research* 10:165-179.
- McDonald, D. L. and P. H. Dutton. 1996. Use of PIT tags and photoidentification to revise remigration estimates of leatherback turtles (*Dermochelys coriacea*) nesting in St. Croix, US Virgin Islands, 1979-1995. *Chelonian Conservation and Biology* 2(2):148-152.

- McElroy, M. 2009. The effect of screening and relocation on hatching and emergence success of loggerhead sea turtle nests at Sapelo Island, Georgia. Master's thesis, University of Georgia, Athens, Georgia, USA.
- McGehee, M. A. 1990. Effects of moisture on eggs and hatchlings of loggerhead sea turtles (*Caretta caretta*). *Herpetologica* 46(3):251-258.
- Melillo, J. M., T. C. Richmond, and G. W. Yohe, eds. 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment*. United States Global Change Research Program.
- Meylan, A., P. Castaneda, C. Coogan, T. Lozon, and J. Fletemeyer. 1990. First recorded nesting by Kemp's ridley in Florida, USA. *Marine Turtle Newsletter* 48:8-9.
- Meylan, A., B. Schroeder, and A. Mosier. 1995. *Sea turtle nesting activity in the state of Florida, 1979-1992*. Florida Marine Research Publications No. 52. St. Petersburg, Florida: Florida Department of Natural Resources.
- Miller, J. D. and C. J. Limpus. 1983. A method for reducing movement-induced mortality in turtle eggs. *Marine Turtle Newsletter* 26:10-11.
- Miller, J. D., C. J. Limpus, and M. H. Godfrey. 2003. Nest site selection, oviposition, eggs, development, hatching, and emergence of loggerhead turtles. Pages 125-143 in Bolten, A. B. and B. E. Witherington, eds. *Loggerhead sea turtles*. Washington, DC: Smithsonian Institution Press.
- Mitchell, G. H., R. D. Kenney, A. M. Farak, and R. J. Campbell. 2002. Evaluation of occurrence of endangered and threatened marine species in Naval ship trial areas and transit lanes in the Gulf of Maine and offshore of Georges Bank. Naval Undersea Warfare Center Newport Technical Memorandum 02-121 Newport, Rhode Island: Naval Undersea Warfare Division.
- Morreale, S. J. and E. A. Standora. 2005. Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. *Chelonian Conservation and Biology* 4(4):872-882.
- Morreale, S. J., G. J. Ruiz, J. R. Spotila, and E. A. Standora. 1982. Temperature-dependent sex determination: Current practices threaten conservation of sea turtles. *Science* 216(4551):1245-1247.
- Morreale, S. J., A. B. Meylan, S. S. Sadove, and E. A. Standora. 1992. Annual occurrence and winter mortality of marine turtles in New York waters. *Journal of Herpetology* 26:301-308.
- Morreale, S. J., P. T. Plotkin, D. J. Shaver, and H. J. Kalb. 2007. Adult migration and habitat utilization: Ridley turtles in their element. Pages 213-229 in Plotkin, P., ed. *Biology and conservation of ridley sea turtles*. Baltimore, Maryland: Johns Hopkins University Press.
- Mortimer, J. A. 1990. The influence of beach sand characteristics on the nesting behavior and clutch survival of green turtles (*Chelonia mydas*). *Copeia* 1990(3):802-817.
- Mortimer, J. A. 1999. Reducing Threats to Eggs and Hatchlings: Hatcheries. Pages 175-178 in Eckert, K. L., K. A. Bjorndal, F. A. Abreu-Grobois, and M. Donnelly, eds. *Research and management techniques for the conservation of sea turtles*. International Union for the Conservation of Nature/Species Survival Commission Marine Turtle Specialist Group Publication No. 4.
- Mortimer, J. A. and M. Donnelly. 2008. Hawksbill turtle (*Eretmochelys imbricata*): Marine turtle specialist group 2008 International Union for the Conservation of Nature Red List status assessment. Gland, Switzerland: International Union for the Conservation of Nature.
- Mrosovsky, N. 1980. Thermal biology of sea turtles. *American Zoologist* 20(3):531-547.
- Mrosovsky, N. 1988. Pivotal temperatures for loggerhead turtles (*Caretta caretta*) from northern and southern nesting beaches. *Canadian Journal of Zoology* 66:661-669.
- Musick, J. A. 1988. *The sea turtles of Virginia, second revised edition*. VIMS Education Series No. 24. Gloucester Point, Virginia: Sea Grant Program, Virginia Institute of Marine Science.
- Musick, J. A. and C. J. Limpus. 1997. Habitat utilization and migration of juvenile sea turtles. Pages 137-163 in Lutz, P.L. and J.A. Musick, eds. *The biology of sea turtles*. Boca Raton, Florida: CRC Press.
- Northeast Fisheries Science Center (NEFSC) and Southeast Fisheries Science Center (SEFSC). 2011. Preliminary summer 2010 regional abundance estimate of loggerhead turtles (*Caretta caretta*) in northwestern Atlantic Ocean continental shelf waters. Northeast Fisheries Science Center Reference Document 11-03. National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, Massachusetts and Southeast Fisheries Science Center, Miami, Florida.
- National Marine Fisheries Service (NMFS). 1979. Determination of critical habitat for the leatherback sea turtle. *Federal Register* 44(58):17710-17712.
- National Marine Fisheries Service (NMFS). 1995. Sea turtle conservation; restrictions applicable to shrimp trawl activities; leatherback conservation zone. *Federal Register* 60(178):47713-47715.

- National Marine Fisheries Service (NMFS). 1998. Designated critical habitat; green and hawksbill sea turtles. Final rule. Federal Register 63(170):46693-46701.
- National Marine Fisheries Service (NMFS). 2000. Sea turtle conservation; restrictions applicable to shrimp trawl activities; Leatherback Conservation Zone--Temporary rule. Federal Register 65(102):33779-33780.
- National Marine Fisheries Service (NMFS). 2006. Final environmental assessment and regulatory impact review, Regulatory Flexibility Act analysis of sea turtle conservation measures for the pound net fishery in Virginia waters of the Chesapeake Bay. Gloucester, Massachusetts: National Marine Fisheries Service.
- National Marine Fisheries Service (NMFS). 2009. Our living oceans. Report on the status of US living marine resources, 6th edition. United States Department of Commerce, NOAA Tech. Memo. NMFS-F/SPO-80, 369 p.
- National Marine Fisheries Service (NMFS). 2014. Endangered and threatened species: Critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle Distinct Population Segment (DPS) and determination regarding critical habitat for the North Pacific Ocean loggerhead DPS. Federal Register 79(132):39856-39912.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 1991a. Recovery plan for US population of Atlantic green turtle. Washington, DC: National Marine Fisheries Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 1991b. Recovery plan for US population of loggerhead turtle. Washington, DC: National Marine Fisheries Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 1992. Recovery plan for leatherback turtles in the US Caribbean, Atlantic, and Gulf of Mexico. Washington, DC: National Marine Fisheries Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 1993. Recovery plan for hawksbill turtles in the US Caribbean Sea, Atlantic Ocean, and Gulf of Mexico. St. Petersburg, Florida: National Marine Fisheries Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 2007. Leatherback sea turtle (*Dermochelys coriacea*). 5-year review: Summary and evaluation. Prepared by National Marine Fisheries Service, Silver Spring, Maryland and United States Fish and Wildlife Service, Jacksonville, Florida.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 2008. Recovery plan for the Northwest Atlantic population of the loggerhead sea turtle (*Caretta caretta*) - Second revision. Silver Spring, Maryland: National Marine Fisheries Service and United States Fish and Wildlife Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 2013a. Hawksbill sea turtle (*Eretmochelys imbricata*). 5-year review: Summary and evaluation. Prepared by National Marine Fisheries Service, Silver Spring, Maryland and United States Fish and Wildlife Service, Jacksonville, Florida.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 2013b. Leatherback sea turtle (*Dermochelys coriacea*) 5-year review: Summary and evaluation. Silver Spring, Maryland and Jacksonville, Florida: National Marine Fisheries Service and United States Fish and Wildlife Service.
- National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). 2015. Endangered and threatened species; identification and proposed listing of eleven distinct population segments of green sea turtles (*Chelonia mydas*) as endangered or threatened and revision of current listings. Federal Register 80(55):15272-15337.
- National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), and Secretaría de Medio Ambiente y Recursos Naturales. 2011. Bi-national recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*): Second revision. Silver Spring, Maryland: National Marine Fisheries Service.
- National Park Service. 2013. Cape Hatteras National Seashore sea turtle monitoring 2013 annual report. National Park Service, Manteo, North Carolina.
- Parker, L. G. 1995. Encounter with a juvenile hawksbill turtle offshore Sapelo Island, Georgia. Marine Turtle Newsletter 71:19-22.

- Peterson, C., G. Monahan, and F. Schwartz. 1985. Tagged green turtle returns and nests again in North Carolina. *Marine Turtle Newsletter* 35:5-6.
- Pintus, K. J., B. J. Godley, A. McGowan, and A. C. Broderick. 2009. Impact of clutch relocation on green turtle offspring. *Journal of Wildlife Management* 73(7):1151-1157.
- Plotkin, P. T., ed. 1995. National Marine Fisheries Service and US Fish and Wildlife Service status reviews for sea turtles listed under the Endangered Species Act of 1973. Silver Spring, Maryland: National Marine Fisheries Service.
- Poloczanska, E. S., C. J. Limpus, and G. C. Hays. 2009. Vulnerability of marine turtles to climate change. Pages 151-211 in Sims, D.W., ed. *Advances in Marine Biology*. Volume 56. Burlington: Academic Press.
- Prescott, R. 2000. Sea turtles in New England waters. *Conservation Perspectives: The on-line journal of New England Society for Conservation Biology*.
- Rabon, D. R., Jr., S. A. Johnson, R. Boettcher, M. Dodd, M. Lyons, S. Murphy, S. Ramsey, S. Roff, and K. Stewart. 2003. Confirmed leatherback turtle (*Dermochelys coriacea*) nests from North Carolina, with a summary of leatherback nesting activities north of Florida. *Marine Turtle Newsletter* 101:4-8.
- Renaud, M. L. 1995. Movements and submergence patterns of Kemp's ridley turtles (*Lepidochelys kempii*). *Journal of Herpetology* 29:370-374.
- Renaud, M. L. and J. A. Williams. 2005. Kemp's ridley sea turtle movements and migrations. *Chelonian Conservation and Biology* 4(4):808-816.
- Revuelta, O., Y. M. León, A. C. Broderick, P. Feliz, B. J. Godley, J. A. Balbuena, A. Mason, K. Poulton, S. Savoré, J. A. Raga, and J. Tomás. 2014. Assessing the efficacy of direct conservation interventions: Clutch protection of the leatherback marine turtle in the Dominican Republic. *Oryx*:1-10.
- Rivas, M. L., P. S. Tomillo, J. D. Uribeondo, and A. Marco. 2015. Leatherback hatchling sea-finding in response to artificial lighting: Interaction between wavelength and moonlight. *Journal of Experimental Marine Biology and Ecology* 463:143-149.
- Roberts, M. A., C. J. Anderson, B. Stender, A. Segars, J. D. Whittaker, J. M. Grady, and J. M. Quattro. 2005. Estimated contribution of Atlantic coastal loggerhead turtle nesting populations to offshore feeding aggregations. *Conservation Genetics* 6:133-139.
- Schmid, J. R. and W. J. Barichivich. 2006. *Lepidochelys kempii* - Kemp's ridley. Pages 128-141 in Meylan, P.A., ed. *Biology and conservation of Florida turtles*. Chelonian Research Monographs No. 3. Lunenburg, Massachusetts: Chelonian Research Foundation.
- Schroeder, B. A. and N. B. Thompson. 1987. Distribution of the loggerhead turtle, *Caretta caretta*, and the leatherback turtle, *Dermochelys coriacea*, in the Cape Canaveral, Florida area: Results of aerial surveys. Pages 45-53 in Witzell, W.N., ed. *Proceedings of the Cape Canaveral, Florida Sea Turtle Workshop*. NOAA Technical Report NMFS 53.
- Schwartz, F. J. 1978. Behavioral and tolerance responses to cold water temperatures by three species of sea turtles (Reptilia, Cheloniidae) in North Carolina. Pages 16-18 in Henderson, G.E., ed. *Proceedings of the Florida and Interregional Conference on Sea Turtles, 24-25 July 1976*, Jensen Beach, Florida. Florida Marine Research Publications No. 33. St. Petersburg, Florida: Florida Department of Natural Resources.
- Schwartz, F. J. 1989. Biology and ecology of sea turtles frequenting North Carolina. Pages 307-331 in George, R.Y. and A.W. Hulbert, eds. *North Carolina Coastal Oceanography Symposium*. National Undersea Research Program Research Report 89-2. Silver Spring, Maryland: National Oceanic and Atmospheric Administration.
- Seaturtle.org. 2014. North Carolina Wildlife Resources Commission Sea Turtle Project. <http://www.seaturtle.org>. Accessed 24 Sep 2014.
- Seney, E. E. and J. A. Musick. 2005. Diet analysis of Kemp's ridley sea turtles (*Lepidochelys kempii*) in Virginia. *Chelonian Conservation and Biology* 4(4):864-871.
- Shoop, C. R. and R. D. Kenney. 1992. Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. *Herpetological Monographs* 6:43-67.
- Sieg, A. E., C. A. Binckley, B. P. Wallace, P. S. Tomillo, R. D. Reina, F. V. Paladino, and J. R. Spotila. 2011. Sex ratios of leatherback turtles: Hatchery translocation decreases metabolic heating and female bias. *Endangered Species Research* 15:195-204.

- Stewart, K. and C. Johnson. 2006. *Dermochelys coriacea* - Leatherback sea turtle. Pages 144-157 in Meylan, P.A., ed. *Biology and conservation of Florida turtles*. Chelonian Research Monographs No. 3. Lunenburg, Massachusetts: Chelonian Research Foundation.
- Stewart, K., M. Sims, A. Meylan, B. Witherington, B. Brost, and L. B. Crowder. 2011. Leatherback nests increasing significantly in Florida, USA; trends assessed over 30 years using multilevel modeling. *Ecological Applications* 21(1):263–273.
- Turtle Expert Working Group (TEWG). 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-444:1-115.
- Turtle Expert Working Group (TEWG). 2007. An assessment of the leatherback turtle population in the Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-555:1-116.
- Turtle Expert Working Group (TEWG). 2009. An assessment of the loggerhead turtle population in the western North Atlantic Ocean. A report of the Turtle Expert Working Group. NOAA Technical Memorandum NMFS-SEFSC-575. National Marine Fisheries Service, Southeast Fisheries Science Center.
- State of the World's Sea Turtles (The SWOT Team). 2007. Worldwide loggerhead nesting sites 2005. SWOT Report-State of the World's Sea Turtles 2:24-25.
- Thompson, N. B., J. R. Schmid, S. P. Epperly, M. L. Snover, J. Braun-McNeill, W. N. Witzell, W. G. Teas, L. A. Csuzdi, and R. A. Myers. 2001. Stock assessment of leatherback sea turtles of the western North Atlantic. Pages 67-104 in NMFS-SEFSC (National Marine Fisheries Service-Southeast Fisheries Science Center), ed. *Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the western North Atlantic*. NOAA Technical Memorandum NMFS-SEFSC-455.
- Tuttle, J. A. and D. Rostal. 2010. Effects of nest relocation on nest temperature and embryonic development of loggerhead sea turtles (*Caretta caretta*). *Chelonian Conservation and Biology* 9:1-7.
- Tuxbury, S. M. and M. Salmon. 2005. Competitive interactions between artificial lighting and natural cues during seafinding by hatchling marine turtles. *Biological Conservation* 121:311-316.
- University of Delaware Sea Grant. 2000. Sea turtles count on Delaware Bay. University of Delaware Sea Grant Reporter 19(1):7.
- United States Fish and Wildlife Service (USFWS). 2001. Nesting loggerhead sea turtle activity report 2000 and 1980-2000 nesting summary. Prepared for United States Army Corps of Engineers, Department of the Army, Norfolk, Virginia by S. Williams and J. Gallegos, Back Bay National Wildlife Refuge.
- United States Fish and Wildlife Service (USFWS). 2005. Refuge Update (Newsletter of the National Wildlife Refuge System) 2(6):1-24.
- United States Fish and Wildlife Service (USFWS). 2010. Memorandum of Understanding between Back Bay National Wildlife Refuge (BBNWR), US Fish and Wildlife Service (USFWS) and Joint Expeditionary Base Little Creek- Fort Story (JEBLCFS). 00485-20100517-serial #.
- United States Fish and Wildlife Service (USFWS). 2011a. Back Bay National Wildlife Refuge. http://www.fws.gov/uploadedFiles/Region_5/NWRS/South_Zone/Back_Bay/BackBay.pdf. Accessed 21 May 2015.
- United States Fish and Wildlife Service (USFWS). 2011b. Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia.
- United States Fish and Wildlife Service (USFWS). 2014. Endangered and threatened wildlife and plants; designation of critical habitat for the Northwest Atlantic Ocean distinct population segment of the loggerhead sea turtle. *Federal Register* 79(132):39756-39854.
- United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). St. Petersburg, Florida: National Marine Fisheries Service.
- United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 2011. Endangered and threatened species: Determination of nine distinct population segments of loggerhead sea turtles as endangered or threatened. *Federal Register* 76(184):58868-58952.
- Virginia Department of Game and Inland Fisheries (VDGIF). 2015. Virginia sea turtle nesting handbook. Charles City, Virginia: Bureau of Wildlife Resources, Virginia Department of Game and Inland Fisheries.

- Virginia Institute of Marine Science (VIMS). 2008. Sea turtle stranding data for the state of Virginia (1998 through 2007). [Excel file]. Gloucester Point, Virginia: Virginia Institute of Marine Science.
- Weber, M. 1995. Kemp's ridley sea turtle, *Lepidochelys kempii*. Pages 109-122 in Plotkin, P.T., ed. Status reviews of sea turtles listed under the Endangered Species Act of 1973. Silver Spring, Maryland: National Marine Fisheries Service.
- Webster, W. D. and K. A. Cook. 2001. Intraseasonal nesting activity of loggerhead sea turtles (*Caretta caretta*) in southeastern North Carolina. *American Midland Naturalist* 145:66-73.
- Wibbels, T. 2003. Critical approaches to sex determination in sea turtles. Pages 103-134 in Lutz, P.L., J.A. Musick, and J. Wyneken, eds. *The biology of sea turtles, Volume 2*. Boca Raton, Florida: CRC Press.
- Witherington, B., M. Bresette, and R. Herren. 2006. *Chelonia mydas* - green turtle. Pages 90-104 in Meylan, P.A., ed. *Biology and conservation of Florida turtles*. Chelonian Research Monographs No. 3. Lunenburg, Massachusetts: Chelonian Research Foundation.
- Witherington, B., S. Hiram, and R. Hardy. 2012. Young sea turtles of the pelagic Sargassum-dominated drift community: Habitat use, population density, and threats. *Marine Ecology Progress Series* 463:1-22.
- Witherington, B. E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. *Herpetologica* 48:31-39.
- Witherington, B. E. and K. A. Bjorndal. 1991. Influence of artificial lighting on the seaward orientation of hatchling loggerhead turtles (*Caretta caretta*). *Biological Conservation* 55:139-149.
- Witherington, B. E. and R. E. Martin. 2003. Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches. Florida Marine Research Institute Technical Report TR-2. 3rd ed. rev. St. Petersburg, Florida: Florida Fish and Wildlife Conservation Commission.
- Witt, M. J., A. C. Broderick, D. J. Johns, C. Martin, R. Penrose, M. S. Hoogmoed, and B. J. Godley. 2007. Prey landscapes help identify potential foraging habitats for leatherback turtles in the northeast Atlantic. *Marine Ecology Progress Series* 337:231-243.
- Witzell, W. N. 1983. Synopsis of biological data on the hawksbill turtle *Eretmochelys imbricata* (Linnaeus, 1766). Food and Agriculture Organization Fisheries Synopsis 137. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Witzell, W. N. 2002. Immature Atlantic loggerhead turtles (*Caretta caretta*): Suggested changes to the life history model. *Herpetological Review* 33(4):266-269.
- Wood, D. W. and K. A. Bjorndal. 2000. Relation of temperature, moisture, salinity, and slope to nest site selection in loggerhead sea turtles. *Copeia* 2000(1):119-128.
- Wyneken, J., T. J. Burke, M. Salmon, and D. K. Pedersen. 1988. Egg failure in natural and relocated sea turtle nests. *Journal of Herpetology* 22(1):88-96.

APPENDICES

This page intentionally left blank

Appendix A

**Memorandum of Understanding between Joint Expeditionary Base Little Creek-Fort Story and
United States Fish and Wildlife Service, Back Bay National Wildlife Refuge**

This page intentionally left blank

MEMORANDUM OF UNDERSTANDING
BETWEEN
JOINT EXPEDITIONARY BASE LITTLE CREEK-FORT STORY (JEBCFS)
AND

U.S. FISH AND WILDLIFE SERVICE, BACK BAY NATIONAL WILDLIFE REFUGE

1. Purpose. This Memorandum of Understanding (MOU) describes procedures for U.S. Fish and Wildlife Service (USFWS), Back Bay National Wildlife Refuge (BBNWR) to perform patrols for sea turtle activity and marine mammal strandings (dead or alive) on the Joint Expeditionary Base Fort Story (JEBFS) side of JEBCFS.

2. Background. Commander, Joint Expeditionary Base Little Creek-Fort Story (JEBCFS) ensures that surveys for nesting sea turtles and marine mammal strandings (dead or alive) are conducted on installation beach front property at JEBFS. This MOU continues previously established turtle patrols, including patrolling for sea turtle and marine mammal strandings. Pursuant to the Sikes Act, 16 U.S.C sections 670a-670f, this MOU supports the Integrated Natural Resources Management Plan (INRMP) of JEBCFS as approved by the installation's Commanding Officer which implements an ecosystem-based conservation and management program that provides for integrated conservation, restoration, and enhancement of natural resources consistent with the various missions supported by JEBCFS, and provides for sustainable, multipurpose use of natural resources subject to safety and security considerations. Management objectives include integrated management of land, fish and wildlife, forest, and outdoor recreation resources, as practicable and consistent with the missions, land use, and operational requirements at JEBCFS. In addition, the MOU between the U.S. Department of Defense and the U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies for Cooperative Integrated Natural Resource Management Program on Military Installations of 29 July 2013 encourages the military services to enter into cooperative agreements to coordinate and implement natural resource management on military installations.

3. Scope. USFWS representatives or volunteer staff will conduct non-intrusive patrols along a portion of beach front property between the JEBFS Gate 8 and the Cape Henry House/Building 734 each morning from 25 May until 31 August annually. However, patrolling may start as early as 15 May in the event that early sea turtle nesting is identified in VA or NC. This effort takes approximately fifteen minutes (Enclosure 1). If items of interest are located, USFWS may be on site for several additional hours.

a. If a nest is present, *in situ* nest management strategies as outlined in the *Virginia Sea Turtle Nesting Handbook* will be

adhered to. USFWS will assist with any nest management measures the base determines they need assistance with. If the base determines a nest is in a sensitive area and has the potential to impact the mission, base representatives and the USFWS (Virginia Field Office) will coordinate with Ruth Boettcher, Virginia Department of Game and Inland Fisheries, to determine a course of action.

b. USFWS will report sea turtle or marine mammal strandings (dead or alive) to the Virginia Aquarium Stranding Team at 757-385-7575; and to the Base Natural Resources at 757-462-5350.

c. USFWS must submit a copy of data collection sheets related to a crawl or nests at JEBFS to the Base Natural Resources staff in an end-of-season annual report via email to sharon.waligora@navy.mil or mail to Sharon Waligora, Naval Facilities Engineering Command, Public Works Department JEBLCFS, 1450 Gator Blvd, Suite 100, Virginia Beach, VA 23459; and contact Base Natural Resources at 757-462-5350 immediately if evidence of a crawl or nesting activity has been identified.

4. Enclosures. Enclosure 1, JEBFS Sea Turtle Patrol Route Map. Enclosure 2, Hold Harmless Agreement for personnel conducting patrols on JEBFS.

5. Responsibilities

a. USFWS responsibilities:

(1) The following persons are allowed access to specified locations (see attached map) at JEBFS solely for the purpose of patrolling and monitoring sea turtle activity and coordinating removal of stranded marine mammals, sea turtles, and sea turtle eggs, if observed:

(a) Ms. Marian Childress (Volunteer) - Performing patrols for USFWS, BBNWR staff.

(b) Ms. Marsha Miller (Volunteer) - Performing patrols for USFWS, BBNWR staff.

(c) Mr. Bruce Haddan (Volunteer) - Performing patrols for USFWS, BBNWR staff.

Access by other individuals must be coordinated with, and approved by, the Installation Commander prior to entry.

(2) USFWS volunteers or representatives will be required to obtain Visitor Passes from the Pass and ID Office.

(3) USFWS volunteers or representatives will notify JEBLCFS Training and Ranges Office (757-422-7101 x231/232/245) upon arrival at JEBFS and when departing the area if during duty hours (between 8:00 AM and 4:30 PM) or the Emergency Communications Center (757-462-4444) if after duty hours. Military operations and training activities take priority over access to the beach areas.

(4) No compensation is authorized to USFWS or its volunteers or representatives to perform this work.

(5) Operators of All Terrain Vehicles (ATVs) must have ATV operator's training prior to commencement of work and wear a helmet while operating an ATV at JEBFS.

(6) No movement over primary dunes, either via ATV, other vehicle, or foot, is authorized.

(7) All volunteers and operators of ATVs must sign a Hold-Harmless Agreement, see Enclosure 2, and will not hold the federal government, United States Navy, JEBLCFS, or their officers, members, agents, and employees, responsible for accidents or injuries. Original signed copies of the Hold-Harmless Agreements will be provided to JEBFS Natural Resources staff prior to commencement of work (Enclosure 2) by mail.

(8) USFWS and its volunteers or representatives understand that the patrolling/work related to this project at JEBFS could be discontinued at any time as directed by the Installation Commander. This includes, but is not limited to: security or safety concerns; military training needs; and changes in mission.

(9) Information on sea turtle activity (to include no observed activity) as well as removal of specimens will be coordinated as stipulated earlier in the last paragraph of the Scope.

(10) The patrol locations at JEB Fort Story are depicted in Enclosure 1, JEB Fort Story Turtle Patrol Route Map. This is the same route used for the previous patrol work performed in 2008-2014.

b. JEBLCFS responsibilities:

(1) Assist USFWS in gaining access to JEBFS.

6. Other Provisions. Nothing in this MOU should be construed in any way to constitute a violation of the Federal Anti-deficiency Act, 31 U.S.C. §1341.

7. Points of Contact (SME)

- a. USFWS
Back Bay National Wildlife Refuge
1324 Sandbridge Road
Wildlife Biologist
Geraldyn Mireles
757-301-7329 x-153
Geraldyn_Mireles@fws.gov
- b. JEBLCFS Environmental Division
Sharon Waligora
757-462-5350
sharon.waligora@navy.mil
- c. USFWS
Virginia Field Office
Assistant Field Office Supervisor
Troy Andersen
804-654-9235
Troy_andersen@fws.gov
- d. Virginia Department of Game and Inland Fisheries
Coastal Terrestrial Biologist
Ruth Boettcher
757-709-0766
Ruth.Boettcher@dgif.virginia.gov

8. Modification and Termination. This MOU may be modified only through the written agreement of all parties. Any party may terminate this MOU. A written notice of termination must be delivered 120 days prior to the termination date in order for such termination to be effective.

9. Effective Date and Term. This MOU is effective when signed by both parties and will remain in effect for a period not to exceed six years or until terminated.

10. Signatures. IN WITNESS WHEREOF, the Parties, by their duly authorized representatives, have affixed their signatures hereto in recognition of their acceptance of the terms and conditions, responsibilities, and obligations set forth herein.

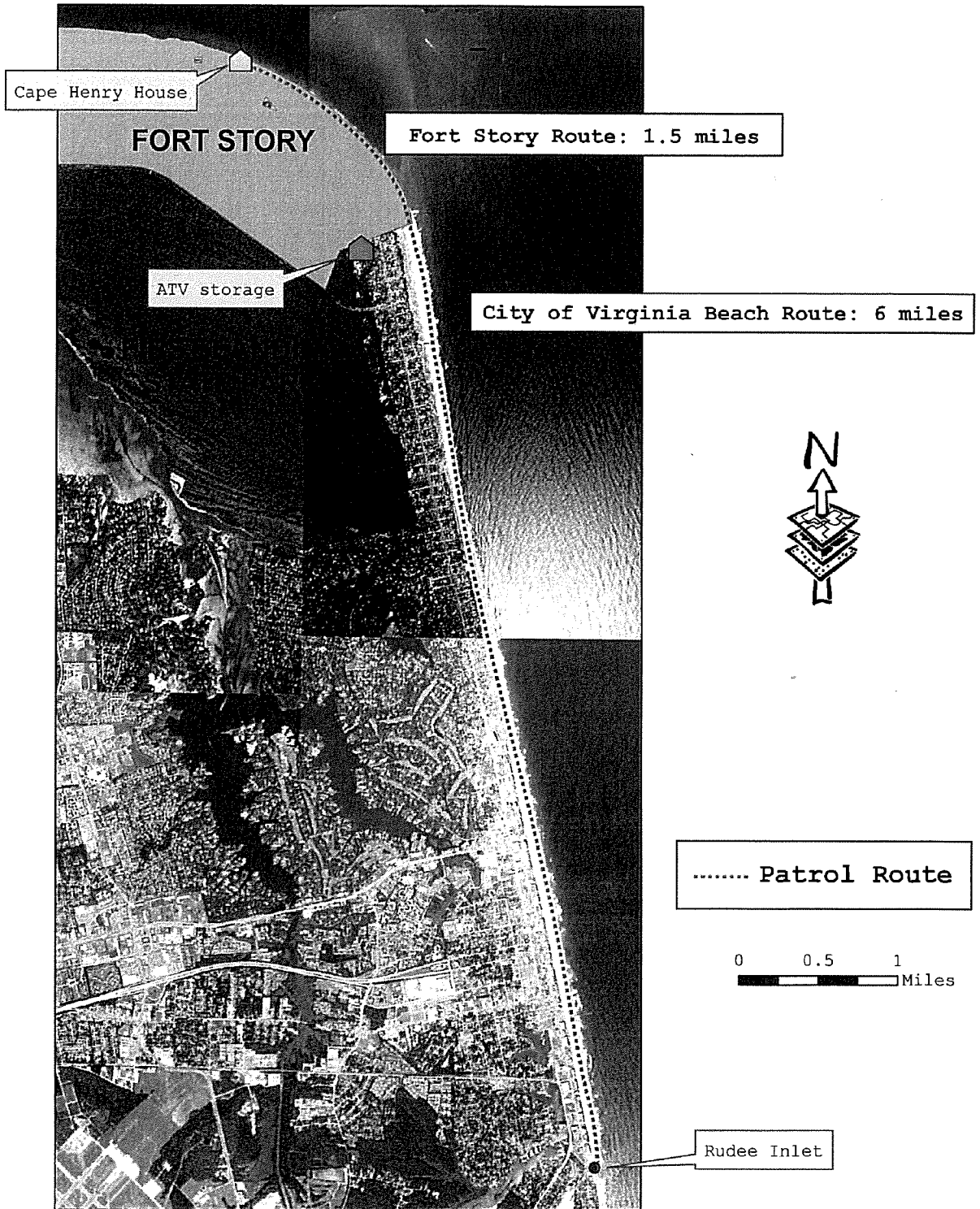
 4/12/16

for DOUG BREWER Deputy Refuge Manager (Date)
Refuge Manager
Back Bay National Wildlife Refuge
U.S. Fish and Wildlife Service

 22 FEB 16

R. L. WILLIAMSON (Date)
Rear Admiral, U.S. Navy
Commander, Navy Region Mid-Atlantic

Back Bay NWR
Sea Turtle Patrol Volunteer Route



Back Bay NWR GIS Lab

Enclosure (1)

Memorandum of Understanding
Number N61643-20150910-0312

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marian R. Childress, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marian R. Childress
Signature

4/22/16
Date

Enclosure (2)

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Ecin Bates, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Ecin B Bates
Signature

4/15/16
Date

Memorandum of Understanding
Number N61643-20150910-0312

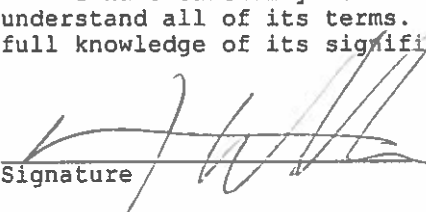
RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, BRUCE HADON, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Signature



Date

4/12/16

Enclosure (2)

Memorandum of Understanding
Number N61643-20150910-0312

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Marsha Miller, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Marsha Miller
Signature

4/12/16
Date

Enclosure (2)

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Lauren Mowbray, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Lauren Mowbray
Signature

5/3/2016
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Kathryn Owens, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.


Signature

4/12/16
Date

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Krystle Rodrigue, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.


Signature

15-April-2016
Date

Krystle Rodrigue

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration of being allowed to participate in the Sea Turtle Morning Patrol by ATV at Joint Expeditionary Base Fort Story, Virginia Beach, VA. I, Sarah A. Rose, execute this release and hold harmless agreement with the express intention of releasing the Navy, including all of its officers, employees, and agents in their official and personal capacities, their heirs, administrators and executors, from all liability, for any and all loss or damage, and from any and every claim, demand, action or right of action, of whatever kind or nature, either in law or equity, arising from or by reason of death, or any bodily injury or personal injuries known or unknown, or property damage resulting or to result from any incident which may occur as a result of activities on JEB Fort Story.

I agree that this hold harmless agreement is intended to be as broad and inclusive as permitted by law, and that if any portion of it is held invalid, the balance of it will, notwithstanding, continue in full force and effect.

I have carefully read this hold harmless agreement and understand all of its terms. I execute it voluntarily and with full knowledge of its significance.

Sarah A. Rose
Signature

4/15/16
Date

Appendix B

**Final Report, Lighting Surveys for Sea Turtle Nest Management, Joint Expeditionary Base Fort
Story, Virginia Beach, Virginia**

This page intentionally left blank

FINAL REPORT

Lighting Surveys for Sea Turtle Nest Management

Contract # N62470-13-D-8017, Task Order WE04

Joint Expeditionary Base Fort Story, Virginia Beach, Virginia

February 2016

FINAL REPORT

Lighting Surveys for Sea Turtle Nest Management

Joint Expeditionary Base Fort Story, Virginia Beach, Virginia

Contract # N62470-13-D-8017, Task Order WE04

Prepared for:



Naval Facilities Engineering Command – MIDLANT

N62470-13-D-8017, Task Order WE04, 23 Jan 2015

Recommended Citation:

Department of the Navy. 2015. Lighting surveys for sea turtle nest management, Joint Expeditionary Base Fort Story, Virginia Beach, Virginia. Draft report. Prepared for Naval Facilities Engineering Command, Mid-Atlantic Region by GMI-AECOM Joint Venture; Versar, Inc.; Azura Consulting LLC; and Virginia Aquarium & Marine Science Center Foundation

EXECUTIVE SUMMARY

Artificial night lighting is known to negatively impact many wildlife species and can lead to changes in orientation, disorientation, and attraction or repulsion from illuminated areas. Light pollution along shorelines is particularly detrimental to sea turtles which almost exclusively nest and hatch at night. Artificial illumination on or near nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest.

Five federally threatened or endangered sea turtle species are known to occur in the Chesapeake Bay and along the Virginia coastline: the leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*) turtles. Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December. Nesting occurs during the spring and summer months, particularly June, July, and August.

Based on the Virginia Department of Game and Inland Fisheries (VDGIF) data from 1970 through 2014, loggerhead false crawls were recorded on Joint Expeditionary Base (JEB) Fort Story during August 1996, June 2002, and July 2002. Four loggerhead nests were recently documented on the installation: one on 13 June 2013, one on 9 August 2013, and two on 23 July 2014. Two turtle nests were also recorded on the installation on 8 September 2013 and 13 July 2013, but could not be identified to species (Navy data).

Daytime and nighttime surveys were conducted on JEB Fort Story beginning in April and ending in September 2015 to identify artificial lighting sources that emit light visible from the beaches

of this installation. Surveys were conducted along the beach face and behind the rear dunes to locate direct light sources (e.g., lamps, globes, reflectors) and indirect lights that reflect off buildings and other objects.

A total of 131 direct, indirect, and potential light sources were visible from the beaches on JEB Fort Story. The majority of light sources identified at JEB Fort Story were elevated fixtures such as perimeter, street, parking lot, and stadium lighting around sports fields that rise above the dunes and scatter light over a wide area. Other sources included wall-mounted area and flood lights located on upper levels of buildings and areas of concentrated light sources that created localized sky glow. Common lamp types included high-pressure sodium (HPS) lamps and white, broad-spectrum lamps; both lamp types are known to be highly or extremely disruptive to sea turtles.

The beaches of JEB Fort Story are relatively dark when compared in general to the dense urban development along many of the beaches of Virginia Beach. Most of the sources of direct sources are in scattered pockets with a few areas in between consisting of one or two sources. The greatest light source was indirect and primarily resulted from the street lights along Atlantic Avenue from Kwajalein Road to New Guinea Road. Based on the results of the lighting surveys, it is recommended that JEB Fort Story develop and implement a comprehensive management strategy to minimize the potential impacts on sea turtles from the artificial light sources identified without compromising safety and security. An effective strategy would include protocols for eliminating unnecessary lights, minimizing lighting from outdoor and indoor sources, using alternative long-wavelength light sources, using light screens, and enhancing dune profiles.

TABLE OF CONTENTS

Executive Summary	i
Table of Contents	iii
List of Tables	iv
List of Figures	iv
List of Appendices	v
Acronyms and Abbreviations	vii
Introduction.....	1
Survey Area	3
Methods.....	4
Desktop Analysis.....	4
Initial Daytime Surveys.....	8
Nighttime Surveys.....	10
Pre-nesting Season Survey	10
Nesting Season Surveys	11
Post-nesting/Hatching Season Surveys	12
Results.....	12
Discussion.....	18
General Recommendations	20

Eliminating Unnecessary Lights	21
Minimizing Lighting from Outdoor Sources	21
Minimizing Lighting from Indoor Sources.....	23
Using Alternative Long-Wavelength Light Sources.....	23
Using Light Screens and Enhancing Dune Profile	25
Specific Recommendations	26
Literature Cited	32

LIST OF TABLES

Table 1. Observed or expected impact and light fixtures identified at Joint Expeditionary Base Fort Story	13
Table 2. Observed or expected impact and type of light identified at Joint Expeditionary Base Fort Story	15
Table 3. Observed or expected impact and location of light at Joint Expeditionary Base Fort Story.....	17

LIST OF FIGURES

Figure 1. Location of Joint Expeditionary Base Fort Story	5
Figure 2. Joint Expeditionary Base Fort Story survey area (east)	6
Figure 3. Joint Expeditionary Base Fort Story survey area (west)	7

Figure 4. Pole-mounted flood light fixtures documented at Joint Expeditionary Base Fort Story 14

Figure 5. Typical pole-mounted stadium lighting arrays at Joint Expeditionary Base Fort Story 14

Figure 6. Arm-mounted area “cobrahead” light fixtures observed at Joint Expeditionary Base Fort Story 15

Figure 7. Examples of gold-peach light, indicative of high-pressure sodium lamps identified at Joint Expeditionary Base Fort Story 16

Figure 8. Examples illustrating the results of strategies to reduce and change light sources to minimize impacts to sea turtles 20

Figure 9. Ball field and track pole-mounted flood array lighting and the Cape Henry Lighthouse as seen from the beach at Vung Tau Road on Joint Expeditionary Base Fort Story 27

Figure 10. Example and suitability of pole-mounted floodlighting with full visor 28

Figure 11. Light distribution patterns (lighting footprints) for street lights with different types of reflectors. 30

LIST OF APPENDICES

Appendix A. Joint Expeditionary Base Fort Story Lighting Survey Observed and Expected Impact Maps

Appendix B. Joint Expeditionary Base Fort Story Lighting Survey Data Sheet

Appendix C. Joint Expeditionary Base Fort Story Reference Photographs of Identified Light Sources

Appendix D. Joint Expeditionary Base Fort Story Locations, Fixture Type, Lamp Type, and Observed and Expected Impacts of Identified Light Sources

ACRONYMS AND ABBREVIATIONS

ac	acre(s)
DoN	Department of the Navy
ft	foot(feet)
FWC	Florida Fish and Wildlife Conservation Commission
GPS	global positioning system
ha	hectare(s)
HPS	high pressure sodium
JEB	Joint Expeditionary Base
LED	light-emitting diode
LPS	low-pressure sodium vapor
m	meter(s)
nm	nanometer(s)
USMC	United States Marine Corps
VDGIF	Virginia Department of Game and Inland Fish

This page intentionally left blank

INTRODUCTION

The presence of artificial night lighting is known to negatively impact many wildlife species. Ecological light pollution can lead to changes in orientation, disorientation, and attraction or repulsion from an area having an altered light environment (Longcore and Rich 2004). These changes may affect the foraging, reproduction, migration, and communication behaviors of individual species, and the cumulative behavioral changes caused by artificial night lighting on competition and predation may disrupt entire ecosystems (Longcore and Rich 2004). Coastal light pollution is particularly detrimental to sea turtles which almost exclusively nest and hatch at night (Witherington and Martin 2003), although Kemp's ridleys (*Lepidochelys kempii*) and some populations of hawksbills (*Eretmochelys imbricata*) nesting during daylight hours (Plotkin 2007, Brooke and Garnett 1983).

Adult female turtles exhibit a general behavioral pattern during the nesting process. They emerge from the surf zone and typically move to a location between the high-tide line and the primary dune (Witherington and Martin 2003). The female turtle prepares the nest site by digging away the surface sand to create a "body pit" and then digs an "egg cavity" within the body pit. She deposits eggs within the egg cavity and covers the eggs with sand. Once the eggs have been buried, the turtle will camouflage the nest by casting sand with her front flippers over the buried nest. After the nest has been completed, the female turtle typically returns to the sea. These activities and the decisions of timing, duration, and accuracy of the behaviors are affected greatly by external stimuli, such as human activity and visible artificial light (Witherington and Martin 2003). Artificial illumination on or near nesting beaches can affect nesting females and hatchlings. After emerging from the nests, sea turtle hatchlings move rapidly toward the sea to avoid predation; they seem to use mainly visual cues and are attracted to the brightest area within

their field of view and move away from elevated dark silhouettes (Salmon et al. 1992). Artificial lights on nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991, Witherington 1992, Witherington and Martin 2003, Tuxbury and Salmon 2005, Brei et al. 2014, Rivas et al. 2015).

Five sea turtle species are known to occur in the Chesapeake Bay and along the Virginia coastline: the leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley, green (*Chelonia mydas*), and hawksbill turtles. All sea turtles are designated as either threatened or endangered under the Endangered Species Act. Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December (Byles 1988, Keinath 1993, Coles 1999). Most of the sea turtles found in the Bay are either immature loggerhead or Kemp's ridley turtles utilizing the bay as a seasonal foraging ground (Lutcavage and Musick 1985, Musick 1988). The Bay is considered an important developmental habitat for juvenile loggerhead turtles (Musick and Limpus 1997, Mansfield et al. 2009). Leatherback and green turtles occur less frequently, and hawksbill turtles are considered extremely rare in Virginia waters. Reports of hawksbills in Virginia include three strandings in the Bay and one along the coast of Virginia north of the mouth of the Bay (Keinath et al. 1991, VIMS 2008, Barco and Swingle 2014).

Sea turtle nesting habitat in Virginia includes beaches along the Atlantic side of the Eastern Shore and beaches south of the Chesapeake Bay mouth from the Virginia Beach oceanfront to the Virginia/North Carolina border. Nesting occurs during the spring and summer months, particularly June, July, and August (Virginia Department of Game and Inland Fisheries [VDGIF]

data). The loggerhead is the only turtle species that nests regularly on Virginia's beaches; approximately 5 to 15 nests are reported annually along Virginia's ocean-facing beaches (Barco and Swingle 2014). Based on VDGIF nesting data between 2000 and 2014, the dates of the earliest and latest reported loggerhead nest in Virginia were 15 May 2006 and 2 September 2013, respectively. Only two Kemp's ridley nests have been recorded in Virginia: one on Naval Air Station Oceana - Dam Neck Annex in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (Boettcher 2015). One green turtle nest was recorded in Virginia in August 2005 (Boettcher 2015).

Based on the VDGIF data from 1970 through 2014, loggerhead false crawls were recorded on Joint Expeditionary Base (JEB) Fort Story during August 1996, June 2002, and July 2002. Four loggerhead nests were recently documented on the installation: one on 13 June 2013, one on 9 August 2013, and two on 23 July 2014. Two turtle nests were also recorded on the installation on 8 September 2013 and 13 July 2013, but could not be identified to species (Navy data).

Because artificial illumination on or near the beaches of JEB Fort Story can affect nesting females and hatchlings, lighting surveys were conducted to identify artificial lighting sources that emit light visible from the beaches of these installations. Potentially problematic lighting includes direct light sources (e.g., lamps, globes, reflectors) that are visible by surveyors and indirect lights that reflect off buildings and are visible from the beach. Light sources that illuminate mist or low clouds may also interfere with sea turtle nesting and hatching behavior (Witherington and Martin 2003).

SURVEY AREA

JEB Fort Story is located in the Tidewater area of southeastern Virginia at Cape Henry, in the City of Virginia Beach (Figure 15). This installation is situated at the mouth of the Chesapeake

Bay at the Bay's juncture with the Atlantic Ocean. JEB Fort Story encompasses approximately 142 hectares (ha) (350 acres [ac]) and has 7.87 kilometers (4.89 miles) of shoreline which includes 65 ha (160 ac) of sand beaches and dune habitat. A 31-ha (76-ac) Dune Protection Area is also located on Fort Story and includes primary and secondary dunes and dune fields (DoN 2013). The beaches on JEB Fort Story contain favorable habitats for the federally listed piping plover and red knot and several state-listed rare species. Portions of the Fort Story beaches are designated as training areas; these sites are used for testing equipment and training exercises. The eastern and western shoreline of JEB Fort Story and facilities adjacent to the shoreline are shown on Figures 16 and 17, respectively, and could be potential sources of light.

METHODS

Desktop Analysis

A desktop analysis was performed using Navy-provided geographic information system layers and aerial imagery of base boundaries, the coastline, facilities (e.g., buildings, roads, parking lots), and utilities that may generate either direct or indirect light that is visible from the beach. A quarter-mile buffer from the shoreline inland was overlaid on the aerial images so that surveyors could focus on sources that had the highest potential to be a source of direct or indirect light. Based on this desktop analysis, both areas of interest for the field surveys and light sources outside of these areas were identified. Surveyors used the aerial images to orient themselves on the beach and identify the potential light sources observed from the beach.

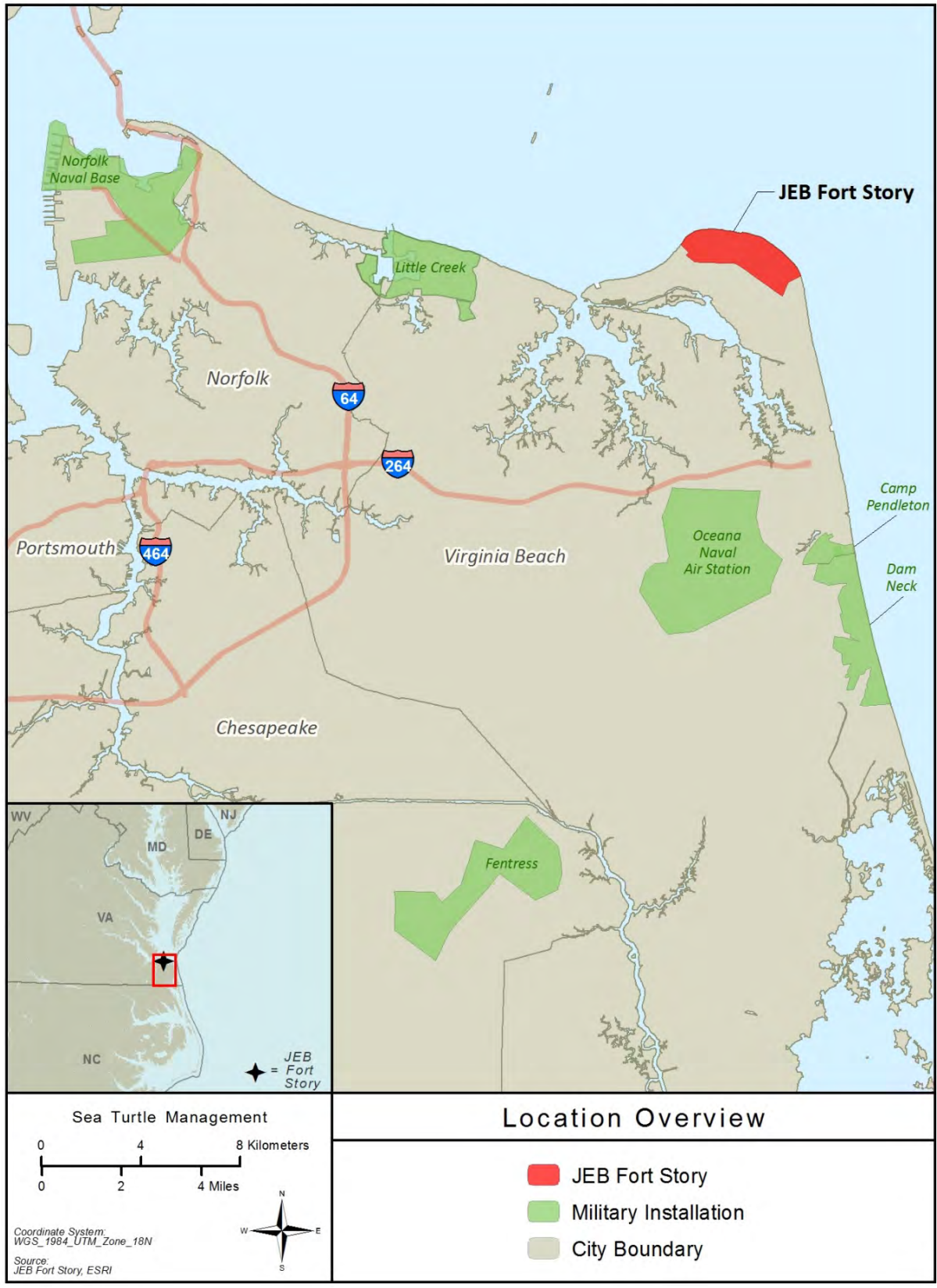


Figure 1. Location of Joint Expeditionary Base Fort Story

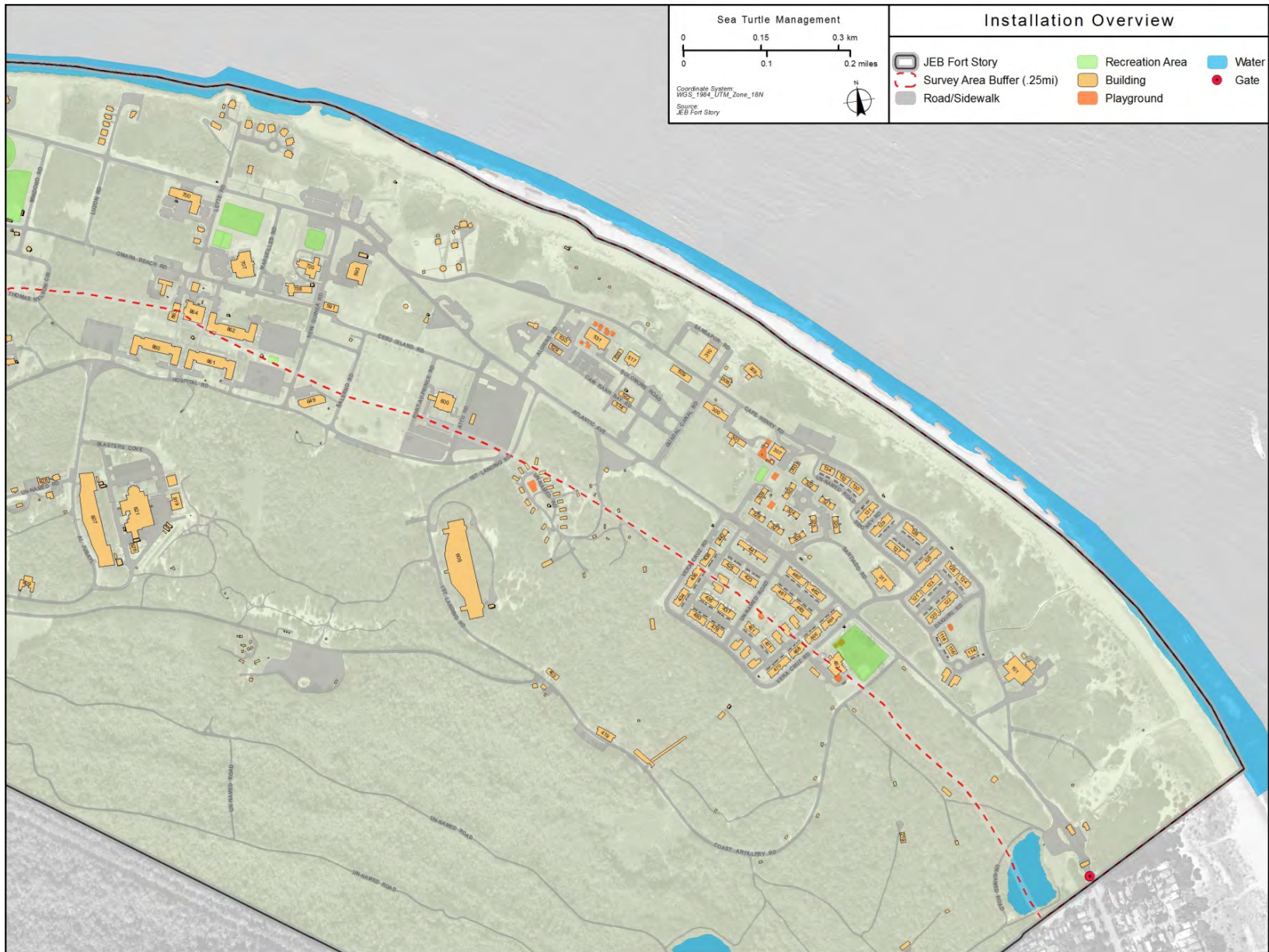


Figure 2. Joint Expeditionary Base Fort Story survey area (east)

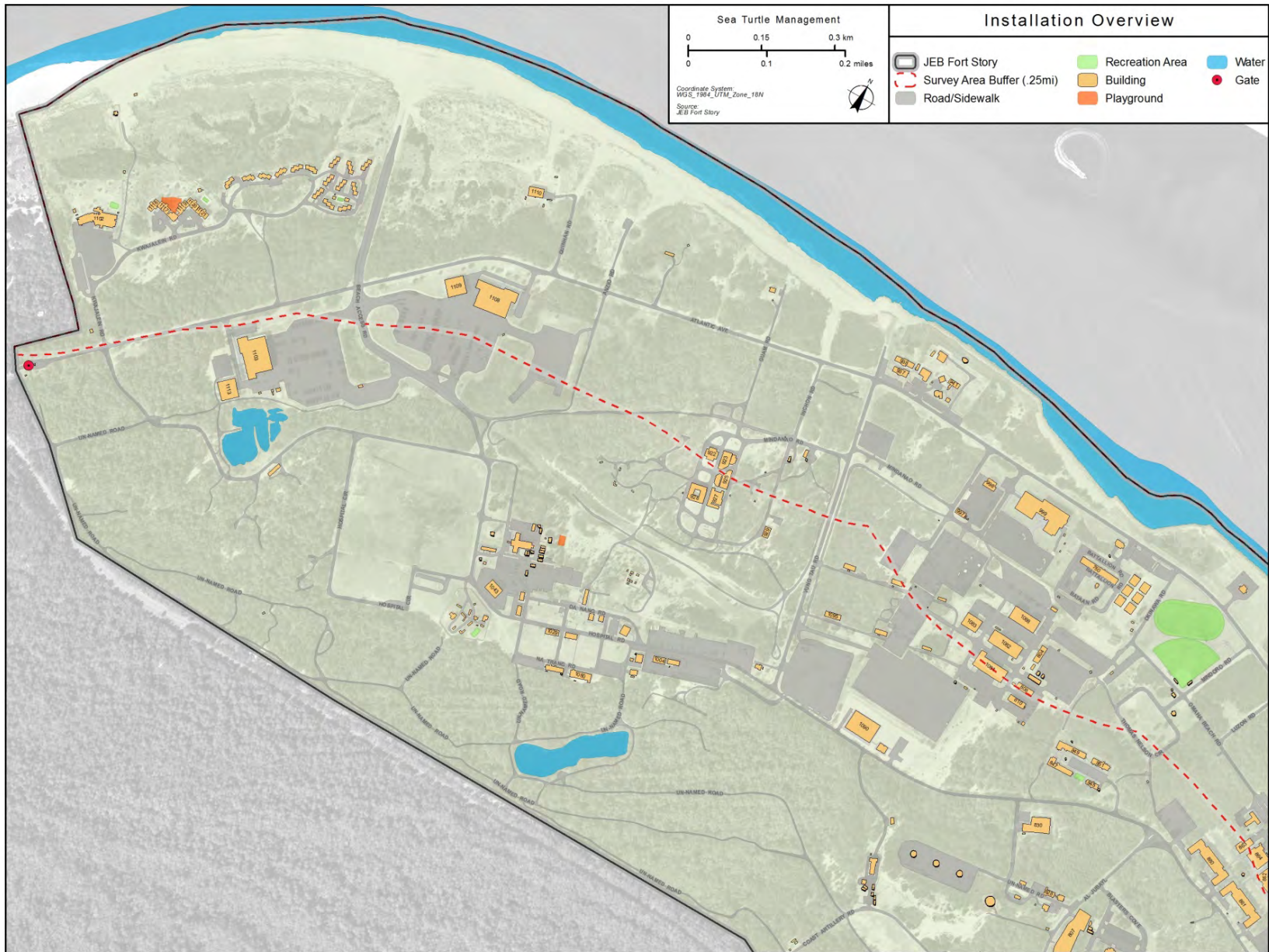


Figure 3. Joint Expeditionary Base Fort Story survey area (west)

Initial Daytime Surveys

Surveyors conducted daytime surveys along the beach face and behind the rear dunes. These surveys allowed the surveyors to familiarize themselves with the areas to be surveyed at night and identify the likely sources of light to be investigated at night. During the beach surveys, surveyors walked just above the swash zone¹ looking inland to identify potential light sources (e.g., street lights, security lights, buildings) and noted their findings for follow up during surveys behind the dunes. The region behind the dunes was surveyed by evaluating the facilities and utilities identified during the beach surveys and the desktop analysis. The primary focus was those facilities and utilities surveyors identified during the beach survey, those closest to the beach, as well as those thought to have the highest potential to produce direct or indirect light visible from the beach. All potential sources of light were documented by noting the building number and/or its global positioning system (GPS) location and type of fixture. The GPS coordinates were collected using a Trimble GeoXT™ handheld (Datum WGS 1984; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; Position Dilution of Precision [PDOP] – 8 resulting in a lowest acceptable distance error of 10 meters). Surveyors obtained a reference photograph for each fixture type and recorded the photograph number to document potential light sources. A predicted impact was assigned to each light (i.e., direct or indirect) if a reasonable certainty existed to potentially impact sea turtles. Other potential light sources were identified by location that were less likely to impact sea turtles for verification during nighttime surveys.

¹ Swash zone is the thin layer of water that remains of a wave as it rolls up the beach and loses energy.

Daytime beach surveys occurred at JEB Fort Story on 2 April 2015 between the hours of 0930 and 1630 hours. The survey started at the beach access at the east end of the installation.

Surveyors walked westward, turned around at the armored shoreline in front of the base housing on Leyte Road, and returned to the starting point. The surveyors assessed the facilities behind the dunes of the beach. Beginning at Buildings 101 and 102, they moved west on Cape Henry Road to the intersection with Algiers Road. They surveyed lights in the parking area for Building 310 and the lights on Buildings 509, 517, 529, 531, and 530 and their respective parking lots (Appendix A). The surveyors continued at the new Cape Henry Light House complex, including the Base Housing offices and the United States Coast Guard (USCG) tower (Building 533). They surveyed the tennis courts on the corner of Atlantic and New Guinea Roads, as well as the street lights in the officers' quarters on Leyte Road.

The beach between Leyte and Vung Tau Roads was not accessible due to the tide and could not be surveyed. The inland area along this section was surveyed, starting at the Morale, Welfare and Recreation cottages on Luzon Road and moving west to Building 704 and its parking lot and the ball fields and running track between Mindoro and Okinawa Roads. The surveyors evaluated Buildings 999 and 998 and Buildings 937, 938, 939, 940 and 941 from Atlantic Avenue as these buildings were in restricted areas and not accessed.

The surveyors continued the beach survey, accessing the west end of the beach via the dune crossing located at Building 1102 (Appendix A, Map 1). They walked east to the armored shoreline located at the end of Vung Tau Road, turned around, and returned to Building 1102. Access to Building 1110 and the lights located on Quinhan Road was gained from the beach. Surveyors completed the inland survey beginning at Building 1102 and the parking lot and travelled east to Vung Tau Road, evaluating the lights along Atlantic Avenue.

Nighttime Surveys

The intent of the nighttime surveys was to identify the light sources that are visible on JEB Fort Story beaches with the potential to impact sea turtles and classify them as either direct or indirect light sources. Four nighttime surveys were conducted: one during the pre-nesting season, two during nesting season, and one at the end of nesting season and the beginning of hatching. Surveys occurred within 2 to 14 days after a full moon and started after 2100 hours Eastern Standard Time. The specific dates and times of each survey are provided below.

The same basic procedures described for daytime procedures were followed for nighttime surveys and routes. Surveyors walked just above the swash line looking inland to identify sources and impact of lights visible from the beach. Afterwards, the surveys continued inland. During inland surveys, surveyors located the sources identified during the beach survey and characterized them by the observed impact, type of fixture, type of light, and specific location of the light source. Where possible, coordinates for all light sources were collected using a Trimble GeoXT™ handheld (Datum WGS 1894; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; Position Dilution of Precision [PDOP] – 8 resulting in a lowest acceptable distance error of 10 meters). In cases where it was not possible to collect GPS coordinates (e.g., location not accessible, location blocked satellite acquisition), surveyors either used the map on the GPS to estimate the location of the light and document coordinates or marked the light source locations on survey maps and documented them in data collection sheets.

Pre-nesting Season Survey

Pre-nesting nighttime surveys at JEB Fort Story occurred on 18 April 2015 between 2100 and 0200 hours. The surveyors followed the same basic route as the daytime surveys. As with the daytime survey, they could not access the armored portion of the beach between Leyte and Vung

Tau Roads. After completing the survey on the eastern portion of the beach, the surveyors evaluated the visible light sources behind the dunes starting at Buildings 101 and 102. They travelled west down Cape Henry Road, collecting data on the flag illumination at Building 300 and the lights that were visible in the parking area for Building 310. They surveyed the New Cape Henry Lighthouse complex and the USCG tower once again to collect additional data, as well as collecting new data from the parking areas and closed beach access at Cape Henry Memorial Park and O'Keefe Lookout. Surveyors assessed the western portion of the beach from the access at Building 1102, following the same route as the daytime survey. They collected data on the street lights along Atlantic Avenue from Kwajalein Road to New Guinea Road.

Nesting Season Surveys

Two nesting season surveys were conducted to document any changes or additions to light sources from previous surveys. Maps generated from the pre-nesting nighttime survey data were used to identify new and changed impacts. Surveyors were searching for any additional light sources not identified during previous surveys.

The first nesting season survey was conducted on 14 June 2015 between 2100 and 0100 hours. This survey began at the beach access on the west side of the base near Building 1102. Surveyors walked west to the armored shoreline located at the end of Vung Tau Road, turned around, and returned to the beach access. The remainder of the beach was accessed from the beach access at the east end of the installation. Surveyors walked westward, turned around at the armored shoreline adjacent to base housing on Leyte Road, and returned to the starting point. The second survey was conducted on 11 July 2015 between 2330 and 0200 hours. Beach surveys began at the east beach access. Surveyors walked west to the armored shoreline near Leyte Road and returned to the beach access. The western portion of the beach was accessed from the beach

access near Building 1102. Surveyors walked east to the armored shoreline near Vung Tau Road and returned to the western beach access. The portion of the beach between Leyte and Vung Tau Roads was not accessible. Inland surveys involved locating any additional light sources seen during the beach surveys and documenting the observed impact, type of fixture, type of light, and specific location of the light source.

Two additional daytime surveys were conducted on 22 July and 19 August 2015 in order to document potential light source data from locations that were not accessible at night and required additional coordination for entry.

Post-nesting/Hatching Season Surveys

The post-nesting/hatching season survey on JEB Fort Story was conducted on 13 September 2015 from approximately 2120 to 2330 hours. Surveys of the eastern portion of the beach began at the eastern beach access and followed the same route as all previous surveys. The western portion of the beach was started from the beach access near Building 1102 and also followed the same route as previous surveys; however, surveyors were able to access the beach between Vung Tau and Luzon Roads on this night. As with previous surveys, the inland portion of the surveys consisted of locating additional light sources seen during the beach surveys and documenting the observed impact, type of fixture, type of light, and specific location of the light source.

RESULTS

A total of 131 direct, indirect, or potential light sources were identified during surveys on JEB Fort Story. The complete data for all identified light sources are included in Appendix B. Most (65) indirectly impacted the beaches at Fort Story. The surveyors observed 48 light sources that were directly visible from the beach. An additional 18 potential light sources that were not turned

on at the time of the survey were identified, 13 of which were classified as “Direct-if on” and 5 as “Indirect-if on.”

Pole-mounted flood lights (14) were the light fixture that was most often identified as being directly visible from the beach (Table 1). A few typical examples of the pole-mounted flood light fixtures located at JEB Fort Story are presented on Figure 4. When in use, however, the eight pole-mounted stadium lighting (Figure 5) around the sports fields between Mindoro and Okinawa Roads would produce the greatest amount of direct light due to the number of lights mounted on each pole and their relatively close proximity to each other (Appendix A, Map 2). The 46 arm-mounted area “cobrahead” fixtures (Figure 6) were the type most often identified with an indirect impact on the beach and an additional five would likely have had an indirect impact if they had been turned on. Reference photographs of the light fixtures identified at JEB Fort Story can be found in Appendix C.

Table 1. Observed or expected impact and light fixtures identified at Joint Expeditionary Base Fort Story

Light fixture description	Observed or expected impact				
	Direct	Direct if on	Indirect	Indirect if on	Fixture total
Arm-mounted area - Cobrahead	8		46	5	59
Arm-mounted area - Cobrahead (double)			1		1
Arm-mounted area - Cobrahead (light-emitting diode)	3				3
Arm-mounted cobrahead & flood	1		1		2
Arm-mounted cutoff - shoebox	2		1		3
Beach facing windows	2				2
Flag illumination			1		1
High intensity strobe	1				1
Pole-mounted - decorative carriage	3				3
Pole-mounted - flood	12	2	4		18

Light fixture description	Observed or expected impact				
	Direct	Direct if on	Indirect	Indirect if on	Fixture total
Pole-mounted - flood (double)	2	2			4
Pole-mounted stadium lighting arrays		8			8
Tower marker - inverted jelly	1				1
Wall-mounted - flood lamp		1			1
Wall-mounted area "Wall pak"	5		9		14
Wall-mounted area and beach facing windows	6				6
Wall-mounted area, round	2		2		4
Total	48	13	65	5	131

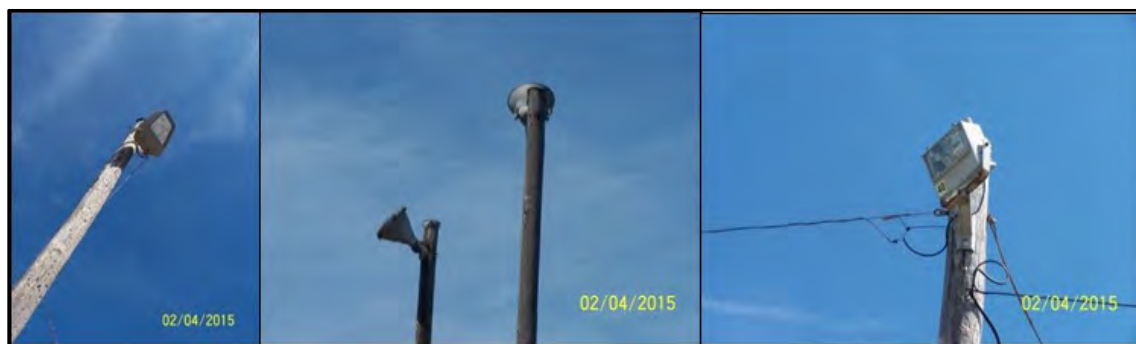


Figure 4. Pole-mounted flood light fixtures documented at Joint Expeditionary Base Fort Story

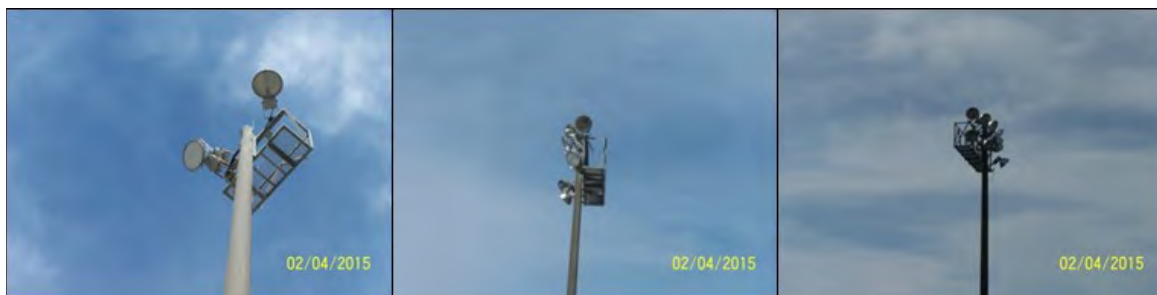


Figure 5. Typical pole-mounted stadium lighting arrays at Joint Expeditionary Base Fort Story



Figure 6. Arm-mounted area “cobrahead” light fixtures observed at Joint Expeditionary Base Fort Story

The most common lamp type identified at JEB Fort Story produced gold-peach light that is indicative of high pressure sodium (HPS) lamps (Table 2, Figure 7). Thirty HPS lamps were observed with a direct impact on the beach, while 52 had an indirect impact. Surveyors also observed 14 sources of white, broad-spectrum lamps that had either a direct or indirect impact. Sixteen lamp types could not be determined since they were not on at the time of surveys, eight of these are the pole-mounted stadium lights. The stadium lighting most likely contain metal-halide lamps that produce white, broad-spectrum light that are most common in older stadium lighting systems (General Electric n.d.); however, these may have been upgraded to HPS lamps.

Table 2. Observed or expected impact and type of light identified at Joint Expeditionary Base Fort Story

Observed lamp type	Observed or expected impact				Lamp total
	Direct	Direct if on	Indirect	Indirect if on	
Gold-peach, indicative of high-pressure sodium (HPS)	30		52		82
Interior lights	2				2
Interior lights and white, broad-spectrum	6				6
Likely HPS		1			1
Likely white, broad-spectrum		1			1
Unknown		11		5	16

Observed lamp type	Observed or expected impact				
	Direct	Direct if on	Indirect	Indirect if on	Lamp total
Red	1				1
White, broad-spectrum	6		2		8
Yellow lens. Likely incandescent or compact florescence bulb	3		11		14
Total	48	13	65	5	131



Figure 7. Examples of gold-peach light, indicative of high-pressure sodium lamps identified at Joint Expeditionary Base Fort Story

The direct light sources at JEB Fort Story consisted of clusters of observed or potential light sources at Building 1102, the Old Cape Henry Inn, Building 1110, Building 704, the base housing on Leyte Road, the parking and perimeter lighting around Building 310, and at Building 102 (Table 3, Appendix A) The base housing located on Leyte Road had the greatest number of direct light sources (9) which includes beach facing windows, wall-mounted area lights, and the street lights; however,, the ball field lights would have eight light sources with a direct impact on the beach when in use. Scattered in between these clusters were several areas having one or two direct sources, such as Building 553, O’Keefe Lookout parking, and others (Table 3). Six street lights along Atlantic Avenue were directly visible from the beach. Additionally, the greatest amount of indirect light was from 40 street lights along Atlantic Avenue between Kwajalein Road and New Guinea Road that produced an apparent skyglow. A table identifying the location

with the type of fixture, lamp type, and its observed or expected impact is located in

Appendix D.

Table 3. Observed or expected impact and location of light at Joint Expeditionary Base Fort Story

Location of light	Observed or expected impact				
	Direct	Direct if on	Indirect	Indirect if on	Location total
119 Transportation Company tarmac	2				2
Atlantic Ave street lights	6		40		46
Ball fields		6			6
Ball fields / track		2			2
Beach access from Building 1110 (off Quinhan Road)		1			1
Building 102	3				3
Building 102 parking	2		1		3
Building 1102 parking	3	1	4		8
Building 1110	1				1
Building 1110 parking	1				1
Building 300			1		1
Building 310 outside fence, Sansapor Road parking	3			3	6
Building 310 perimeter	1				1
Building 704	1				1
Building 704 parking	6				6
Building 712		2			2
Building 714	1				1
Building 734 (Leyte Rd housing)	1				1
Building 740 (Leyte Rd housing)	1				1
Building 741 (Leyte Rd housing)	1				1
Building 742 (Leyte Rd housing)	1				1
Building 743 (Leyte Rd housing)	1				1
Building 744 (Leyte Rd housing)	1				1
Leyte Rd (housing)	3				3
Cape Henry Memorial Park			1		1

Location of light	Observed or expected impact				
	Direct	Direct if on	Indirect	Indirect if on	Location total
Cape Henry Road across from Building 307			3		3
Cape Henry Road near Building 531				2	2
Cape Henry Road at Guadalcanal Road			1		1
Building 553 (Coast Guard Tower)	1				1
Cape Henry Lighthouse	1				1
Luzon Street			1		1
O'Keefe Lookout	1		2		3
Old Cape Henry Inn	4		11		15
Quinhan Road	1				1
Quinhan Road Beach Access		1			1
United States Marine Corps (USMC) Security Cooperation Group perimeter	1				1
Total	48	13	65	5	131

DISCUSSION

Light pollution on or near beaches can reduce the reproductive success of sea turtles by disrupting the behaviors of nesting females and hatchlings. Artificial lights on nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991; Witherington 1992; Witherington and Martin 2003; Tuxbury and Salmon 2005; Brei et al. 2014; Rivas et al. 2015).

The beaches of JEB Fort Story are relatively dark when compared in general to the dense urban development along many of the beaches of Virginia Beach. During the surveys, a variety of

lighting sources were identified that contribute to the direct and indirect artificial light visible or that would likely be visible from JEB Fort Story beaches (See Table 1; Appendix D). The majority of these sources were on elevated fixtures such as street, parking lot, and stadium lighting, as well as buildings that sat above the dunes. These sources rise above the dunes and scatter light over a wide area. Most of the sources of direct sources identified on JEB Fort Story consist of clusters of light sources such as those located at Building 1102, the Old Cape Henry Inn, Building 704, the housing on Leyte Road, and the parking and perimeter lighting around Building 310 (Appendix A). The remaining direct sources consisted of one or two light sources located between these scattered pockets. The greatest number of light sources documented were indirect and primarily resulted from the street lights along Atlantic Avenue between Kwajalein Road and New Guinea Road.

The best method of solving light pollution is to manage the light rather than eliminating it (Witherington and Martin 2003). The principal sources of light that cause problems for sea turtles is that which “spills over” onto the beach from the areas that are intended to be illuminated. Managing this spillage can resolve many of the impacts identified during the surveys.

No set criteria for the acceptable level of light intensity to mitigate potential impacts to turtles; factors such as the level of natural light and the availability of other visual clues such as dunes and vegetation vary widely, and the amount of artificial lighting that may interfere with nesting or disorient hatchlings differs greatly from one location to the next (Witherington and Martin 2003). The most effective mitigation method is to minimize the amount of artificial light as much as possible using the best available technology. It is recommended that JEB Fort Story undertake a comprehensive management strategy to minimize the potential impacts of the 131 direct,

indirect, and potential light sources on sea turtles at this installation. An effective strategy would include protocols for eliminating unnecessary lights, minimizing lighting from outdoor and indoor sources, using alternative long-wavelength light sources, using light screens, and enhancing dune profiles (Witherington and Martin 2003).

General Recommendations

The general recommendations listed below should be considered individually or together based on the need, type, intensity, and orientation of the light source without compromising safety and security. Some of the changes discussed below can reduce the impact to beaches and are illustrated on Figure 8. These measures should also be considered for any future construction of facilities near the beach.



Figure 8. Examples illustrating the results of strategies to reduce and change light sources to minimize impacts to sea turtles.

Eliminating Unnecessary Lights

All of the direct, indirect, and potential light sources identified during these surveys should be evaluated based on their effectiveness and the lighting needs of this installation. Reducing the use of lights is the easiest and least expensive method to reduce the amount of light visible from the beach. While this may be an option in some areas of JEB Fort Story, safety and security may require the use of artificial lighting and must remain a priority in certain areas of the base.

Wherever possible, unnecessary light sources should be eliminated. Unnecessary light sources may include those that illuminate areas which do not require security and areas that are vacant and do not have foot traffic as well as decorative light sources and those light sources that provide more than adequate lighting for a particular function (Witherington and Martin 2003).

Minimizing Lighting from Outdoor Sources

The simplest method to reduce the impact of artificial lighting on sea turtles is to prevent light from reaching the beach although this is not always a practical solution. Fixtures that are directly visible from the beach can be realigned, modified, repositioned, or shielded to keep light from reaching the beach (Florida Power & Light Company 1998). The following is a list of recommended solutions compiled from the FWC (2011), Witherington and Martin (2003), and Florida Power & Light (1998) to minimize the amount of light reaching the beach from existing light sources:

1. Turn off lights that are not essential for safety or security. This is the simplest and less expensive method to minimize light trespass onto beach areas. Lighting only needs to be turned off during the nesting and hatching season.

2. Reduce the wattage of the lamps used to the lowest level necessary to fulfill the purpose for the light and remain within the manufacture's guidelines. This will reduce the amount of light emitted and, subsequently, reaching the beach.
3. Reposition luminaires to better focus the light to where it is most needed.
4. Substitute high-watt, multidirectional luminaires with low-watt, directional luminaires that are directed away from the beach.
5. Install shields on light sources that are sufficiently opaque, large, and positioned to prevent light from reaching the beach.
6. Recess light sources and position them to direct the light downward and away from the beach.
7. Reduce the height of pole-mounted and arm-mounted luminaires. The lower a light source is mounted, the less area it will illuminate. In addition, lower-mounted luminaires may also be better shielded by dunes, vegetation, and buildings.
8. Take advantage of natural light screens, such as dunes and vegetation, to shield luminaires.
9. Install timers or motion detectors so that the light is illuminated only when it is most needed. These are relatively inexpensive solutions, yet they have some limitations in their use and efficacy. Timers are minimally effective since nesting and hatching can take place throughout the night and should be set to turn off early in the evening. Motion detectors can be a better solution than timers, but they should not be used in high traffic areas visible from the beach and can only be used with incandescent lighting. If used, motion detectors work well with yellow bug-light bulbs.

Minimizing Lighting from Indoor Sources

Indoor lighting that is visible from the beach, such as that identified from the officers' quarters on Leyte Street, Building 704, and Building 553 USCG tower, also has the potential to disrupt sea turtle nesting and hatching. These sources are typically from buildings located close to the beach with windows that are visible above the dunes. Indoor lighting that trespasses onto the beach is easily eliminated and typically involves a few simple and inexpensive methods. Lights in rooms that are not in use should be turned off, and lamps can be repositioned away from windows that are visible from the beach. Windows that are visible from the beach can be tinted to reduce the amount of light passing through the glass using either manufactured tinted glass or an applied film. Installing and closing opaque curtains or blinds and closing them after dark can block the majority of light that might otherwise trespass onto beaches.

Using Alternative Long-Wavelength Light Sources

As previously discussed, it is not always practical to eliminate all light sources that are visible from the beach. In these instances, steps should be considered to minimize the use of light sources that produce the most disruptive wavelengths of light. In areas close to the beach where light is needed, the use of long-wavelength light sources should be considered (Florida Power & Light Company 1998).

The most common lamp type that was in use during the lighting surveys was HPS lamps. A total of 82 sources of this type of light were observed, 30 of which were identified as having direct impacts. Based on studies on physiological spectral sensitivity, hatchling orientation with respect to laboratory and commercial light sources, and spectral profiles of commonly used lamps, HPS light sources are thought to be highly disruptive to sea turtles. Although less disruptive than the white, broad-spectrum sources, HPS is one of the most common causes of hatchling

disorientation and mortality (see Witherington and Martin 2003). The stadium lights around the ball fields were not in use at the time of the survey and when turned on they would likely add an additional eight sources of direct white, broad-spectrum light. White, broad-spectrum light is known to be extremely disruptive to sea turtles (see Witherington and Martin 2003).

The use of alternative light sources in place of these HPS and white, broad-spectrum light sources should be evaluated. Alternative light sources which are known to be minimally disruptive to sea turtles include low-pressure sodium (LPS) vapor lighting, yellow filters, yellow or amber incandescent light bulbs (bug lights), and red light-emitting diode (LED) lighting (Witherington and Martin 2003). These types of light bulbs and sources are on the FWC list of approved sea turtle lighting (FWC 2011). The FWC (2011) approves lamps visible from and adjacent to turtle nesting beaches if they produce wavelengths of light greater than 560 nanometers (nm) for sources visible from and adjacent to turtle nesting beaches. Acceptable lamps include:

- LPS 18 and 35 watts;
- red, orange, or amber LED (true red, orange, or amber diodes, NOT filters);
- true red neon; and
- other lighting sources that produce light of 560 nm or longer.

The installation or replacement of luminaire lens on the typical arm-mounted cutoff and “cobrahead” fixture typically used as street and parking lot lighting should also be considered. Examples include replacing existing clear lens and dropdown globes with yellow, dichroic “long-pass” filters that exclude short wavelengths well and are less likely to degrade overtime. If

dichroic filters are considered, they should filter all wavelengths (have a stopband) below 520 nm.

Using Light Screens and Enhancing Dune Profile

Natural dune systems are highly variable; dunes grow, shrink, and move in the direction of prevailing winds over time (Broome 2002). Dune systems may have areas with large dunes and small, low dunes only a few hundred yards away. In addition, foredunes often contain natural gaps such as blowouts and overwash passes.

As reviewed in Witherington and Martin (2003), several researchers have found that improper sea turtle orientation is exacerbated when the dune profile is low or sparsely vegetated. The dune silhouette may influence hatchling behavior by providing visual cues, shielding light, or both since hatchlings tend to move away from darkly silhouetted objects. In areas that may have a low dune profile, restoring dunes so that they are similar in appearance to the preexisting or adjacent natural dunes may be an option to provide more natural orientation cues for hatchlings. This method may be considered in locations such as old, unused beach access points or in areas where erosion has reduced the profile to an extent that it no longer provides sufficient visual cues for sea turtle hatchlings.

Small areas can be restored using methods such as planting native pioneer dune vegetation (e.g., American beachgrass, sea oats, and bitter panicum) and installing sand fencing (Broome 2002). If the restoration of larger areas is being considered, methods such as bulldozing and dredging may be necessary. It must be noted, however, that any dune manipulation should be carefully considered and planned. Sand fencing should not be installed in areas where turtles may nest. Moreover, dune restoration typically requires several years of continuous actions. For example, dune building with sand fencing requires the installation of additional rows of fencing over

several years, with the placement of new fencing at the seaward dune toe when the preceding fence is filled approximately two-thirds high (O’Connell 2008). The use of bulldozing and dredging are expensive and can be extremely damaging to the coastal environment (Broome 2002). In addition, large dune building projects may affect adjacent ecology by changing the micro-climate and negatively impacting plant communities (O’Connell 2008).

Light screens may be considered to prevent beachfront lighting from shining directly on the beach. They can be created from vegetation buffers, natural features, or artificial screens such as shade cloth and privacy fencing. Light screens, also known as ground level barriers, are used extensively in Florida to block existing light sources and are required in accordance with coastal city and county ordinances. Ground level barriers should be placed so that they do not interfere with nesting sea turtles or hatchlings or cause short- or long-term damage to the beach-dune system. Artificial screens would only be necessary during nesting and hatching season or until vegetation has become tall and dense enough to block the light (Martin 2000).

Specific Recommendations

The greatest challenge for JEB Fort Story will be mitigating the impacts of the observed pole- and arm-mounted flood and area direct light sources. The majority of these are located in the parking areas for Buildings 102, 704, and 1102. Most of these light sources use HPS lamps, although some use white, broad-spectrum lamps (Appendix D). Additionally, mitigating the impacts of the stadium lighting identified at the JEB Fort Story ball fields and track will present a challenge. These lights likely contain metal-halide lamps that produce white, broad-spectrum light and are located within about 110 meters (m) (360 feet [ft]) of the beach (Appendix A, Map 3) and would be visible on a large portion of the beach. The distance at which these lights can be seen is illustrated on Figure 9 as photographed from the beach north of Vung Tau Road

approximately 800 m (2,625 ft) away. Because this lighting likely uses intense white, broad-spectrum lamps and are mounted on tall poles, it can affect nesting beaches many kilometers away (Witherington and Martin 2003). Mitigation of these light sources could include the use of visors and louvers that can be installed to direct light down onto parking lots and fields and reduce the amount of upward and lateral light (Figure 10). It may also be possible to replace the metal-halide lamps that produce the extremely disruptive white, broad-spectrum light with less disruptive lamps, reduce the wattage of the bulbs, and redirect and lower the lights that are most visible on the beach. These steps should also be considered for the pole-mounted flood lights along Quinhan Road, at O’Keefe Lookout, on the tarmac at the 119 Transportation Company, and around Buildings 712, 938, and 1110.

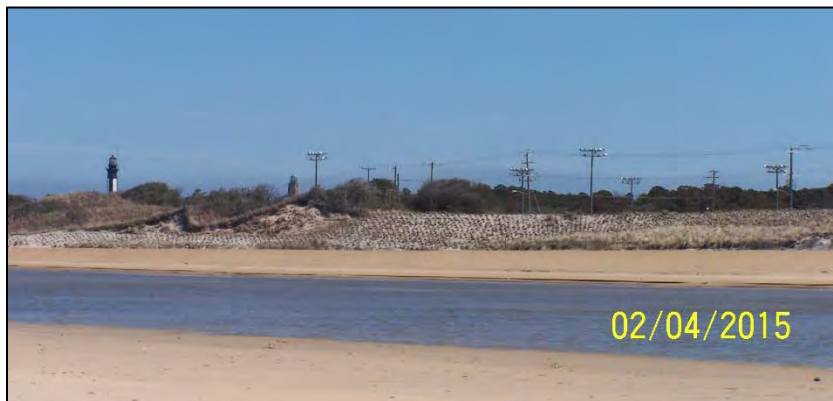
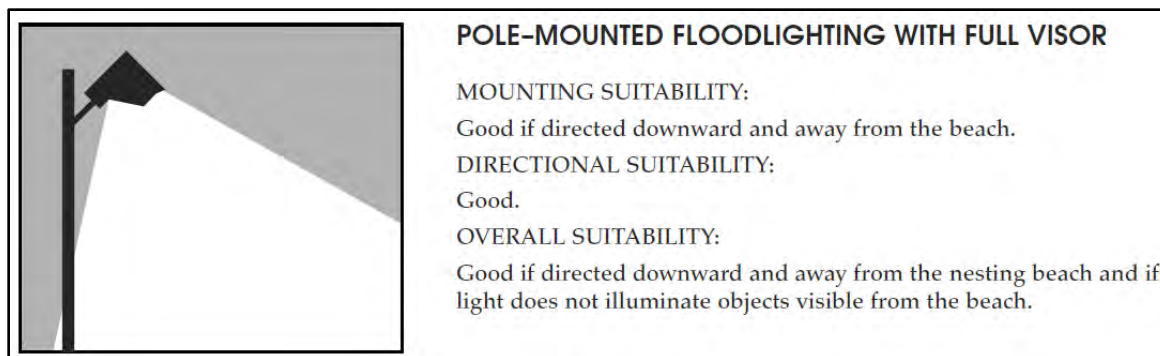


Figure 9. Ball field and track pole-mounted flood array lighting and the Cape Henry Lighthouse as seen from the beach at Vung Tau Road on Joint Expeditionary Base Fort Story



Source: Witherington and Martin 2003

Figure 10. Example and suitability of pole-mounted floodlighting with full visor

While the Cape Henry Lighthouse (see Figure 9) is a direct light source, it is not expected to disrupt sea turtle nesting and hatching activities. A study conducted by the Florida Atlantic University in 2012 did not reveal any statistical difference between loggerhead hatchling orienting on beaches with and without the influence of a lighthouse (Reintsma et al. 2014).

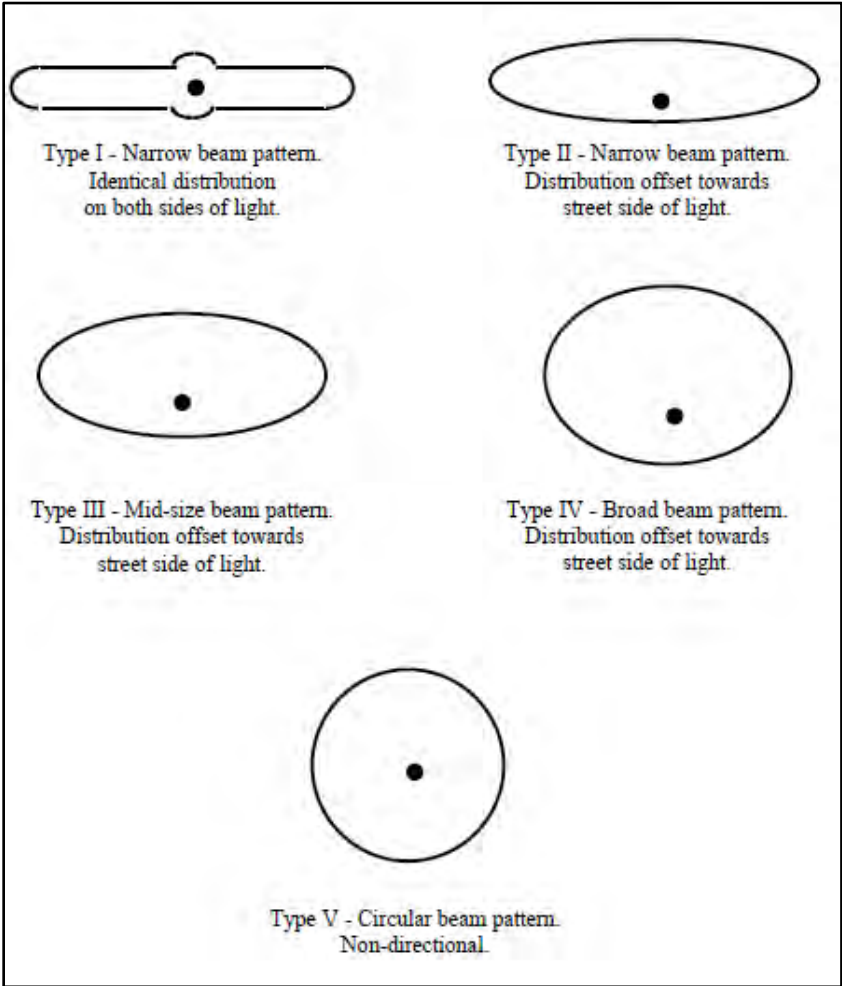
Moreover, Mrosovsky (1978) found that green turtles are relatively insensitive to flashing lights and orient using permanent cues (i.e., the open seaward horizon versus the dark landward dune and vegetation).

The impact of the arm-mounted area “cobrahead” street lights identified along Atlantic Avenue, Cape Henry Road, and Luzon Road could be reduced using several of the methods described by Florida Power & Light Company (1998). Reducing the height of the fixture below 5 m (15 ft) for those lights within 100 m (330 ft) would reduce the footprint of the light. Changing reflectors or the lamp socket position within the existing fixture would change the way light is distributed away from the source. If uniformity of light distribution of an area can be altered without compromising safety or security, adjusting fixtures to produce a long longitudinal pattern would require fewer lights to illuminate an area or street. To minimize the indirect light produced by street lights, fixtures should be configured to have good backside cutoff properties, and changing

reflectors should be considered. The distance light travels across the roadway parallel to the mounting arm of the fixture refers to its transverse distribution and is dependent on the type of reflector within the fixture (Figure 11). It is preferable to install Type I, II, and III reflectors in street lights facing the ocean due to their narrow transverse properties. Type II and III reflectors in fixtures facing away from the beach may be sufficient to prevent direct illumination of the beach depending on their height and distance from the beach. Other methods that should be considered include adding a dark non-reflective internal shield to reduce the lighting footprint and amount of light cast toward the beach and aligning the mounting angle of the fixture away from the beach. Similar steps could be taken for arm-mounted area parking lot lights identified at Buildings 102, 310, 714, and 1110, Cape Henry Memorial Park, and O'Keefe Lookout.

The United States flag illumination at Building 300, undoubtedly honoring the historic significance of JEB Fort Story, creates a unique challenge. The flag illumination produces an indirect sky glow that is visible over a large portion of the beach. Potential mitigation of this light source would include not illuminating and lowering the flag during sea turtle nesting and hatching seasons, reducing the wattage of the lamps used, or changing the lamps to those that produce wavelengths above 560 nm (i.e. not white light). All of these options may diminish the significance of why the United States flag is flown over Fort Story at all times. In accordance with United States Code 36, Title 10, the flag must be properly illuminated during the hours of darkness. If the lights are extinguished during nesting and hatching seasons the flag must be lowered during these times. Using lower wattage lamps may be the best option to reduce the indirect light reaching the beach, but may not properly illuminate the flag. Using lamps that produce wavelengths of light above 560 nm (yellow to red light) may alter the appearance of the flag's colors. It may be feasible to install shields on the light to focus more of the light onto the

flag and reduce the amount of lateral and upward light that reaches the beach. As previously discussed, the best method to solve light pollution is to manage the light that spills over onto the beach rather than eliminating it.



Source: Florida Power & Light Company 1998

Figure 11. Light distribution patterns (lighting footprints) for street lights with different types of reflectors.

Prior to any additional construction or improvements to facilities that are adjacent to the beach in which light sources are replaced or installed, planners should consult resources that identify sea turtle friendly lighting such as the following:

- Witherington and Martin (2003), Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches
- International Dark Sky Association (2000), Outdoor lighting code handbook, Version 1.14. Available at www.darksksociety.org/handouts/idacodehandbook.pdf.
- Florida Fish and Wildlife Conservation Commission (2015), Marine turtles and lights, Available at <http://www.myfwc.com/wildlifehabitats/managed/sea-turtles/lighting/#Solutions%20to%20Decrease%20Light-Pollution>
- Florida Power & Light Company. 1998. Florida Fish and Wildlife Commission. Coastal roadway lighting manual; A handbook of practical guidelines for managing street lighting to minimize impacts to sea turtles. Available at http://myfwc.com/media/1421691/Coastal_Roadway_Lighting_Manual.pdf

This page intentionally left blank

LITERATURE CITED

- Barco, S. G., and W. M. Swingle. 2014. Sea turtle species in the coastal waters of Virginia: Analysis of stranding and survey data. VAQF Scientific Report # 2014-07b Virginia Department of Mines, Minerals, and Energy. Virginia Aquarium & Marine Science Center Foundation.
- Boettcher, R. 2015. Personal communication via email between Ms. Ruth Boettcher, Virginia Department of Game and Inland Fisheries, and Ms. Amy Whitt, Azura Consulting, 6 March 2015.
- Brei, M., A. Pérez-Barahona, and E. Strobl. 2014. Environmental pollution and biodiversity: Light pollution and sea turtles in the Caribbean. *Journal of Economic Literature* Q57.
- Brooke, M. de L., and M. C. Garnett. 1983. Survival and reproductive performance of hawksbill turtles *Eretmochelys imbricata* L. on Cousin Island, Seychelles. *Biological Conservation* 25:161–170.
- Broome, S. W. 2002. Restoration and Management of Coastal Dune Vegetation. North Carolina State University, North Carolina Cooperative Extension Service.
<http://broome.soil.ncsu.edu/ram.html>. Accessed 23 September 2015.
- Byles, R. A. 1988. Behavior and ecology of sea turtles from Chesapeake Bay, Virginia. Dissertation, College of William and Mary, Williamsburg, Virginia, USA. 112 p.
- Coles, W. C. 1999. Aspects of the biology of sea turtles in the mid-Atlantic region. Dissertation. College of William and Mary, Williamsburg, Virginia, USA. 149 p.
- DoN (Department of the Navy). 2013. Integrated natural resources management plan, Joint Expeditionary Base Fort Story, Virginia Beach, Virginia. Department of the Navy, Naval

Facilities Engineering Command, Atlantic Division, Norfolk, Virginia, USA. Tetra Tech, Arlington, Virginia, USA.

Florida Fish and Wildlife Conservation Commission (FWC). 2011. FWC approved sea turtle lighting. http://myfwc.com/media/418417/SeaTurtle_LightingGuidelines.pdf. Accessed 12 December 2014.

Florida Power & Light Company. 1998. Florida Fish and Wildlife Commission Coastal roadway lighting manual; A handbook of practical guidelines for managing street lighting to minimize impacts to sea turtles. http://myfwc.com/media/1421691/Coastal_Roadway_Lighting_Manual.pdf. Accessed 6 May 2015.

General Electric. No Date. Complete Lighting Systems For The Entire Recreational Facility. General Electric webpage. http://www.gelighting.com/LightingWeb/na/images/OLP2736A-GE-Sports-Lighting-System-Selection_tcm201-81285.pdf. Accessed 22 April 2015.

Keinath, J. A. 1993. Movements and behavior of wild and head-started sea turtles [Ph.D. dissertation]: College of William and Mary, Williamsburg, Virginia, USA.

Keinath, J. A., J. A. Musick, and W. M. Swingle. 1991. First verified record of the hawksbill sea turtle (*Eretmochelys imbricata*) in Virginia waters. *Catesbeiana* 11(2):35-38.

Longcore, T., and C. Rich. 2004. Ecological light pollution. *Frontiers in Ecology and the Environment* 2(4):191-198.

Lutcavage, M., and J. A. Musick. 1985. Aspects of the biology of sea turtles in Virginia. *Copeia* 1985(2):449-456.

- Mansfield, K. L., V. S. Saba, J. A. Keinath, and J. A. Musick. 2009. Satellite tracking reveals a dichotomy in migration strategies among juvenile loggerhead turtles in the Northwest Atlantic. *Marine Biology* 156:2555–2570.
- Martin, R. E. 2000. Making Informed Choices: Lighting Technologies. Pages 13-19 *in* Proceedings of Sea Turtles and Beachfront Lighting: An Interactive Workshop for Industry Professionals and Policy Makers in Barbados. K. L. Eckert and J. A. Horrocks, technical editors. Wider Caribbean Sea Turtle Conservation Network, the Barbados Sea Turtle Project, and the Tourism Development Corporation of Barbados. Technical Report 1. 13 October 2000.
- Mrosovsky, N. 1978. Effects of flashing lights on sea-finding behavior of green turtles. *Behavioral Biology* 22: 85-91.
- Musick, J. A. 1988. The sea turtles of Virginia, second revised edition. VIMS Education Series No. 24. Virginia Institute of Marine Science, Sea Grant Program, Gloucester Point, Virginia, USA.
- Musick, J. A., and C. J. Limpus. 1997. Habitat utilization and migration of juvenile sea turtles. Pages 137-163 *in* P. L. Lutz, and J. A. Musick, editors. The biology of sea turtles. CRC Press, Boca Raton, Florida, USA.
- O’Connell, J. 2008. Coastal Dune Protection & Restoration, Using ‘Cape’ American Beach Grass and Fencing. <https://www.whoi.edu/fileserver.do?id=87224&pt=2&p=88900>. Accessed 23 September 2015.
- Plotkin, P., editor. 2007. Biology and conservation of ridley sea turtles. Johns Hopkins University Press, Baltimore, USA.

- Reintsma, N., M. Young, and M. Salmon. 2014. Do Lighthouses Disrupt the Orientation of Sea Turtle Hatchlings? Hypothesis Testing With Arena Assays at Hillsboro Beach, Florida, U.S.A. *Marine Turtle Newsletter* 140:1-3. <http://www.seaturtle.org/mtn/archives/mtn140/mtn140-1.shtml>. Accessed 20 October 2015.
- Rivas, M. L., P. S. Tomillo, J. D. Uribeondo, and A. Marco. 2015. Leatherback hatchling sea-finding in response to artificial lighting: Interaction between wavelength and moonlight. *Journal of Experimental Marine Biology and Ecology* 463:143-149.
- Salmon, M., J. Wyneken, E. Fritz, and M. Lucas. 1992. Seafinding by hatchling sea turtles: Role of brightness, silhouette and beach slope as orientation cues. *Behaviour* 122:56-77.
- Tuxbury, S. M., and M. Salmon. 2005. Competitive interactions between artificial lighting and natural cues during seafinding by hatchling marine turtles. *Biological Conservation* 121:311-316.
- VIMS (Virginia Institute of Marine Science). 2008. Sea turtle stranding data for the state of Virginia (1998 through 2007). [Excel file]. Virginia Institute of Marine Science, Gloucester Point, Virginia, USA.
- Witherington, B. E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. *Herpetologica* 48:31-39.
- Witherington, B. E., and K. A. Bjorndal. 1991. Influence of artificial lighting on the seaward orientation of hatchling loggerhead turtles (*Caretta caretta*). *Biological Conservation* 55:139-149.
- Witherington, B. E., and R. E. Martin. 2003. Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches. Florida Marine Research Institute

Technical Report TR-2. 3rd edition revision. Florida Fish and Wildlife Conservation
Commission, St. Petersburg, Florida, USA.

This page intentionally left blank

Appendix A

Joint Expeditionary Base Fort Story

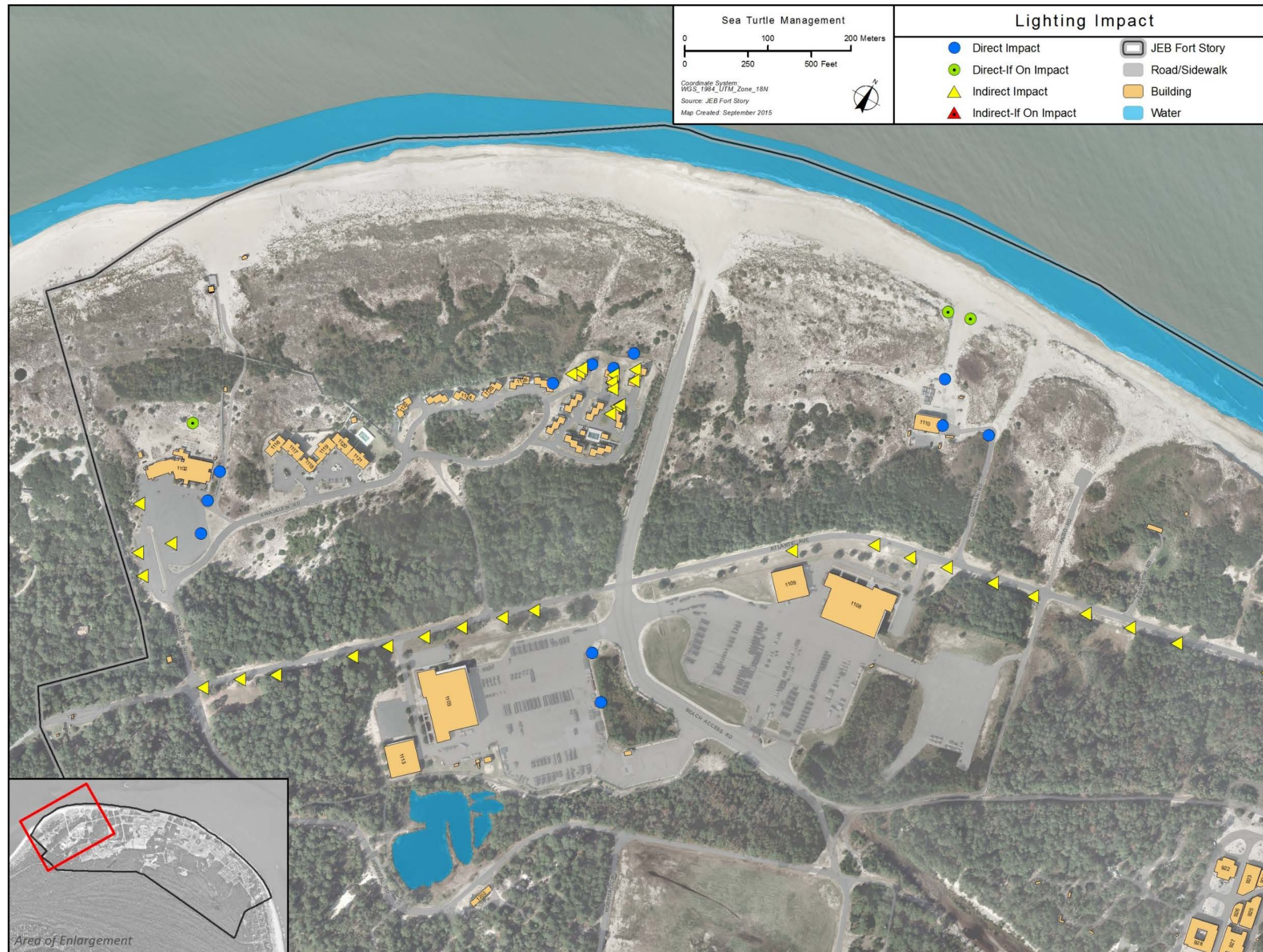
Lighting Survey Observed and Expected Impact Maps

List of Maps

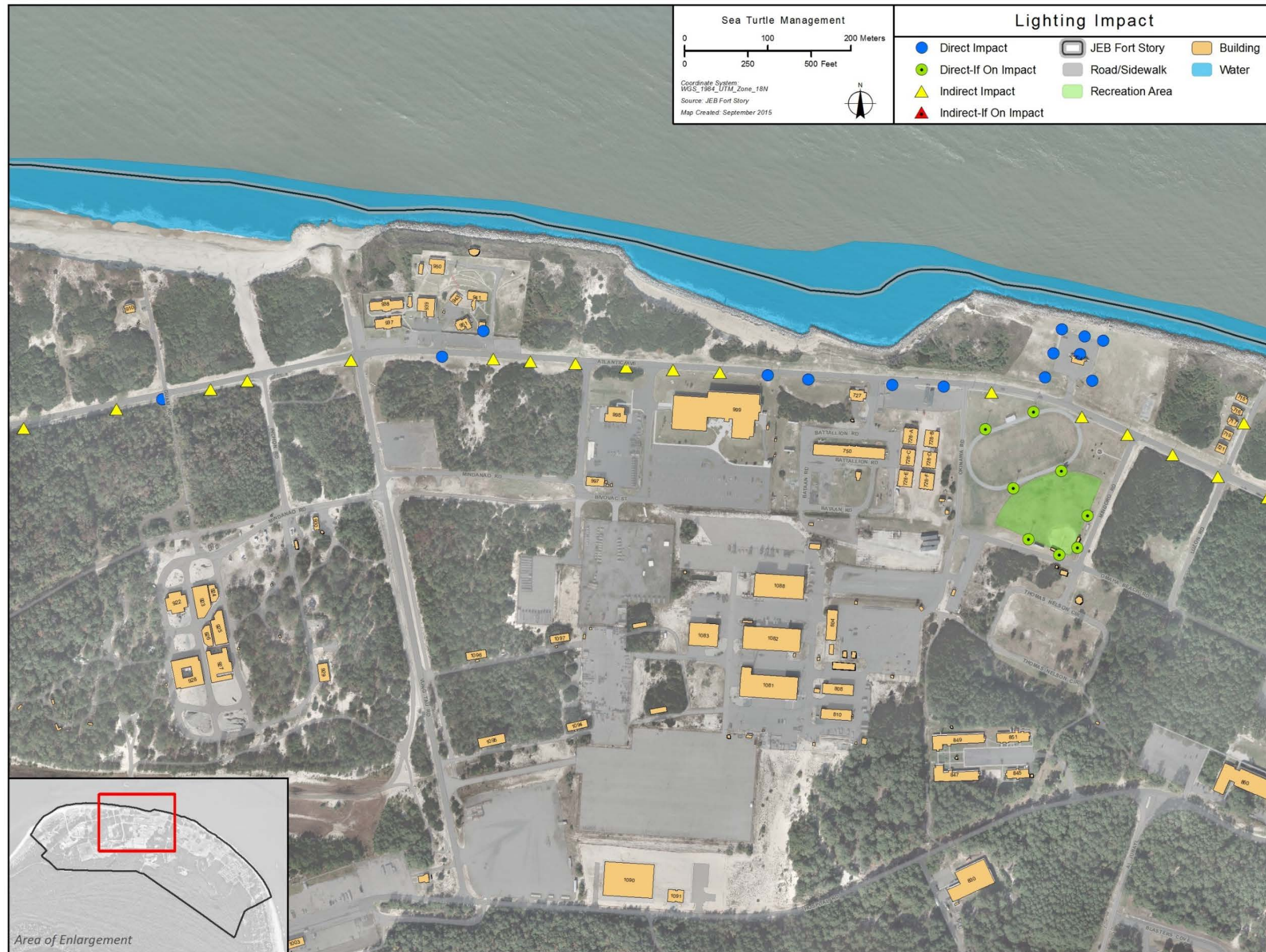
Map 1. Joint Expeditionary Base Fort Story – East.....A-3
Map 2. Joint Expeditionary Base Fort Story – East CentralA-4
Map 3. Joint Expeditionary Base Fort Story – West Central.....A-5
Map 4. Joint Expeditionary Base Fort Story – West.....A-6

This page intentionally left blank

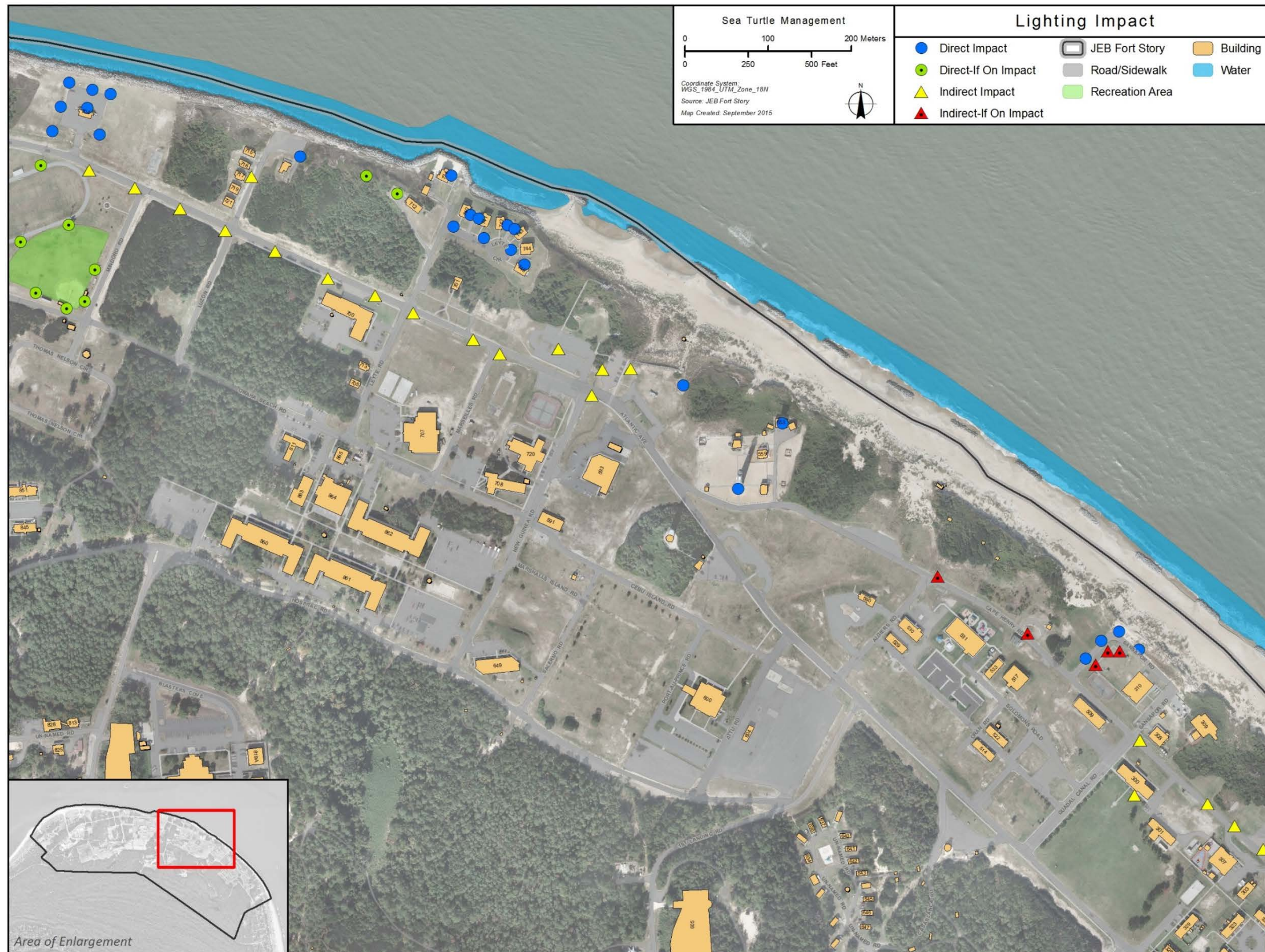
Map 1. Joint Expeditionary Base Fort Story – East



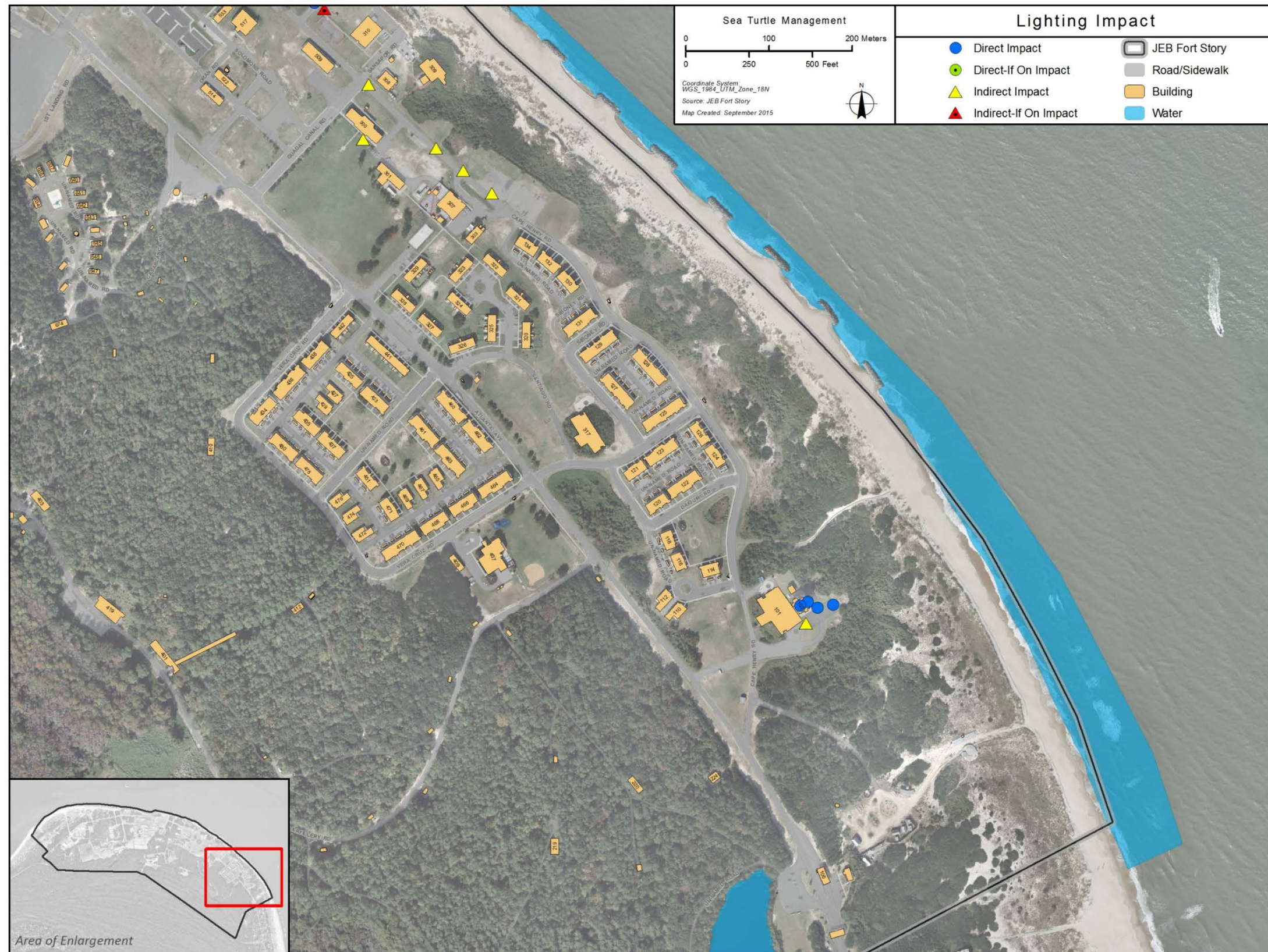
Map 2. Joint Expeditionary Base Fort Story – East Central



Map 3. Joint Expeditionary Base Fort Story – West Central



Map 4. Joint Expeditionary Base Fort Story – West



Appendix B
Joint Expeditionary Base Fort Story
Lighting Survey Data Sheet

The data presented in the table below are a consolidation of all field data sheets from all surveys. The GPS coordinates presented here are the pre-processed GPS coordinates and may be slightly different than the coordinates contained in the post-processed GIS database.

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
119 Transportation Company tarmac	FS225	36°55'34.25"	76°02'13.56"	Pole-mounted - flood	1	59126	Direct	White, broad-spectrum	
119 Transportation Company tarmac	FS226	36°55'32.75"	76°02'12.00"	Pole-mounted - flood	1	59126	Direct	White, broad-spectrum	
Atlantic Ave street lights	FS104	36°55'26"	76°02'29"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS105	36°55'27"	76°02'28"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS106	36°55'27"	76°02'26"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS107	36°55'30"	76°02'24"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS108	36°55'31"	76°02'22"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS109	36°55'32"	76°02'21"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS110	36°55'33"	76°02'20"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS111	36°55'34"	76°02'18"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS112	36°55'35"	76°02'17"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS113	36°55'42"	76°02'08"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS114	36°55'44"	76°02'04"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS115	36°55'44"	76°02'02"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS116	36°55'44"	76°02'01"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS117	36°55'45"	76°01'58"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS118	36°55'45"	76°01'56"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS119	36°55'45"	76°01'54"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS120	36°55'46"	76°01'51"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS121	36°55'46"	76°01'49"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Atlantic Ave street lights	FS122	36°55'47"	76°01'45"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS123	36°55'47"	76°01'42"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS124	36°55'48"	76°01'40"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS125	36°55'48"	76°01'38"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS126	36°55'49"	76°01'33"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS127	36°55'49"	76°01'29"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS128	36°55'49"	76°01'26"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS129	36°55'49"	76°01'25"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS130	36°55'49"	76°01'22"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS131	36°55'49"	76°01'20"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS132	36°55'49"	76°01'18"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS133	36°55'49"	76°01'15"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS134	36°55'48"	76°01'13"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS135	36°55'48"	76°01'11"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS136	36°55'48"	76°01'07"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS137	36°55'48"	76°01'04"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS138	36°55'48"	76°01'02"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS139	36°55'47"	76°00'58"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS140	36°55'46"	76°00'55"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS141	36°55'46"	76°00'53"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Atlantic Ave street lights	FS142	36°55'45"	76°00'51"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS143	36°55'44"	76°00'49"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS144	36°55'43"	76°00'46"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS145	36°55'42"	76°00'44"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS146	36°55'42"	76°00'42"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS147	36°55'40"	76°00'39"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS148	36°55'40"	76°00'38"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Atlantic Ave street lights	FS54	36°55'38.496"	76°00'33.105"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Ball fields	FS90	36°55'41.930"	76°00'57.801"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields	FS91	36°55'43.146"	76°00'57.313"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields	FS92	36°55'44.903"	76°00'58.632"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields	FS95	36°55'44.217"	76°01'00.934"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields	FS96	36°55'42.235"	76°01'00.165"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields	FS97	36°55'41.621"	76°00'58.695"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Ball fields / Track	FS93	36°55'47.209"	76°01'00.017"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Ball fields / Track	FS94	36°55'46.507"	76°01'02.327"	Pole-mounted stadium lighting arrays	1	7006 -7011	Direct if on	Not on	Likely white, broad-spectrum typical of mercury vapor or metal halide lamps. May be HPS if they've been upgraded.
Beach access from Building 1110 (Quinhan Road)	FS78	36°55'52.938"	76°02'05.772"	Pole-mounted - flood (double)	1	7003	Direct if on	Not on	
Building 102	FS155	36°55'05.16"	75°59'44.65"	Wall-mounted area "Wall pak"	2	6998	Direct	Gold-peach, indicative of HPS	Beach facing; Mounted on upper story wall
Building 102	FS227	36°55'05.015"	75°59'45.035"	Tower marker - inverted jelly	1	Example A	Direct	Red	
Building 102 parking	FS100	36°55'05.012"	75°59'44.180"	Arm-mounted cutoff - shoebox	1	7111	Direct	White, broad-spectrum	
Building 102 parking	FS101	36°55'04.424"	75°59'44.723"	Arm-mounted cutoff - shoebox	1	7111	Indirect	White, broad-spectrum	
Building 102 parking	FS99	36°55'05.134"	75°59'43.436"	Arm-mounted cutoff - shoebox	1	7111	Direct	White, broad-spectrum	
Building 1102 parking	FS74	36°55'31.926"	76°02'33.481"	Pole-mounted - flood (double)	1	6995	Direct	Gold-peach, indicative of HPS	
Building 1102 parking	FS75	36°55'33.170"	76°02'33.677"	Pole-mounted - flood	1	6996	Direct	Gold-peach, indicative of HPS	
Building 1102 parking	FS76	36°55'34.267"	76°02'35.999"	Pole-mounted - flood	1	6997	Direct if on	Likely HPS	
Building 1102 parking	FS81	36°55'30.568"	76°02'36.236"	Pole-mounted - flood	1	6997	Indirect	Gold-peach, indicative of HPS	
Building 1102 parking	FS82	36°55'28.898"	76°02'35.125"	Pole-mounted - flood	1	6997	Indirect	Gold-peach, indicative of HPS	
Building 1102 parking	FS83	36°55'28.192"	76°02'34.341"	Pole-mounted - flood	1	6997	Indirect	Gold-peach, indicative of HPS	
Building 1102 parking	FS84	36°55'29.788"	76°02'33.974"	Pole-mounted - flood	1	6997	Indirect	Gold-peach, indicative of HPS	
Building 1102 parking	FS85	36°55'31"	76°02'33"	Pole-mounted - flood	1	6997	Direct	Gold-peach, indicative of HPS	
Building 1110	FS221	36°55'48.79"	76°02'04.34"	Wall-mounted area "Wall pak"	1	7055	Direct	Gold-peach, indicative of HPS	
Building 1110 parking	FS79	36°55'50.401"	76°02'05.384"	Arm-mounted cobrahead & flood	1	7004	Direct	Gold-peach, indicative of HPS	
Building 300	FS102	36°55'23.121"	76°02'00.514"	Flag illumination	1	7113	Indirect	White, broad-spectrum	Seen from majority of eastern beach
Building 310 outside fence, Sansapor Rd parking	FS20	36°55'28.130"	76°00'08.446"	Arm-mounted area - Cobrahead	1	6973	Indirect if on	Not on	

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Building 310 outside fence, Sansapor Rd parking	FS21	36°55'28.646"	76°00'07.871"	Arm-mounted area - Cobrahead	1	6973	Indirect if on	Not on	
Building 310 outside fence, Sansapor Rd parking	FS22	36°55'28.655"	76°00'07.314"	Arm-mounted area - Cobrahead	1	6973	Indirect if on	Not on	
Building 310 outside fence, Sansapor Rd parking	FS23	36°55'28.335"	76°00'08.984"	Arm-mounted area - Cobrahead (LED)	1	6973	Direct	Gold-peach, indicative of HPS	
Building 310 outside fence, Sansapor Rd parking	FS24	36°55'29.043"	76°00'08.219"	Arm-mounted area - Cobrahead (LED)	1	7110, 7114	Direct	Gold-peach, indicative of HPS	
Building 310 outside fence, Sansapor Rd parking	FS25	36°55'29.444"	76°00'07.394"	Arm-mounted area - Cobrahead (LED)	1	7110, 7114	Direct	Gold-peach, indicative of HPS	
Building 310 perimeter	FS175	36°55'28.73"	76°00'06.37"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Building 704	FS228	36°55'49.449"	76°00'57.780"	Beach facing windows	1	Not taken	Direct	Interior lights	No photos were taken of buildings.
Building 704 parking	FS68	36°55'48.499"	76°00'57.168"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 704 parking	FS69	36°55'50.065"	76°00'56.653"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 704 parking	FS70	36°55'50.227"	76°00'57.540"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 704 parking	FS71	36°55'50.515"	76°00'58.674"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 704 parking	FS72	36°55'49.558"	76°00'59.063"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 704 parking	FS73	36°55'48.589"	76°00'59.452"	Pole-mounted - flood	1	6994	Direct	Gold-peach, indicative of HPS	
Building 712	FS65	36°55'46.220"	76°80'42.606"	Wall-mounted - flood lamp	1	6992	Direct if on	Likely white, broad-spectrum	
Building 712	FS229	36°55'46.897"	76°00'44.166"	Pole-mounted - flood	1	6993	Direct if on	Not on	Located in dunes.
Building 714	FS66	36°55'47.742"	76°00'47.412"	Arm-mounted area - Cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Building 734 (Housing)	FS149	36°55'46.96"	76°00'40.04"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing
Building 740 (Housing)	FS150	36°55'45.43"	76°00'39.10"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing
Building 741 (Housing)	FS151	36°55'45.29"	76°00'38.69"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing
Building 742 (Housing)	FS152	36°55'45.03"	76°00'37.30"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing
Building 743 (Housing)	FS153	36°55'44.90"	76°00'36.95"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Building 744 (Housing)	FS154	36°55'43.51"	76°00'36.45"	Wall-mounted area and beach facing windows	1	Not taken	Direct	Interior lights and white, broad-spectrum	No photos were taken of housing
Cape Henry Memorial Park	FS103	36°55'40.329"	76°00'34.727"	Arm-mounted area - Cobrahead (double)	1	6972 / 7117	Indirect	Gold-peach, indicative of HPS	
Cape Henry Rd - across from 307	FS14	36°55'20.984"	76°00'00.250"	Arm-mounted area - Cobrahead	1	6972 / 7112	Indirect	Gold-peach, indicative of HPS	
Cape Henry Rd - across from 307	FS15	36°55'21.861"	76°00'01.608"	Arm-mounted area - Cobrahead	1	6972 / 7112	Indirect	Gold-peach, indicative of HPS	
Cape Henry Rd - across from 307	FS16	36°55'21.861"	76°00'01.608"	Arm-mounted area - Cobrahead	1	6972 / 7112	Indirect	Gold-peach, indicative of HPS	
Cape Henry Rd - near 593	FS26	36°55'29.304"	76°00'11.761"	Arm-mounted area - Cobrahead	1	6972	Indirect if on	Not on	
Cape Henry Rd - near 593	FS27	36°55'31.492"	76°00'16.210"	Arm-mounted area - Cobrahead	1	6972	Indirect if on	Not on	
Cape Henry Rd at Guadal Canal	FS19	36°55'25.200"	76°00'06.271"	Arm-mounted area - Cobrahead	1	6972 / 7112	Indirect	Gold-peach, indicative of HPS	
Coast Guard Tower 553	FS156	36°55'37.42"	76°00'23.82"	Beach facing windows	1	Not taken	Direct	Interior lights	No photos were taken of buildings
Lighthouse (new)	FS230	36°55'34.846"	76°00'25.943"	High intensity strobe	1	Not taken	Direct	White, broad-spectrum	
Luzon Street	FS67	36°55'46.924"	76°00'49.758"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Officers' quarters (Leyte Rd)	FS62	36°55'45.034"	76°00'39.910"	Pole-mounted - decorative carriage	1	6991	Direct	Gold-peach, indicative of HPS	
Officers' quarters (Leyte Rd)	FS63	36°55'44.600"	76°00'38.454"	Pole-mounted - decorative carriage	1	6991	Direct	Gold-peach, indicative of HPS	
Officers' quarters (Leyte Rd)	FS64	36°55'44.142"	76°00'37.139"	Pole-mounted - decorative carriage	1	6991	Direct	Gold-peach, indicative of HPS	
O'Keefe Lookout	FS51	36°55'38.957"	76°00'28.708"	Pole-mounted - flood	1	6986 / 7116	Direct	Gold-peach, indicative of HPS	
O'Keefe Lookout	FS52	36°55'39.549"	76°00'31.252"	Arm-mounted cobrahead & flood	1	6987 / 7115	Indirect	Gold-peach, indicative of HPS	
O'Keefe Lookout	FS53	36°55'39.483"	76°00'32.624"	Arm-mounted area - Cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Old Cape Henry Inn	FS157	36°55'45.2"	76°02'19.1"	Wall-mounted area, round	1	090954	Direct	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS158	36°55'44.8"	76°02'18.6"	Wall-mounted area, round	1	090954	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS159	36°55'44.4"	76°02'18.4"	Wall-mounted area, round	1	090954	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS160	36°55'44.3"	76°02'19.6"	Wall-mounted area "Wall pak"	1	091458	Direct	Yellow lens. Likely incandescent or CFL bulb.	

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Qty	Reference photo number	Observed Impact	Light Type	Other Remarks
Old Cape Henry Inn	FS161	36°55'44.2"	76°02'19.4"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS162	36°55'43.9"	76°02'19.3"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS163	36°55'43.7"	76°02'19.1"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS164	36°55'43.2"	76°02'18.5"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS165	36°55'43.3"	76°02'18.4"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS166	36°55'42.8"	76°02'18.6"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS167	36°55'44.0	76°02'20.6"	Wall-mounted area "Wall pak"	1	091458	Direct	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS169	36°55'43.6"	76°02'20.9"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS170	36°55'43.4"	76°02'21.2"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS171	36°55'43.8"	76°02'20.9"	Wall-mounted area "Wall pak"	1	091458	Indirect	Yellow lens. Likely incandescent or CFL bulb.	
Old Cape Henry Inn	FS172	36°55'42.6"	76°02'21.8"	Wall-mounted area, round	1	093023	Direct	White, broad-spectrum	
Quinhan Rd	FS80	36°55'49.360	76°02'02.176	Pole-mounted - flood	1	7005	Direct	Gold-peach, indicative of HPS	
Quinhan Rd Beach Access	FS77	36°55'52.735	76°02'06.879	Pole-mounted - flood (double)	1	7002	Direct if on	Not on	
USMC Security Cooperation Group perimeter	FS217	36°55'50.11"	76°01'26.83"	Pole-mounted - flood (double)	1 131	49720 / 58471	Direct	Gold-peach, indicative of HPS	

This page intentionally left blank

Appendix C
Joint Expeditionary Base Fort Story
Reference Photographs of Identified Light Sources

This page intentionally left blank

Location of Light	Fixture Type	Photograph Number ²
119 Transportation Company tarmac	Pole-mounted - flood	59126
Atlantic Ave street lights	Arm-mounted area - Cobrahead	6972
Ball fields	Pole-mounted stadium lighting arrays	7006 -7011
Ball fields / Track	Pole-mounted stadium lighting arrays	7006 -7011
Beach access from Building 1110 (Quinhan Road)	Pole-mounted - flood (double)	7003
Building 102	Tower marker - inverted jelly	Example A
	Wall-mounted area "Wall pak"	6998
Building 102 parking	Arm-mounted cutoff - shoebox	7111
Building 1102 parking	Pole-mounted - flood	6996
	Pole-mounted - flood	6997
	Pole-mounted - flood (double)	6995
Building 1110	Wall-mounted area "Wall pak"	7055
Building 1110 parking	Arm-mounted cobrahead & flood	7004
Building 300	Flag illumination	7113
Building 310 outside fence, Sansapor Rd parking	Arm-mounted area - Cobrahead	6973
	Arm-mounted area - Cobrahead (LED)	6973
	Arm-mounted area - Cobrahead (LED)	7110, 7114
Building 310 perimeter	Arm-mounted area - Cobrahead	6972
Building 704	Beach facing windows	none
Building 704 parking	Pole-mounted - flood	6994
Building 712	Pole-mounted - flood	6993
	Wall-mounted - flood lamp	6992
Building 714	Arm-mounted area - Cobrahead	6972
Cape Henry Memorial Park	Arm-mounted area - Cobrahead (double)	6972 / 7117
Cape Henry Rd - across from 307	Arm-mounted area - Cobrahead	6972 / 7112
Cape Henry Rd - near 593	Arm-mounted area - Cobrahead	6972
Cape Henry Rd at Guadal Canal	Arm-mounted area - Cobrahead	6972 / 7112
Luzon Street	Arm-mounted area - Cobrahead	6972
Officers' quarters (Leyte Rd)	Pole-mounted - decorative carriage	6991

² The reference photographs are in numerical order and are provided on pages C-5 through C-11

Location of Light	Fixture Type	Photograph Number ²
O'Keefe Lookout	Arm-mounted area - Cobrahead	6972
	Arm-mounted cobrahead & flood	6987 / 7115
	Pole-mounted - flood	6986 / 7116
Old Cape Henry Inn	Wall-mounted area "Wall pak"	091458
	Wall-mounted area, round	090954
	Wall-mounted area, round	093023
Quinhan Rd	Pole-mounted - flood	7005
Quinhan Rd Beach Access	Pole-mounted - flood (double)	7002
USMC Security Cooperation Group perimeter	Pole-mounted - flood (double)	49720 / 58471

6972



6973



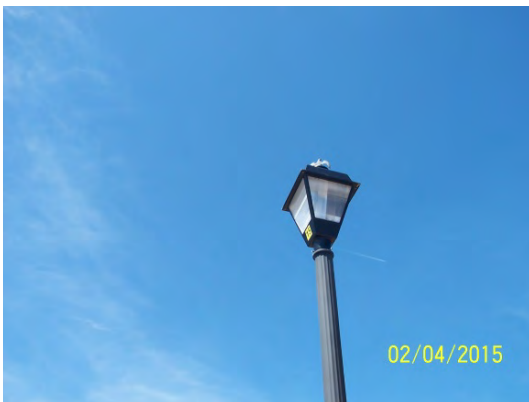
6986



6987



6991



6992



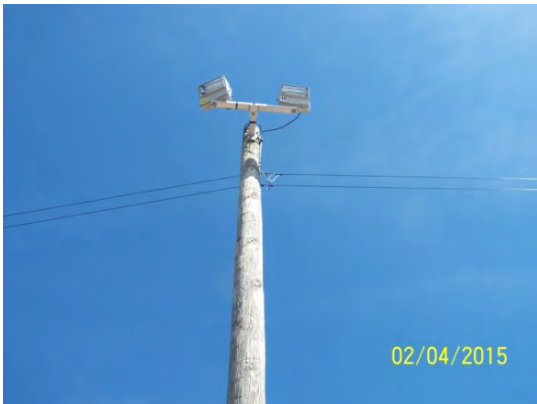
6993



6994



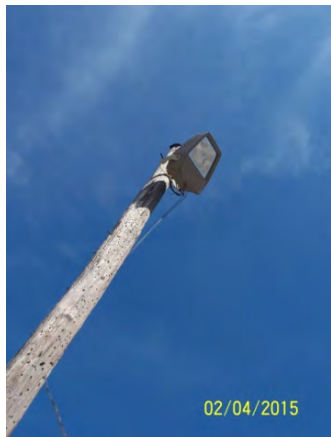
6995



6996



6997



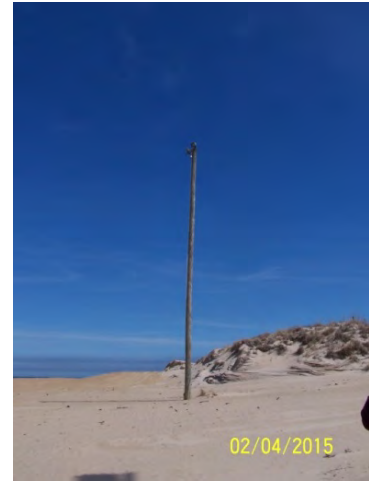
6998



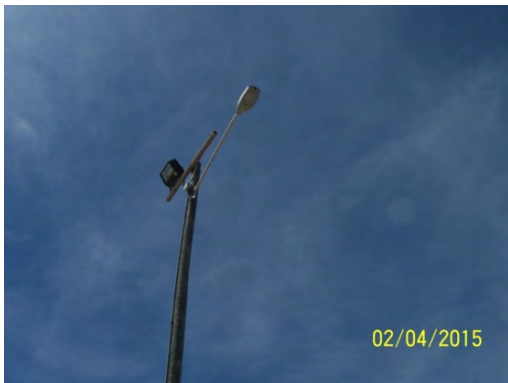
7002



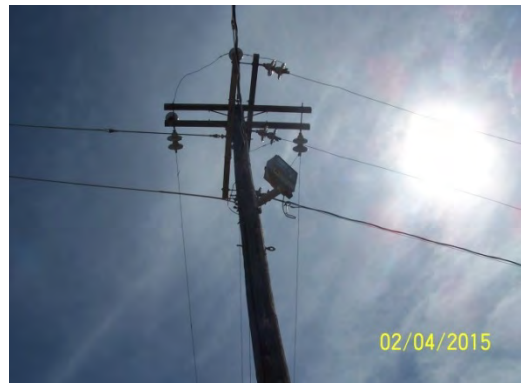
7003



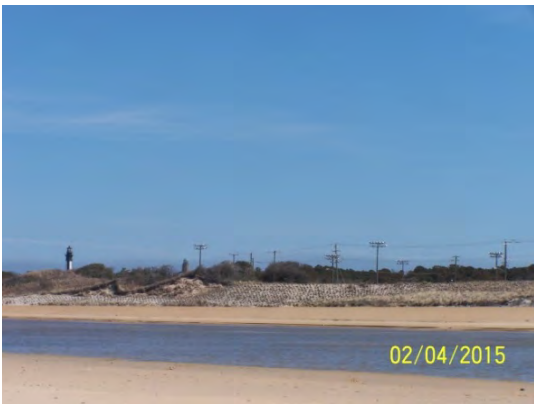
7004



7005



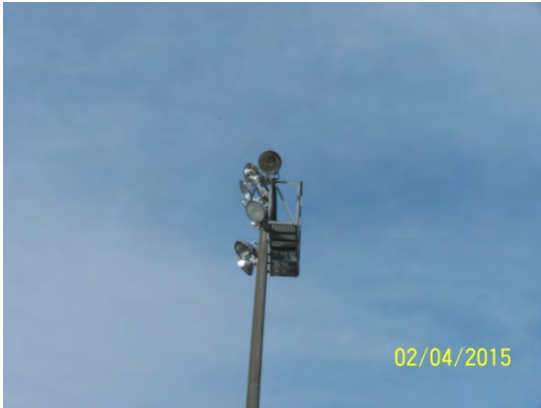
7006



7007



7008



7009



7010



7011



7055



7110



7111



7112



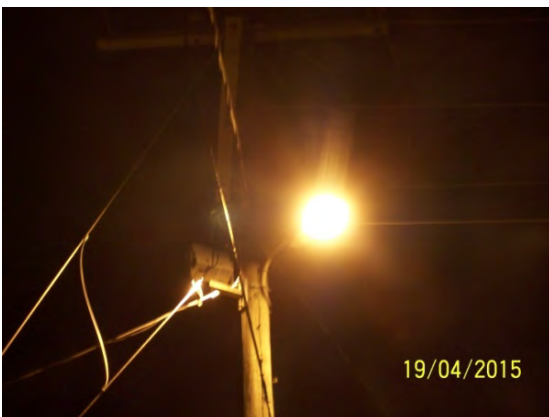
7113



7114



7115



7116



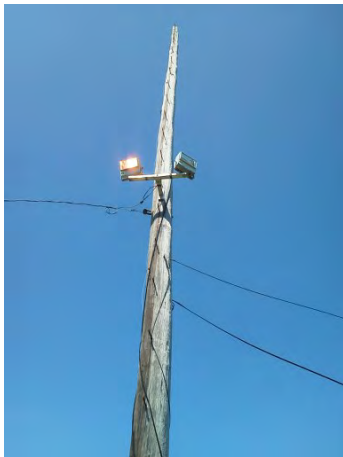
7117



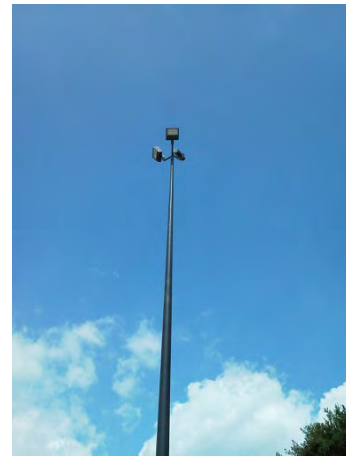
49720



58471



59126



090954



091458



093023



Example A



This page intentionally left blank

Appendix D

Joint Expeditionary Base Fort Story

Locations, Fixture Type, Lamp Type, and Observed and Expected
Impacts of Identified Light Sources

This page intentionally left blank

Location, Fixture, Lamp Type	Quantity of Observed or Expected Impact				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
119 Transportation Company tarmac	2				2
Pole-mounted - flood	2				2
<i>White, broad spectrum</i>	2				2
Atlantic Ave street lights	6		40		46
Arm-mounted area - Cobrahead	6		40		46
<i>Gold-peach, indicative of high pressure sodium (HPS)</i>	6		40		46
Ball fields		6			6
Pole-mounted stadium lighting arrays		6			6
<i>Not on</i>		6			6
Ball fields / Track		2			2
Pole-mounted stadium lighting arrays		2			2
<i>Not on</i>		2			2
Beach access from Building 1110 (Quinhan Road)		1			1
Pole-mounted - flood (double)		1			1
<i>Not on</i>		1			1
Building 102	3				3
Tower marker - inverted jelly	1				1
<i>Red</i>	1				1
Wall-mounted area "Wall pak"	2				2
<i>Gold-peach, indicative of HPS</i>	2				2
Building 102 parking	2		1		3
Arm-mounted cutoff - shoebox	2		1		3
<i>White, broad spectrum</i>	2		1		3
Building 1102 parking	3	1	4		8
Pole-mounted - flood	2	1	4		7
<i>Gold-peach, indicative of HPS</i>	2		4		6
<i>Likely HPS</i>		1			1
Pole-mounted - flood (double)	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Building 1110	1				1
Wall-mounted area "Wall pak"	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Building 1110 parking	1				1
Arm-mounted cobrahead & flood	1				1

Location, Fixture, Lamp Type	Quantity of Observed or Expected Impact				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
<i>Gold-peach, indicative of HPS</i>	1				1
Building 300			1		1
Flag illumination			1		1
<i>White, broad spectrum</i>			1		1
Building 310 outside fence, Sansapor Rd parking	3			3	6
Arm-mounted area - cobrahead				3	3
<i>Not on</i>				3	3
Arm-mounted area - cobrahead light-emitting diode	3				3
<i>Gold-peach, indicative of HPS</i>	3				3
Building 310 perimeter	1				1
Arm-mounted area - cobrahead	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Building 704	1				1
Beach facing windows	1				1
<i>Interior lights</i>	1				1
Building 704 parking	6				6
Pole-mounted - flood	6				6
<i>Gold-peach, indicative of HPS</i>	6				6
Building 712		2			2
Pole-mounted - flood		1			1
<i>Not on</i>		1			1
Wall-mounted - flood lamp		1			1
<i>Likely white, broad spectrum</i>		1			1
Building 714	1				1
Arm-mounted area - cobrahead	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Building 734 (Housing)	1				1
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	1				1
Building 740 (Housing)	1				1
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	1				1
Building 741 (Housing)	1				1

Location, Fixture, Lamp Type	Quantity of Observed or Expected Impact				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	<i>1</i>				<i>1</i>
Building 742 (Housing)	1				1
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	<i>1</i>				<i>1</i>
Building 743 (Housing)	1				1
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	<i>1</i>				<i>1</i>
Building 744 (Housing)	1				1
Wall-mounted area and beach facing windows	1				1
<i>White, broad-spectrum and interior lights</i>	<i>1</i>				<i>1</i>
Cape Henry Memorial Park			1		1
Arm-mounted area - cobrahead (double)			1		1
<i>Gold-peach, indicative of HPS</i>			<i>1</i>		<i>1</i>
Cape Henry Rd - across from 307			3		3
Arm-mounted area - cobrahead			3		3
<i>Gold-peach, indicative of HPS</i>			<i>3</i>		<i>3</i>
Cape Henry Rd - near 593				2	2
Arm-mounted area - cobrahead				2	2
<i>Not on</i>				<i>2</i>	<i>2</i>
Cape Henry Rd at Guadal Canal			1		1
Arm-mounted area - cobrahead			1		1
<i>Gold-peach, indicative of HPS</i>			<i>1</i>		<i>1</i>
Coast Guard Tower 553	1				1
Beach facing windows	1				1
<i>Interior lights</i>	<i>1</i>				<i>1</i>
Lighthouse (new)	1				1
High intensity strobe	1				1
<i>White, broad spectrum</i>	<i>1</i>				<i>1</i>
Luzon Street			1		1

Location, Fixture, Lamp Type	Quantity of Observed or Expected Impact				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Arm-mounted area - cobrahead			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Officers' quarters (Leyte Rd)	3				3
Pole-mounted - decorative carriage	3				3
<i>Gold-peach, indicative of HPS</i>	3				3
O'Keefe Lookout	1		2		3
Arm-mounted area - cobrahead			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Arm-mounted cobrahead & flood			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Pole-mounted - flood	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Old Cape Henry Inn	4		11		15
Wall-mounted area "Wall pak"	2		9		11
<i>Yellow lens. Likely incandescent or compact florescent (CFL) bulb.</i>	2		9		11
Wall-mounted area, round	2		2		4
<i>White, broad spectrum</i>	1				1
<i>Yellow lens. Likely incandescent or CFL bulb.</i>	1		2		3
Quinhan Rd	1				1
Pole-mounted - flood	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Quinhan Rd Beach Access		1			1
Pole-mounted - flood (double)		1			1
<i>Not on</i>		1			1
USMC Security Cooperation Group perimeter	1				1
Pole-mounted - flood (double)	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Total	48	13	65	5	131

Appendix C

Sea Turtle Data Sources

Numerous federal, state, non-profit, and academic research efforts have been conducted to obtain records of sea turtles in Virginia. We compiled a variety of records, including sightings, strandings, bycatch, nests, and false crawls, to describe the occurrence of sea turtles on and near military installations in the Virginia Beach area. The sources of these data are summarized in Table C-1. Summaries of the occurrence records for each turtle species near the Action Area are provided in Tables C-2 through C-6. These records are shown in Figures 6 through 13 in Section 3.0.

**Table C-1
Data Sources for Sea Turtle Occurrence Records included in this Biological Assessment**

Dataset	Year(s)
Shipboard Sighting Surveys	
United States Navy Marine Species Monitoring Program	
Norfolk/Virginia Beach Photo-ID Surveys	2012-2013
Norfolk/Virginia Beach MINEX Vessel Surveys	2012-2013
Norfolk/Virginia Beach Inshore Vessel Surveys	2012-2013
North Atlantic Right Whale Consortium (NARWC) Database	1762-2001
Cetacean and Turtle Assessment Program (CETAP) Shipboard Survey	1978-1982
Aerial Sighting Surveys	
Virginia and Maryland Sea Turtle Research and Conservation Initiative Aerial Survey ¹	2011-2013
Virginia Coastal Zone Management Wind Energy Area Aerial Surveys ¹	2012-2014
National Marine Fisheries Service (NMFS)-Southeast Fisheries Science Center (SEFSC) Mid-Atlantic <i>Tursiops</i> Surveys (MATS)	1995; 2002
NARWC Database	1762-2001
CETAP Aerial Survey	1978-1982
NMFS-Northeast Fisheries Science Center (NEFSC) Twin Otter Aerial Survey	2004
Strandings	
NMFS-NEFSC Sea Turtle Mapping and Information System	1980-1997
Sea Turtle Stranding and Salvage Network (STSSN) ²	1998-2015
Nests/False Crawls	
Virginia Department of Game and Inland Fisheries (VDGIF) Nesting/False Crawl Database	1970-2015
United States Navy Virginia Installation Nesting/False Crawl Database	2002-2014
Published Literature	
Keinath et al.	1991
Musick et al.	1988
Swingle et al.	2007

¹ Data provided by the Virginia Aquarium and Marine Science Foundation

² Note that stranding data from 2006 and 2007 were not included in the STSSN database provided because data from these years have not been reviewed yet.

Table C-2
Summary of Occurrence Records of the Leatherback Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	spring				2	
2013	spring				4	
2012	summer			2		
2011	summer				4	
	fall			1		
2010	spring				1	
2009	summer				1	
	spring				1	
2006	spring				3	
	summer				6	
2005	summer				3	
2004	spring				1	
	summer				2	
	fall				2	
2003	spring				2	
	summer				6	
	fall				1	
2002	spring				1	
	summer				3	
	fall				1	
2001	summer				2	
	fall				1	
2000	summer				1	
	fall				1	
1999	spring				1	
	summer				1	
1997	spring				3	
	summer				3	
	fall				1	
1996	fall				1	
1993	summer				1	
	fall				1	

Table C-2
Summary of Occurrence Records of the Leatherback Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1992	spring				2	
	summer				1	
	fall				1	
1991	spring				4	
1990	spring				1	
1989	summer				1	
1988	spring				1	
	summer				2	
1987	fall				1	
1984	summer				1	
1983	summer				1	
	fall				1	
1982	summer				2	
1980	spring				1	
1977	summer			1		

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2015	winter				1	
	summer		5			
2014	spring				29	
	summer	15	1	5	22	
	fall			1	9	
2013	winter				3	
	spring		1	3	11	
	summer		4	4	33	
	fall				24	
2012	spring		2	14	27	
	summer	3	7	33	22	
	fall				14	

**Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2011	spring	1		50	12	
	summer		4	31	33	
	fall			8	14	
2010	winter				1	
	spring				26	
	summer				14	
	fall				9	
2009	spring		1		24	
	summer	1	1		35	
	fall				24	
2008	winter				2	
	spring				23	
	summer	4	4		48	
	fall				11	
2007	summer		1			
2006	spring				15	
	summer	1			40	
2005	spring		2		9	
	summer	6	16		59	
	fall				9	
2004	spring			1	33	
	summer				43	
	fall				35	
2003	winter				2	
	spring	3	4		43	
	summer		2		85	
	fall				31	
2002	winter				2	
	spring				26	
	summer	2	14	11	46	
	fall				24	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2001	spring				23	
	summer				50	
	fall				13	
2000	spring				55	
	summer				35	
	fall				27	
1999	spring				31	
	summer		2		74	
	fall				11	
1998	winter				1	
	spring				68	
	summer		2		58	
	fall				21	
1997	spring				58	
	summer				30	
	fall				6	
1996	winter				1	
	spring				25	
	summer				5	
	fall				2	
1995	spring				12	
	summer			14	8	
	fall				2	
1994	spring				20	
	summer				18	
	fall				9	
1993	spring				20	
	summer			2	7	
	fall				19	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1992	winter				1	
	spring		4		14	
	summer		15		23	
	fall				14	
1991	winter				1	
	spring				20	
	summer		1		9	
	fall				6	
1990	spring		4		24	
	summer		8		8	
	fall				1	
1989	spring				11	
	summer				12	
	fall				8	
1988	spring				23	
	summer				11	
	fall				7	
1987	winter				1	
	spring				14	
	summer				12	
	fall				7	
1986	winter				1	
	spring				6	
	summer				10	
	fall				4	
1984	spring		16		4	
	summer		47		4	
1983	spring				5	
	summer			1	6	
	fall				3	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1982	winter				1	
	spring				10	
	summer				1	
	fall				1	
1981	spring				9	
	summer				2	
	fall				3	
1980	spring				7	
	summer			1	6	
	fall			2	2	
1979	summer			2		

Table C-4
Summary of Occurrence Records of the Green Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	summer				2	
	fall				2	
2013	summer				2	
	fall				4	
2012	winter				1	
	summer			1		
	fall				4	
2011	spring			3		
	summer			1		
	fall				2	
2010	winter				2	
	fall				4	
2009	summer				5	
2008	summer				3	
	fall				1	
2006	summer				2	
2005	summer		2		1	
2004	fall				2	

**Table C-4
Summary of Occurrence Records of the Green Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2003	fall				2	
2002	fall				5	
	winter				2	
2000	fall				4	
1998	summer				1	
	fall				5	
1994	spring				1	
	summer				1	
	fall				1	
1993	fall				2	
1989	fall				2	
1988	fall				2	
1987	summer				1	
1986	fall				1	

**Table C-5
Summary of Occurrence Records of the Hawksbill Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2004	fall				1	
2000	fall				1	
1990	fall					1

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	winter				1	
	spring				17	
	summer		1		10	
	fall				15	

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2013	winter				1	
	spring				3	
	summer				4	
	fall				25	
2012	winter				1	
	spring		1		10	
	summer				3	
	fall				8	
2011	spring			1	6	
	summer				1	
	fall				9	
2010	winter				1	
	spring				6	
	summer				1	
	fall				9	
2009	winter				2	
	spring				9	
	summer				9	
	fall				10	
2008	spring				9	
	summer				2	
	fall				1	
2006	spring				6	
	summer				2	
2005	spring				2	
	summer				1	
	fall				4	
2004	winter				1	
	spring				1	
	summer				1	
	fall				3	

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2003	spring				8	
	summer				5	
	fall				8	
2002	spring				12	
	summer				2	
	fall				4	
2001	summer				5	
	fall				5	
2000	spring				3	
	summer				4	
	fall				20	
1999	winter				1	
	spring				2	
	summer				3	
	fall				4	
1998	spring				1	
	fall				13	
1997	spring				5	
	summer				2	
	fall				1	
1996	spring				2	
	fall				1	
1995	fall				1	
1994	spring				6	
	summer				2	
	fall				2	
1993	spring				4	
	fall				7	
1992	spring				2	
	summer				1	
	fall				7	

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1991	fall				2	
1990	spring				2	
1989	summer				1	
	fall				1	
1988	summer				1	
	fall				3	
1987	spring				1	
	fall				3	
1986	spring				1	
	fall				4	
1983	spring				1	
1981	spring				1	
	summer				1	
1980	spring				2	
	summer				1	

References

- (Cetacean and Turtle Assessment Program (CETAP). 1982. Characterization of marine mammals and turtles in the Mid- and North Atlantic areas of the US Outer Continental Shelf- Final report of the Cetacean and Turtle Assessment Program. Prepared for US Bureau of Land Management, Washington, DC by Cetacean and Turtle Assessment Program, University of Rhode Island, Graduate School of Oceanography, Kingston, Rhode Island. Contract AA551-CT8-48.
- Engelhaupt, A., M. Richlen, T. A. Jefferson, and D. Engelhaupt. 2014. Occurrence, distribution, and density of marine mammals near Naval Station Norfolk & Virginia Beach, VA: Annual progress report. Submitted to Naval Facilities Engineering Command (NAVFAC) Atlantic, Norfolk, Virginia, under Contract No. N62470-10-3011, Task Orders 031 and 043, issued to HDR Inc., Norfolk, Virginia. 22 July 2014.
- Hoggard, W. 2002. Mid Atlantic bottlenose dolphin aerial surveys. <http://www.aoc.noaa.gov/article_midatlantic.htm>. Accessed 2 Feb 2006.
- Keinath, J. A., J. A. Musick, and W. M. Swingle. 1991. First verified record of the hawksbill sea turtle (*Eretmochelys imbricata*) in Virginia waters. *Catesbeiana* 11(2):35-38.
- Musick, J.A., J. A. Keinath, and D. E. Bernard. 1988. Aerial surveys of the Currituck EMPRESS area. Submitted by the Virginia Institute of Marine Science, College of William and Mary to the Department of the Navy, Theater Nuclear Warfare Program Office, Naval Sea Systems Command.
- Scott, G. P. and J. R. Gilbert. 1982. Problems and progress in the US BLM-sponsored CETAP surveys. *Reports of the International Whaling Commission* 32:587-600.
- Swingle, W. M., C. M. Trapani, S. G. Barco, and G. G. Lockhart. 2007. Marine mammal and sea turtle stranding response 2006 grant report. NOAA Coastal Zone Management Grant #NA05NOS4191180. Virginia Aquarium Foundation Scientific Report 2007-01. Prepared for the Virginia Coastal Zone Management Program by Virginia Aquarium Foundation Stranding Response Program, Virginia Beach, Virginia.

This page intentionally left blank

Appendix D

Construction and Placement of Predator-proof Nest Cages

When a nest is at high risk of predation and flat a piece of screening is not enough of a deterrent to keep predators such as foxes, pigs and coyotes from digging into the nest, the eggs and pre-emergent hatchlings may be protected by placing a self-releasing cage over the nest (Figure 1). The cages should provide enough room for all hatchlings to completely emerge from the sand and be made of 2x4-inch (in) mesh fencing (welded wire or some other strong bendable material). The 4-in width of the mesh must be parallel to the surface of the sand.

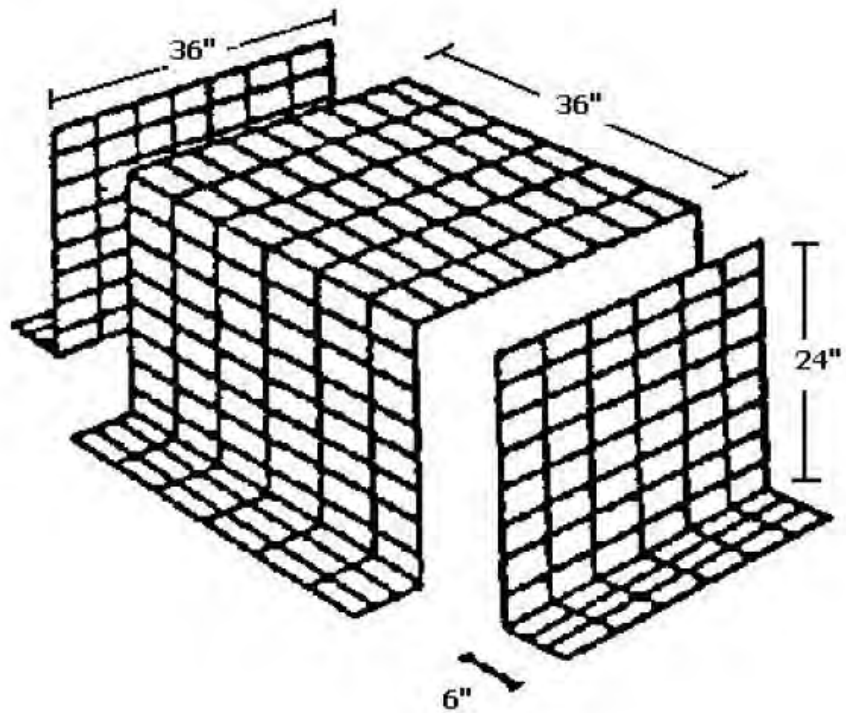
Methods and Placement

Cut one piece of 36x96-in and two pieces of 30x36-in welded wire fencing. Shape the fencing pieces to create the cage and flanges as shown in Figure 1. Use plastic zip ties to attach the two short side pieces to the long piece that forms the top and two sides.

Cages are to be centered exactly over the egg chamber to make it less likely that mammalian predators will burrow to the eggs from the side of the cage and to make sure that any anchoring stakes placed along the edges of the cage will not enter the egg chamber. Most cages are anchored by burying the outward pointing flanges (Figure 1) about one foot under the sand's surface. Center the cage over the egg chamber and trace the edges of the cage in the sand. The cage should be oriented so that the opposing sides of the cage are either parallel or perpendicular to the shoreline. Remove the cage and the temporary egg chamber marker, and carefully dig a one foot deep trench along the tracing of the edges of the cage. Place the cage into the trench and fill the trench with sand. When completed, the sand around the cage and over the egg chamber should be at the original level. Because cages may become partially or completely dislodged, they must be checked regularly.

Source: Bureau of Wildlife Resources, Virginia Department of Game and Inland Fisheries. 2015. Virginia Sea Turtle Nesting Handbook.

Figure 1. Example of a self-releasing cage. The cage is constructed of 2" x 4" welded wire fencing. Hatchlings are able to escape through the mesh of the wire. Cage design courtesy of The Conservancy of Southwest Florida.



APPENDIX M: FORT STORY HISTORIC
DETERMINATION OF ELIGIBILITY NOTIFICATION
(2003)



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
1849 C Street, N.W.
Washington, D.C. 20240

DETERMINATION OF ELIGIBILITY NOTIFICATION

National Register of Historic Places
National Park Service

Name of Property: Fort Story Historic District

Location: Virginia Beach (Independent City)

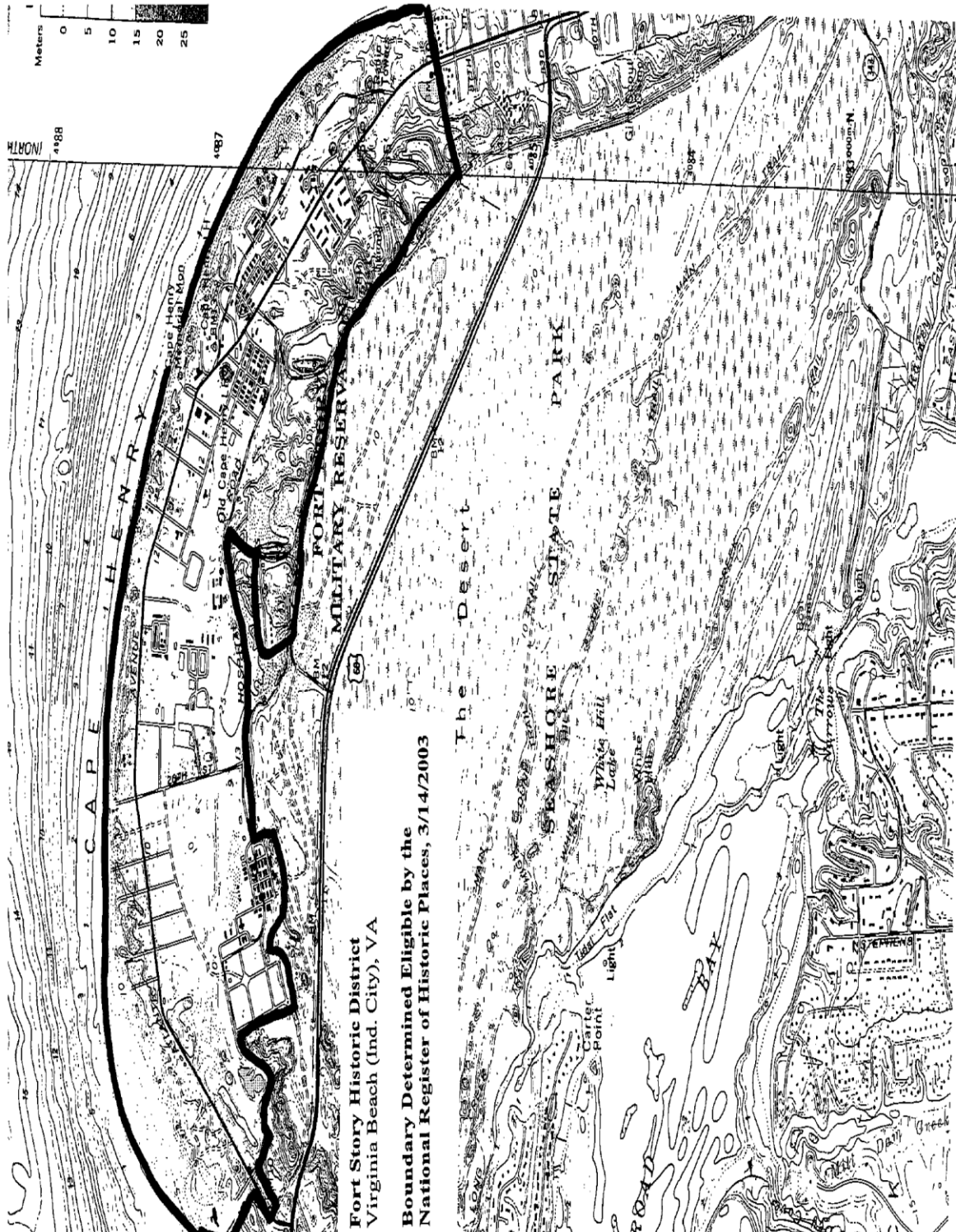
State: Virginia

Comment: The Fort Story Historic District is eligible for the National Register of Historic Places under Criterion A for its historic significance in the area of military history and government. The period of significance for the historic district is 1792 (the date of completion of the Cape Henry Lighthouse) to 1974 (the year that Fort Story's Nike Missile battery was inactivated). The district is of exceptional historical importance for its role in the defense of the Tidewater area of Virginia during the Cold War. All buildings and structures (except those shown to have lost historic integrity) at Fort Story constructed prior to 1974 contribute to the historic district, including those buildings categorized as "temporary" in the reports accompanying the determination of eligibility request.

See attached map for the boundary of the determined eligible district.

Patrick Andrus

Patrick Andrus
Historian
National Register of Historic Places
3/14/2003



Fort Story Historic District
Virginia Beach (Incl. City), VA
Boundary Determined Eligible by the
National Register of Historic Places, 3/14/2003

**APPENDIX N: INVASIVE SPECIES MANAGEMENT
PLAN FOR JEB FORT STORY**

NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE54

FINAL - December 2013



INVASIVE SPECIES INVENTORY AND CONTROL PLAN FOR JOINT EXPEDITIONARY BASE FORT STORY VIRGINIA BEACH, VIRGINIA



Prepared for:
NAVFAC Mid-Atlantic
Hampton Roads IPT 9742
Maryland Ave., Norfolk, VA 23511



Prepared by:
Tetra Tech, Inc.
2200 Wilson Blvd., Suite 400
Arlington, VA 22201



NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE54

INVASIVE SPECIES INVENTORY AND CONTROL PLAN FOR JOINT EXPEDITIONARY BASE FORT STORY VIRGINIA BEACH, VIRGINIA

FINAL – December 2013

Prepared for:

NAVFAC Mid-Atlantic
Hampton Roads IPT 9742
Maryland Ave., Norfolk, VA 23511

Prepared by:

Tetra Tech, Inc.
2200 Wilson Blvd., Suite 400
Arlington, VA 22201

Recommended Citation: Department of the Navy 2013. Invasive Species Inventory and Control Plan for Joint Expeditionary Base Fort Story, Virginia Beach, VA. Prepared for NAVFAC Mid-Atlantic, Norfolk, VA. Prepared by Tetra Tech, Inc., Arlington, VA.

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1
1.1 Purpose.....	1
1.2 Goals and Objectives	1
1.3 Background.....	1
1.4 Description of Invasive Species and Regulatory Controls	2
1.5 Benefits of Invasive Plant Management	3
2.0 MONITORING AREA.....	3
3.0 METHODS	5
3.1 Work Plan	5
3.2 Stakeholder Coordination	5
3.3 Transect and Plot Layout	5
3.4 Surveys.....	7
3.5 Data Recording and Mapping.....	7
4.0 RESULTS	7
4.1 Surveys.....	7
4.2 Mapping.....	9
4.3 Prioritization	13
4.3.1 High-Ranking Sites	14
4.3.2 Low-Ranking Sites.....	15
5.0 PREVENTION AND CONTROL.....	15
5.1 Purpose.....	18
5.2 Methods.....	18
5.2.1 Mechanical	18
5.2.2 Biological	19
5.2.3 Chemical.....	19
5.2.4 Grazing.....	20
5.3 Preventing Introductions.....	21
5.4 Control Recommendations.....	21
6.0 SURVEY RECOMMENDATIONS.....	22
6.1 Purpose and Goals.....	22
6.2 Survey Recommendations	23
7.0 EDUCATION, TRAINING AND PUBLIC OUTREACH	23
8.0 LITERATURE CITED.....	23

LIST OF APPENDICES

- Appendix A – Stakeholder Coordination Memo
- Appendix B – Representative Photographs of Invasive Species at JEB Fort Story
- Appendix C – Invasive Species Survey Field Data Forms
- Appendix D – Invasive Species Fact Sheets
- Appendix E – Invasive Species Pamphlet for JEB Fort Story

LIST OF FIGURES

Figure		Page
Figure 1.	Location of JEB Fort Story.....	4
Figure 2.	Transect and Plot Layout at JEB Fort Story.....	6
Figure 3.	Surveyed Point Locations at JEB Fort Story.....	8
Figure 4.	Invasive Species Point Features at JEB Fort Story.....	10
Figure 5.	Invasive Species Polygons at JEB Fort Story.....	11
Figure 6.	Prioritization of Invasive Plant Species at JEB Fort Story.....	14
Figure 7.	Prioritization of High-Ranking Sites at JEB Fort Story.....	16
Figure 8.	Prioritization of Low-Ranking Sites at JEB Fort Story.....	17

LIST OF TABLES

Table		Page
Table 1.	Target list of invasive plant species at JEB Fort Story.....	9
Table 2.	Control Priority of Invasive Species at JEB Fort Story.....	21

1.0 INTRODUCTION

Presidential Executive Order (EO) 13112, Invasive Species, defines an invasive species as an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. In 1999, EO 13112 charged all federal departments whose actions may affect the status of invasive species, to the extent practicable and permitted by law, to work together within their current authorities to prepare, prevent, and protect resources from harm caused by invasive species. EO 13112 reinforces Department of Defense (DoD) Instruction 4715.3, *Environmental Conservation Program*, by requiring that DoD monitor invasive species populations, prevent additional invasive species introductions, promote native species restoration, and endorse invasive species education to the public (DoD 2011). This invasive species inventory and control plan contributes to supporting DoD policy of preventing and controlling invasive species on military lands.

An invasive plant infestation is like a slow motion explosion, which, if left unchecked, may severely alter a sites natural, economic, aesthetic, and other cultural values (Heffernan 1998).

1.1 PURPOSE

The primary objective of the Invasive Species Inventory and Control Plan (Plan) is to accurately identify and delineate invasive plants at Joint Expeditionary Base (JEB) Fort Story in support of the military mission and consistent with the JEB Fort Story Integrated Natural Resources Management Plan (INRMP). The Plan identifies areas of the base that are free of infestation, prioritizes areas for controlling invasive plants, and provides a control plan for implementation. The maps of invasive species areas provide a historical database that can be used to assess and measure the success of the Plan and future treatments.

1.2 GOALS AND OBJECTIVES

The inventory and mapping effort is focused on identifying and locating invasive plant species that may be present or may pose the greatest risk of becoming established at JEB Fort Story. The control plan is focused on providing maps of invasive plant species locations and recommendations that may be used for implementing invasive plant control measures at JEB Fort Story.

1.3 BACKGROUND

The JEB Fort Story INRMP identified invasive plants as a serious threat to native vegetative communities (Department of the Navy 2013). About 50 years ago, kudzu (*Pueraria montana*) was planted to reduce erosion. Now it has become a major threat. Invasive plant species have become established in all of the vegetative communities except forested wetlands and ponds. The pest management activities at JEB Fort Story include control of invasive species.

An invasive plant inventory was completed in 2008 with a draft management plan (Department of the Navy 2010). The USFWS inventory identified Kudzu as one of the more serious invasive species at JEB Fort Story because of its widespread occurrence. The USFWS noted that surveys of invasive plants from 2003 to 2005 at JEB Fort Story identified 24 species considered invasive by the Virginia Department of Conservation and Recreation (VDCR). The survey in 2008

identified four additional species. Invasive plant species (listed in order of priority for control) identified at JEB Fort Story included kudzu, common reed (*Phragmites australis*), Japanese hops (*Humulus japonicus*), Japanese honeysuckle (*Lonicera japonica*), mimosa tree (*Albizia julibrissin*), Chinese privet (*Ligustrum sinense*), autumn olive (*Elaeagnus umbellata*), Chinese lespedeza (*Lespedeza cuneata*), English ivy (*Hedera helix*), and Japanese stilt grass (*Microstegium vimineum*). General mechanisms of invasive plant control were provided and restoration of native plants following removal of invasive plants was deemed the most important final phase of an integrated invasive plant eradication program.

1.4 DESCRIPTION OF INVASIVE SPECIES AND REGULATORY CONTROLS

Invasive plants are those plants that are non-native, grow aggressively, crowd out native plants, and degrade native ecosystem (Alliance for the Chesapeake Bay 2003). Not all non-native plants are invasive. Only a small percentage of non-native species cause great harm (National Invasive Species Council 2008). Those considered invasive exhibit the following traits that help them out-compete native plants:

- Aggressive spreaders or prolific reproducers;
- Adapt to a variety of conditions;
- Possess few natural controls in their new habitat;
- Difficult to control or eliminate once established;
- Possess long flowering/fruitlet period, which increases seed production and dispersal;
- Reach reproductive maturity quickly;
- Seeds remain viable (or dormant) for extended periods;
- Efficiently use light, water, and nutrients in the environment; and
- Possess well-developed root systems.

EO 13112 established the National Invasive Species Council and led to the development of a National Invasive Species Management Plan that created a blueprint for federal action to prevent the introduction of invasive species, provide for their control, and minimize their economic, environmental, and human health impacts. Subject to availability of appropriations and to the extent practicable and permitted by law, each federal agency must use relevant programs and authorities to:

- Prevent the introduction of invasive species;
- Detect and control such species in a cost-effective manner;
- Monitor invasive species populations;
- Provide for restoration of native habitats that have been invaded;
- Conduct research on invasive species to prevent introduction and sound control; and
- Promote public education and awareness of invasive species.

The Virginia Pest Law (Code of Virginia §§ 3.1 - 188.20 - 31:2), the Nonindigenous Aquatic Nuisance Species Act (Code of Virginia § 29.1-571-577), and the Noxious Weed Law (Code of Virginia §§ 3.1-296.11-21) are used to prevent, regulate, and control invasive species. Some plants referred to as “invasive species” are actually pest, nuisance, or noxious species (Virginia Invasive Species Working Group 2012). The Invasive Species Working Group of Virginia was

established in 2009 by the General Assembly (Code of Virginia § 2.2-220.2) to develop a state invasive species management plan and list of invasive species that pose the greatest threat to the Commonwealth.

1.5 BENEFITS OF INVASIVE PLANT MANAGEMENT

In addition to addressing legal requirements, effective invasive plant management has many benefits. Controlling invasive species helps to avoid crowding out native plants, reducing biodiversity, and lowering the quality of wildlife habitats. Climbing species such as kudzu can actually cover and kill trees, block entrances to facilities, and create utility problems.

Eradicating invasive plants followed by establishing native species results in more manageable maintenance requirements and cost savings. Annual economic losses due to invasive species in the U.S. are estimated at over \$120 billion (Pimentel 2007). Proper management of invasive species will reduce these economic losses. Furthermore, invasive species can impair military operations by:

- Eliminating realistic training or testing conditions and thus limit related activities;
- Diverting funding from other natural resource or operational priorities;
- Causing habitat destruction and biodiversity loss, thus reducing training lands; and
- Posing safety and security risks (e.g., wildfires and visual screening) (Westbrook and Ramos 2005).

An effective invasive species program can save costs and reduce impacts on military operations. Invasive plant management is an important component of maintaining healthy ecosystems, which are essential for maintaining land uses, native wildlife populations, and human quality of life (Swearingen, et al. 2010).

2.0 MONITORING AREA

JEB Fort Story (Figure 1) is located in the Coastal Plain at Cape Henry adjacent to the city of Virginia Beach, Virginia. It is bordered by the Atlantic Ocean and Chesapeake Bay to the north, and on the south by the 2,770-acre First Landing State Park (Department of the Navy 2013). The 1,458 acres of land at JEB Fort Story include administrative and training areas, maritime forests, forested wetlands, beaches and dunes, and four man-made ponds. Approximately 510 acres of the installation are forested areas consisting of pine uplands and cypress swamps. The beaches and dunes area covers approximately 160 acres. The four man-made ponds cover approximately 10 acres.

The two primary land uses at JEB Fort Story are operational areas and developed, administrative areas. Most of the operational area (1,027 acres) is used for training. The developed, administrative area (430 acres) includes housing, administrative offices, indoor training, and recreation. The Cape Henry Lighthouse (1.8 acres) and Cape Henry Memorial (1.2 acres) are the two major tourist attractions on JEB Fort Story.

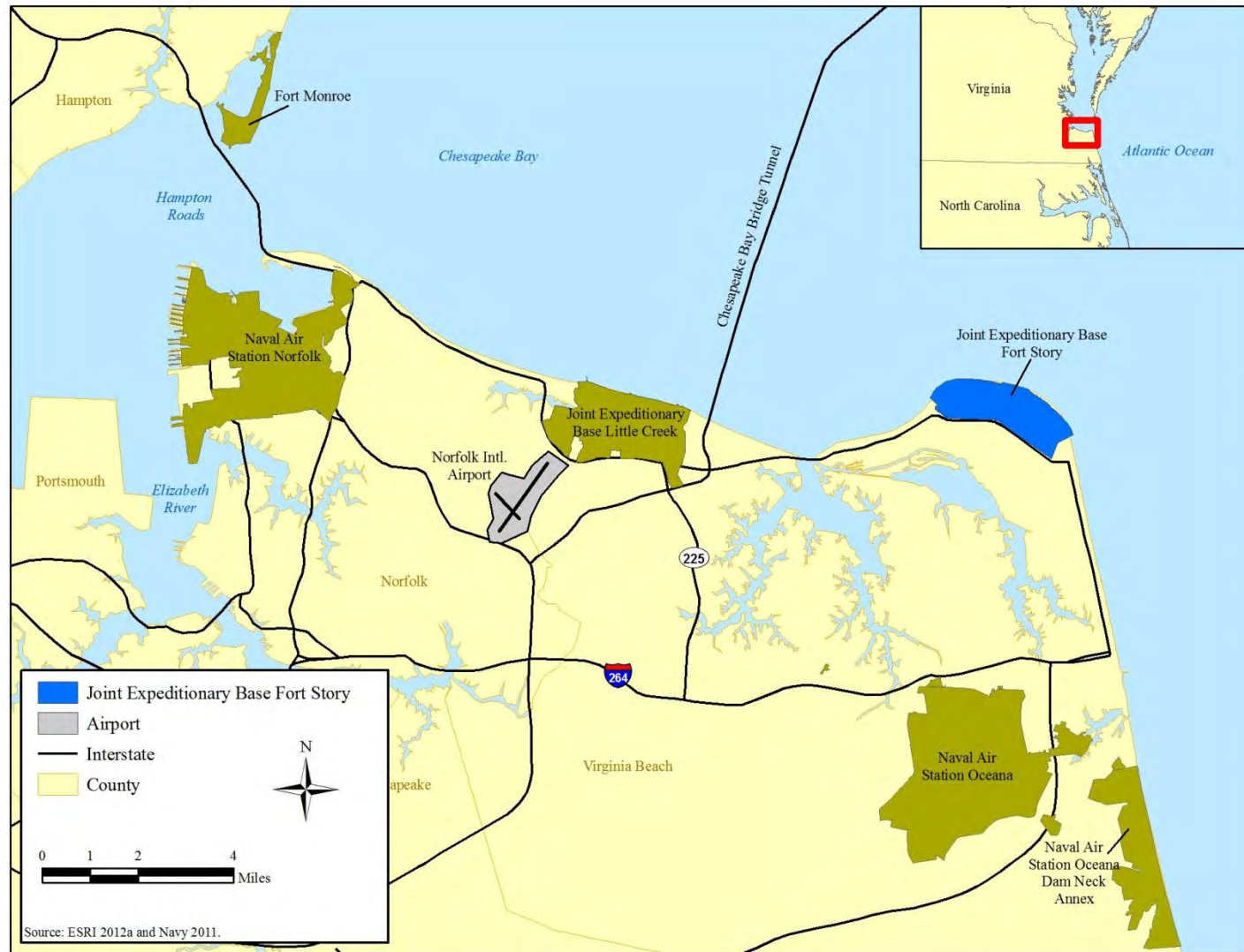


Figure 1. Location of JEB Fort Story.

3.0 METHODS

3.1 WORK PLAN

A work plan was prepared at the beginning of the project to direct all elements of the Invasive Species Inventory and Control Plan. The work plan identified planning, coordination, research, and site visits required to conduct the initial assessment of invasive plants at JEB Fort Story. The work plan described methods that would be used for the inventory, data collection, and reporting. Scheduling and key points of contact were included. Finally, health and safety guidelines were included to provide awareness of known hazards, personal protective equipment, and safe work practices. The JEB Fort Story Natural Resources Specialist (NRS) reviewed and approved work plan.

3.2 STAKEHOLDER COORDINATION

To refine the preliminary list of invasive plants at JEB Fort Story, a stakeholder coordination memo (Appendix A) was emailed to Kevin Heffernan VDCR, Division of Natural Heritage (DNH) Program; David Bishop at USFWS, Virginia Ecological Field Office; and Erik Mollen at VDCR, First Landing State Park. These stakeholders were asked to provide input on invasive plant species that may be present or may pose the greatest risk of becoming established at JEB Fort Story for prioritizing the inventory and control efforts. Stakeholders were also asked to comment on the species that may pose the greatest risk to natural resources at JEB Fort Story.

A preliminary list of invasive plants that may be present at JEB Fort Story was prepared from the VDCR-DNH database list of Invasive Alien Plant Species in Virginia (VDCR 2009). The stakeholders were asked to review the preliminary list taken from the highly or moderately invasive plant species of the Coastal Plain.

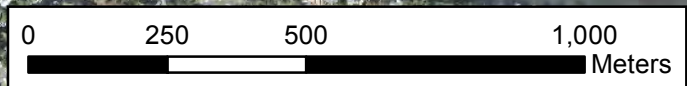
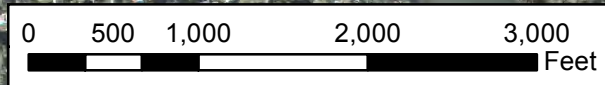
3.3 TRANSECT AND PLOT LAYOUT

A grid layout of evenly distributed points across JEB Fort Story was established using the existing ortho-photography provided by NAVFAC Midlant to conduct surveys. Seventeen west-to-east transects and 280 survey points (Figure 2) were distributed across the installation at 150-meter intervals and projected on the ortho-photography using a geographic information system (GIS). The grid layout was used to direct fieldwork systematically across JEB Fort Story to locate where invasive plant species occurred and where they did not occur. Initial survey points along each transect were established five meters inside the installation boundary. Points that fell within paved areas, the built environment/urban areas, and mowed fields were excluded from the survey.



Legend

- Invasive Plant Species Survey Plot
- Invasive Plant Species Survey Line
- Structure Existing Area
- Paved Road
- Unpaved Road
- Installation Area
- Grounds Maintenance Area



2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters



**TRANSECT AND PLOT LAYOUT
JOINT EXPEDITIONARY BASE
FORT STORY
VIRGINIA BEACH, VIRGINIA**

CTO	WE54	SCALE	AS NOTED
FIGURE NO.	2	REV	DATE
			9/25/13

3.4 SURVEYS

A five-meter radius around each survey point was visually surveyed for presence of invasive species. As the field survey team reconnaissance across JEB Fort Story was conducted. Plots containing invasive species were documented with the invasive species information and plots absent of invasive species were recorded as cleared. Survey points between adjacent cleared points were also recorded as cleared if the habitat remained similar. Since invasive species are associated with edge habitats and disturbed areas, particular attention was given to survey points within these areas. Cleared survey points within the 150-meter spacing of habitat edges and disturbed areas were shifted to ensure that these areas were visually surveyed.

3.5 DATA RECORDING AND MAPPING

Plot observations were recorded in the field then transcribed into the data form (Appendix B) and GIS attribute files. Data included date; plot number; list of invasive species observed; abundance, coverage, density for each species observed; and global positioning system (GPS) coordinates. The level of infestation, patch shape (i.e., point, linear, patch, or mix), current spreading vectors, and additional comments were also recorded. Representative photographs (Appendix C) were taken to help characterize the invasive plants at JEB Fort Story; however, only selected areas were photographed to avoid taking images of training facilities.

A sub-meter GPS (Trimble GeoXH 6000) was used to collect coordinates for invasive species locations. GPS points were imported into a GIS program after the field effort. Point features were used to represent individuals and infestation areas less than 0.01 acres. Polygons were created from GPS coordinates on the extents of large infestations and 2010 digital orthophotography (obtained from the Geo Readiness Center) to represent the aerial coverage of the species. Geospatial data were created in accordance with the current NAVFAC GIS Data Guide GIS Data Deliverable Specifications (United States Navy 3.0 Data Model, Environmental Section, May 2012).

Common herbaceous invasive species such as wild onion (*Allium vineale*) and common chickweed (*Stellaria media*), although known to occur, were not mapped because these species occur primarily in developed (mowed) areas. Since Japanese honeysuckle (*Lonicera japonica*) is a species that occurs throughout JEB Fort Story and appears to be naturalized, it was not mapped because the installation would essentially be dotted with locations. The NRS concurred with these decisions on data recording and mapping.

4.0 RESULTS

4.1 SURVEYS

Surveys were conducted from June through September 2013. Site visits were coordinated with the NRS. The paved and non-paved roads were travelled by vehicle and the field team surveyed for invasive species utilizing the established transects and grid layout. Field data forms were completed for 43 plots (Appendix B); no invasive species were observed at the remaining 237 survey point locations. Survey results indicated that 15 percent of the survey points distributed across JEB Fort Story contained one or more of the target invasive species and 85 percent of the survey points were cleared (Figure 3).



Legend

- Invasive Species Observed
- No Invasive Species Observed
- Installation Area



G:\GIS_files\JEBFS\Map_Docs\MXD\FortStory_transects_update_082813.mxd 100313

2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters

SURVEYED POINT LOCATIONS JOINT EXPEDITIONARY BASE FORT STORY VIRGINIA BEACH, VIRGINIA	
CTO	WE54
SCALE	AS NOTED
FIGURE NO.	3
REV	DATE
	10/3/13

4.2 MAPPING

The target list of invasive species (Table 1) was selected in coordination with the NRS from the preliminary list of invasive plants that was sent to the state and federal stakeholders. There were other invasive species included on the preliminary list, but none were sufficiently present to cause concern. The target list included species present or those that may pose the greatest risk of becoming established and that may pose the greatest risk to natural resources at JEB Fort Story. Although included in the target list, beach vitex (*Vitex rotundifolia*) was not found at JEB Fort Story.


Table 1. Target list of invasive plant species at JEB Fort Story.

Highly Invasive Plant Species	
Tree-of-heaven	<i>Ailanthus altissima</i>
Asiatic sand sedge	<i>Carex kobomugi</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Chinese privet	<i>Ligustrum sinense</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese stilt grass	<i>Microstegium vimineum</i>
Phragmites	<i>Phragmites australis</i>
Kudzu	<i>Pueraria montana</i>
Multiflora rose	<i>Rosa multiflora</i>
Beach vitex	<i>Vitex rotundifolia</i>
Moderately Invasive Plant Species	
Mimosa	<i>Albizia julibrissin</i>
English ivy	<i>Hedera helix</i>
Yellow sweet clover	<i>Melilotus officinalis</i>
White sweet clover	<i>Melilotus sinensis</i>
Chinese lespedeza	<i>Lespedeza cuneata</i>

There were 264 point feature locations containing invasive species recorded with GPS and later imported into a GIS program for mapping (Figure 4). These point locations each cover less than or equal to 0.01 acre and may include a single plant, several plants, or multiple species of invasive plants. There were 34 points (12.9 percent) that occurred in the beaches and dunes area and 230 points (87.1 percent) occurred in the maritime forest areas.

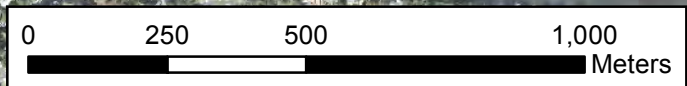
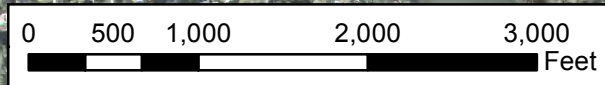
Area polygons were recorded for locations that covered more than 0.01 areas (Figure 5). These data indicate that at least 3.31 percent (48.33 acres) of JEB Fort Story contains invasive species. There were 2.75 acres (1.7 percent) that occurred in the beaches and dunes area and 45.58 acres (8.9 percent) occurred in the maritime forest areas.



- Legend**
-  Asiatic Sand Sedge
 -  Autumn Olive
 -  Chinese Lespedeza
 -  Chinese Privet
 -  English Ivy
 -  Japanese Honey Suckle
 -  Japanese Stilt Grass
 -  Mimosa
 -  Multiflora Rose
 -  Phragmites
 -  Tree of Heaven
 -  White Sweet Clover
 -  Installation Area



P:\GIS_files\JEBFS\Map_Docs\IMXD\FortStory_flora_073013.mxd 100313

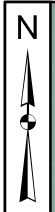


2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters



**INVASIVE SPECIES POINT FEATURES
JOINT EXPEDITIONARY BASE
FORT STORY
VIRGINIA BEACH, VIRGINIA**

CTO	WE54	SCALE	AS NOTED
FIGURE NO.	4	REV	DATE
			10/3/13



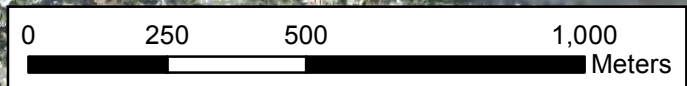
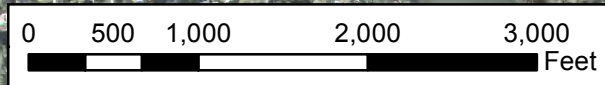
Legend

- Autumn Olive Area
- Kudzu Area
- Phragmites Area
- Installation Area

Note:
Some invasive species polygons include small patches of other invasive species.



G:\GIS_files\JEBFS\Map_Docs\MXD\FortStory_kudzu_072913.mxd 100313



2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters



**INVASIVE SPECIES POLYGONS
JOINT EXPEDITIONARY BASE
FORT STORY
VIRGINIA BEACH, VIRGINIA**

CTO	WE54	SCALE	AS NOTED
FIGURE NO.	5	REV	DATE
			10/3/13

Kudzu, Chinese Privet, English Ivy, and Japanese Honeysuckle

There were 45.71 acres of area polygons (3.1percent of JEB Fort Story) recorded in the GIS for mapping kudzu. There were 2.7 acres (1.7percent) that occurred in the beaches and dunes area and 43 acres (8.4percent) occurred in the maritime forest areas.

Kudzu is by far the primary concern for invasive species control and mostly occurs in the eastern half of JEB Fort Story. The landfill is one of the largest infested areas and covers 8.1 acres. The entire landfill area is covered by an almost complete monoculture of kudzu; Japanese hops was previously reported in the landfill area but was not observed. Besides expanding over the dune habitats, kudzu is infesting the maritime forest habitats. Kudzu appears to be limited by hydric soils to the roadsides and adjacent uplands within the maritime forest areas.

Although individual plants were found, Chinese privet was frequently found within kudzu patches. There were 17 point locations recorded for Chinese privet and 10 of the point locations were within Kudzu patches. Similar to the kudzu infestations, Chinese privet occurred along roadsides and edge habitats in the dune and maritime forest areas. Small (0.01 acres) patches of English ivy were found widely scattered across the installation. There were no expansive areas of English ivy, the patches were isolated occurrences or were found within kudzu patches. There were 19 point locations recorded for English ivy and 3 point locations were within Kudzu patches. Japanese honeysuckle was also frequently found within kudzu patches but, as mentioned previously, was not mapped because it occurs as naturalized throughout JEB Fort Story. There were no monocultures of Japanese honeysuckle observed at JEB Fort Story, rather it co-exists with greenbriers (*Smilax* spp.), grapevines (*Vitis* spp.), trumpet creeper (*Campsis radicans*), and Virginia creeper (*Parthenocissus quinquefolia*) as a vegetative “fabric” covering the dune habitats. Therefore, attempts to control Japanese honeysuckle would indirectly cause greater harm to the erosion protection of dune habitats by reducing cover of the associated native vines.

Japanese Stilt Grass, Asiatic Sand Sedge, and Tree-of-Heaven

Japanese stilt grass was found at one site, which covers approximately 0.01 acre. This isolated patch is near the intersection of First Landing Road and Coast Artillery Road. Two small (<0.01 acres) patches of Asiatic sand sedge were found near the end of the boardwalk in the northwest beaches and dunes area (see Figure 4). Tree-of-heaven was found at several localized sites, the largest cluster of plants was found at the southwest corner of Hospital Circle (see Figure 4). The observations ranged from individual plants to clusters of tree-of-heaven in the dune and maritime forest habitats. There were 18 point locations recorded for tree-of-heaven of which 6 were located in the dune habitat. These are examples of early detection, rapid removal, and high priority sites for control because these species are localized and could be eliminated from JEB Fort Story.

Mimosa, Autumn Olive, Sweet Clovers, Multiflora rose, and Chinese Lespedeza

Individual plants of mimosa, autumn olive, yellow sweet clover, white sweet clover, and multiflora rose are widely scattered across JEB Fort Story, with small patches occurring infrequently. These species were found primarily along roadsides and wooded edges of the dune habitats. Three area polygons (1.8 total acres) were recorded for autumn olive in the northwest beaches and dunes area (see Figure 5); all other sites for autumn olive were point locations.

Small patches (0.01 acres) of Chinese lespedeza and sweet clovers were found along roadsides and disturbed places throughout JEB Fort Story. There were 63 point locations recorded for mimosa, 88 for autumn olive, 2 for sweet clovers, 1 for multiflora rose, and 40 for Chinese lespedeza. Mowing under the ground maintenance program is limiting the infestation of these species; however, there are large plants of mimosa and autumn olive that exist just outside the mowed edge along roadways.

Phragmites

Phragmites was recorded at 11 point feature locations and in 2 area polygons. All of the Phragmites sites are localized, range from 11 point locations to 0.82 acres of polygons at 2 sites (see Figures 4 and 5), and could be effectively eliminated. One of the locations is designated for training area development; the Phragmites will be displaced in accordance with the Navy's National Environmental Policy Act (NEPA) document prepared for the development. The largest area of Phragmites is located in the northwest beaches and dunes area. Two adjacent patches of Phragmites were found in an interdunal swale of the secondary dune habitat. It appears that the encroaching woody vegetation will eventually dominate the area and displace the Phragmites, which is scattered amongst trees and shrubs.

4.3 PRIORITIZATION

The scale of invasive species infestations at JEB Fort Story is large enough that available labor and funding would not likely allow all existing areas to be addressed immediately. The state and federal stakeholders highly recommended developing a prioritization framework to implement the invasive plant species control plan. Sound decisions are needed because invasive species control generally detracts from other efforts to manage natural resources. Moreover, managing invasive plants is an expensive, labor-intensive, and usually long-term effort. Prioritization is also important because the significance of impact from an invasive plant as well as the impact of removing the species must be considered. Disturbance in an area from invasive species control could lead to infestation by the same or other invasive plants. There are three primary approaches to prioritization: (1) targeting control to manage a species regardless of where it occurs, (2) targeting control to manage multiple species in specific areas, and (3) targeting control to manage corridors or routes of dispersal and invasion.

The National Park Service (NPS) system (U. S. Department of Interior 1993) of prioritizing invasive species for control was developed to give high priority to species causing major impacts and easy to control while giving low priority to species causing little impact and difficult to control. This ranking system provides a tool to resource managers and biologists who are knowledgeable of the area and species under investigation. The information provided by using this system to prioritize species is only good for a specific place and time because the ecology of another area may be different in ecosystem dynamics; distribution, abundance, and type of species; and level of impacts. The assignment of invasive species priority at JEB Fort Story, using the NPS model, is based on species descriptions (Appendix D) and the current distribution and abundance of invasive species (Figure 6).

The current and potential significance of impact for an invasive plant species includes distribution and abundance of the invasive plant; level of impact on native species, natural communities, and ecosystem processes; and the ability of the species to become invasive. The feasibility of control for a species includes questions on the extent of the infestation, availability

of effective methods, effectiveness of methods, effects of control methods on non-target species, and likelihood of reinfestation (Heffernan 1998). The effect of plotting the invasive species by significance and feasibility is to pictorially show that Priority 1 infestations are easy to control and have a high level of impact on a site, priority 2 are those with a high impact and are hard to control, Priority 3 exhibit a low impact and are easy to control, and Priority 4 are low impact and hard to control.

Invasive Plants		
Significance of Impact	<i>Serious Threat</i> <i>Hard to Control</i> Kudzu Chinese privet Priority 2	<i>Serious Threat</i> <i>Easy to Control</i> Tree of heaven Japanese stilt grass Phragmites Multiflora rose Asiatic sand sedge Priority 1
	<i>Lesser Threat</i> <i>Hard to Control</i> Japanese honeysuckle English ivy Priority 4	<i>Lesser Threat</i> <i>Easy to Control</i> Mimosa Autumn olive Chinese lespedeza Yellow sweet clover White sweet clover Priority 3
Feasibility of Control		

Figure 6. Prioritization of Invasive Plant Species at JEB Fort Story

4.3.1 High-Ranking Sites

The high ranking sites include invasive plants in Priorities 1 and 2. These species already have significant impacts on the environment at JEB Fort Story or will soon become so widespread that effective control is beyond reach. These species have the greatest ability of all the non-native plants at JEB Fort Story to become invasive. The high ranking sites should be those small patches of invasive plant species that could be eliminated, thus decreasing the distribution and abundance of invasive plants at JEB Fort Story.

Tree of heaven, Japanese stilt grass, Asiatic sand sedge, phragmites, and multiflora rose could effectively be eliminated from JEB Fort Story while these species occur in isolated locations.

The opportunity to remove these species with minimal effects on habitat gives these sites a high ranking.

For kudzu sites, the easy to control, smaller patches are more widely distributed and have a greater potential to displace the native plants should receive the highest ranking. The larger kudzu sites have already become monocultures and will require intensive treatments for control and thus receive a lower ranking. In addition, the larger kudzu sites include various sizes of Chinese privet to control. Less intensive treatment would be needed for control and elimination of the smaller kudzu sites. Figure 7 presents the recommended order of control for the high-ranking invasive plant sites. Sites are ranked in consecutive order, with 1 being the highest rank.

4.3.2 Low-Ranking Sites

The low ranking sites include invasive plants in Priorities 3 and 4. These species appear to be less invasive, less abundant, and less threatening to native plants than the others on the target list of invasive plant species. In addition, the low ranking is derived from observations that the priority 3 and 4 species primarily occur along roadsides and woodland edges, as isolated individuals or clusters, and co-located with the high priority species. The lowest ranking should be given to control Chinese lespedeza, yellow sweet clover, and white sweet clover locations because these species are almost sufficiently controlled by mowing under the grounds maintenance program.

Removal of mimosa and autumn olive in the easily accessible roadside locations could be accomplished with minimal effect on the adjacent habitat and would largely eliminate the concern for these plants as invasive species at JEB Fort Story. Efforts to reduce the occurrence of Japanese honeysuckle and English ivy should be considered as collateral control during treatment of kudzu locations. Figure 8 presents the recommended order of control for the low-ranking invasive plant sites. Sites are ranked in consecutive order, with 1 being the highest rank.

5.0 PREVENTION AND CONTROL

This invasive species control plan includes the following strategies:

- (1) Protect invasive-free areas by conducting frequent monitoring and immediately treating encroaching invasive plants.
- (2) Prevent sand/soil relocation to avoid the potential for spreading seed and root material of the invasive species at JEB Fort Story.
- (3) Focus control on sites with potential to completely eradicate invasive species in one growing season versus sites that are too large to effectively eliminate invasive plants from the whole site.
- (4) Continue control efforts through the growing seasons as required for eradication of invasive species.

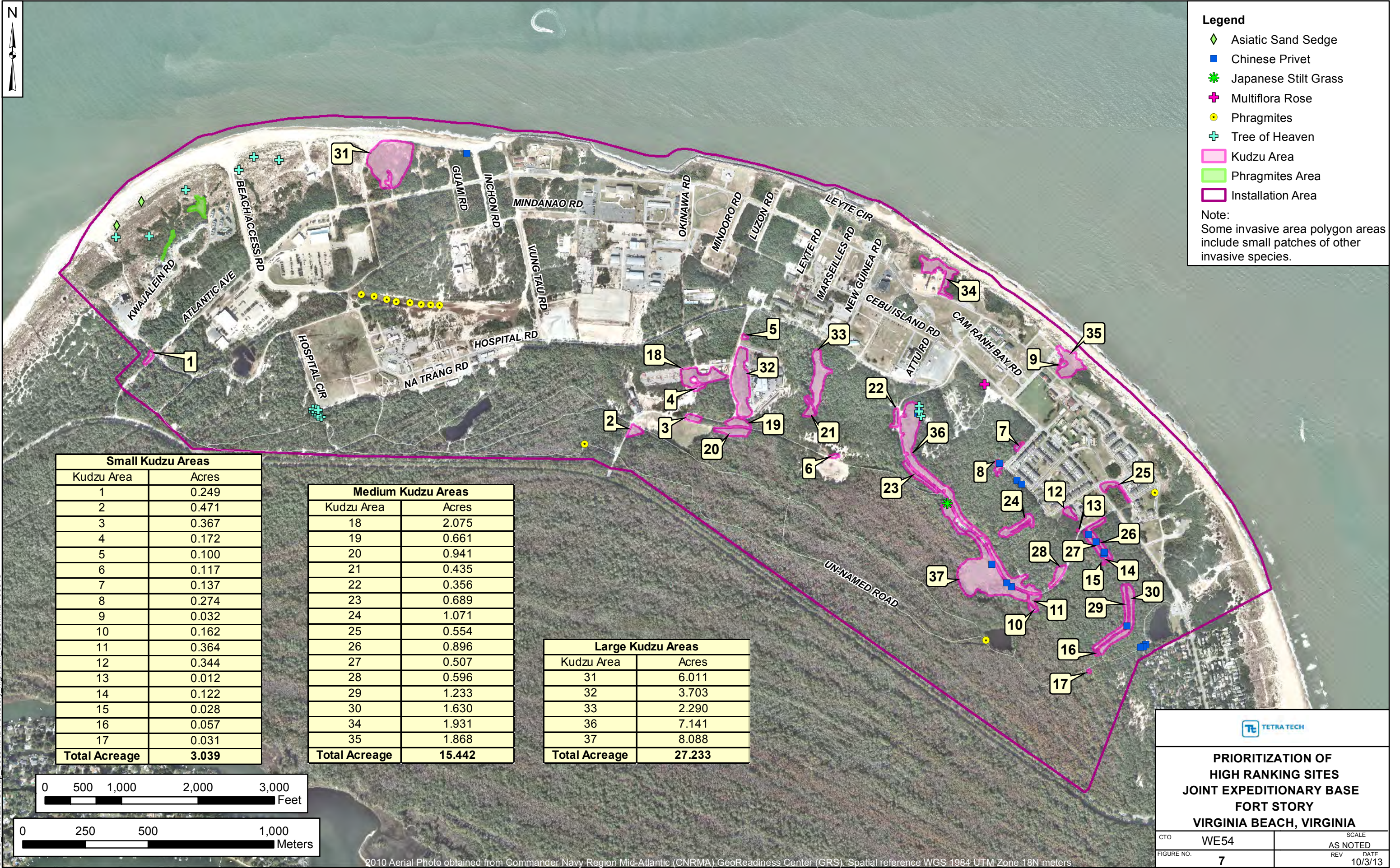
Under these strategies, the longer an invasive species goes undetected in a new area, the less opportunity there is to intervene and thus decreasing the chance of success. As mentioned previously, prevention and early detection activities are vital in protecting the environments at JEB Fort Story from invasive species. The phases of invasive plant species management include:



Legend

- ◆ Asiatic Sand Sedge
- Chinese Privet
- ✱ Japanese Stilt Grass
- + Multiflora Rose
- Phragmites
- + Tree of Heaven
- Kudzu Area
- Phragmites Area
- Installation Area

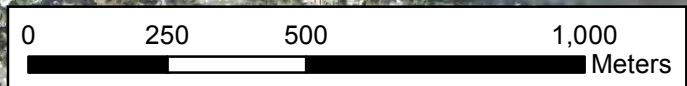
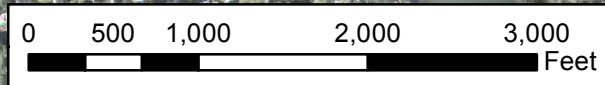
Note:
Some invasive area polygon areas include small patches of other invasive species.



Small Kudzu Areas	
Kudzu Area	Acres
1	0.249
2	0.471
3	0.367
4	0.172
5	0.100
6	0.117
7	0.137
8	0.274
9	0.032
10	0.162
11	0.364
12	0.344
13	0.012
14	0.122
15	0.028
16	0.057
17	0.031
Total Acreage	3.039

Medium Kudzu Areas	
Kudzu Area	Acres
18	2.075
19	0.661
20	0.941
21	0.435
22	0.356
23	0.689
24	1.071
25	0.554
26	0.896
27	0.507
28	0.596
29	1.233
30	1.630
34	1.931
35	1.868
Total Acreage	15.442

Large Kudzu Areas	
Kudzu Area	Acres
31	6.011
32	3.703
33	2.290
36	7.141
37	8.088
Total Acreage	27.233



2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters

TETRA TECH

**PRIORITIZATION OF
HIGH RANKING SITES
JOINT EXPEDITIONARY BASE
FORT STORY
VIRGINIA BEACH, VIRGINIA**

CTO	WE54	SCALE	AS NOTED
FIGURE NO.	7	REV	DATE
			10/3/13

G:\GIS_files\JEBFS\Map_Docs\MXD\FortStory_highrank_092513.mxd 100313



Legend

- Autumn Olive- 86
- ▲ Chinese Lespedeza- 35
- English Ivy- 16
- ✱ Mimosa- 60
- White Sweet Clover- 2
- Autumn Olive Area
- Installation Area

Note:
Invasive point species located in kudzu areas are not shown or included in the species count.



G:\GIS_files\JEBFS\Map_Docs\MXD\FortStory_lowrank_092613.mxd 100113

0 500 1,000 2,000 3,000 Feet

0 250 500 1,000 Meters

2010 Aerial Photo obtained from Commander Navy Region Mid-Atlantic (CNRMA) GeoReadiness Center (GRS). Spatial reference WGS 1984 UTM Zone 18N meters



**PRIORITIZATION OF
LOW RANKING SITES
JOINT EXPEDITIONARY BASE
FORT STORY
VIRGINIA BEACH, VIRGINIA**

CTO	WE54	SCALE	AS NOTED
FIGURE NO.	8	REV	DATE
			10/3/13

- Planning – to identify goals and objectives regarding invasive species control;
- Survey – to determine which species are present and their distribution;
- Monitoring – to obtain information on how species/populations change over time, their impacts on ecosystems and impacts of management practices, and to detect new invasive plant species/populations; and
- Control– to use appropriate control methods (e.g., physical, chemical, and biological) for eradication, suppression, containment, or restoration thereby reducing distribution and impact of invasive species.

5.1 PURPOSE

Prevention is the first-line of defense and can be the most cost-effective approach because, once an invasive species becomes widespread, controlling it may require significant and sustained expenditures. The long-term success in prevention will reduce the rate of introduction, establishment, and damage to the environment. Even the best prevention efforts cannot stop all invasive species from occurring in an area. Early detection and rapid response (EDRR) was first conceptualized in 1998 by the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW 2003) and outlines critical steps in the second defense (control) against establishment of invasive species. EDRR increases the likelihood that localized invasive populations will be found, contained, and eradicated before they become widely established (National Invasive Species Council 2008). Early detection and rapid response can make the difference between a manageable population and one that is not technically or financially feasible to control.

Early detection, rather than late discovery, of invasive plants requires planning and conducting area searches for potential occurrences of invasive plants every year. The ability to rapidly assess an invasive species situation is necessary for timely action, which is essential to rapid response for quickly mobilizing resources to control an infestation before it becomes widely dispersed.

5.2 METHODS

The types and timing of control treatments differ in effectiveness and efficiency. Not all invasive species will respond to the same types of treatments, and a single type of treatment may not be appropriate for a site with multiple invasive species, especially if it is interspersed with native plants. Only the control methods that would be expected to be employed at JEB Fort Story are presented in this control plan. For example, while burning is frequently used this method has no potential for invasive species control at JEB Fort Story. The JEB Fort Story natural resources manager might need to use a combination of treatments and timing to meet site-specific needs.

5.2.1 Mechanical

Mechanical treatments include hand pulling, weed wrenching, cutting, and mowing. Individual plants such as privet, mimosa, and autumn olive can be cut to remove surface growth; however, resprouting from roots will occur and require repeated cuttings or mowing for control until the root system is exhausted of growth potential. The effectiveness can be enhanced through the use of chemical treatments to prevent root sprouts. Other mechanical methods such as hand pulling

and digging out roots are also effective for control of certain species in small areas, but are labor and time intensive for large infestations.

5.2.2 Biological

Biological control is a scientific method for identifying natural control agents of invasive species and introducing the agents into infested areas (Gundlach 2007). Biological control usually involves intentionally introducing an insect herbivore or a microbial pathogen that is an undomesticated enemy organism of the target species (Heffernan 1998). Advocates of biological control have made promising claims over the last 150 years; however, serious criticisms have emerged that raise important questions about the effects of biological control agents on non-target species, and associated community and ecosystem effects that may result. The benefits and risks of biological control should be weighed against those of other control methods or absence of control altogether. Consultation with appropriate local, state, and federal agencies is required before implementing a biological control program for invasive species to ensure their efficacy and to avoid potential detrimental effects to the ecosystem. The only example of biological control in Virginia that applies to the target species at JEB Fort Story is European wasp control on multiflora rose. Additional information on use of biological control in Virginia is available from: http://www.biocontrol.ento.vt.edu/BC_html.htm.

5.2.3 Chemical

Chemical treatments are pesticide applications and only a certified pesticide applicator may apply herbicides on JEB Fort Story. Applicators must follow all federal, state and local regulations regarding herbicide use. Applicators must read and follow product labels. It is a violation of federal law to use an herbicide in a manner inconsistent with its label. In addition, the health and safety of applicators and others in the vicinity must be considered before herbicides are applied. The benefit of using herbicides must outweigh the potential harm to the environment and human health and safety.

A primary goal of any invasive plant management program is selectivity of control—control of the invasive species without harming desirable, native vegetation that is often present in close proximity. Chemical treatments may offer such selectivity through application technique, timing, and chemical modes. Dow Agrosciences (2012) provides a practical and technical guide for using herbicides.

Herbicides can be applied in a variety of ways. Foliar applications apply herbicide directly to the leaves and stems of a plant, usually by spraying or misting the invasive species. Basal bark treatments apply a band of herbicide around the trunk of the target plant. The frill method, also called the “hack and squirt” treatment is used to apply herbicide to cuts in woody species with large, thick trunks. Invasive trees that resprout vigorously are usually treated with the cut stump method; a herbicide is applied immediately to the cut stump to prevent resprouting. A dye mixed with the herbicide should always be used so applicators can see which plants have been treated and if they have gotten any herbicide on themselves or their equipment. Chemical applications in successive and multiple growing seasons are required for effective control. Detailed information on general properties of herbicides is presented in The Nature Conservancy’s Weed Control Handbook (Tu et al. 2001).

5.2.4 Grazing

Grazing can be used to reduce the competitive advantage that invasive plants have over native species. Timing, intensity, and monitoring are key factors in successfully implementing a grazing program to control invasive species. Animals should be placed in an infested area at a time when they will be most likely to damage the target invasive plant species without significantly impacting desirable species. Grazing timed to remove developing flowers or seed heads can reduce seed production for that year. Grazing intensity is a factor of how many (stocking rate), how long (duration), and how often (frequency) animals are allowed to graze in an area. Grazing intensity should be closely monitored to achieve the maximum impact on the target species without significant consumption of desirable plants. Management considerations for use of grazing animals include providing access to water, protection from predators, and containment. Goats may be a preferred species for grazing invasive species because of the following characteristics.

- Prefer woody plants over forbs
- Tolerant of secondary plant compounds
- Prefer stripping individual leaves and chewing branches
- May reach taller branches by standing on hind legs or climbing
- Do not graze uniformly
- Adapt to herding or can be tethered to concentrate grazing activity
- Can be contained with temporary, portable fencing

Additional information is available from:

<http://www.fws.gov/invasives/stafftrainingmodule/methods/grazing/practice.html>.

A two-year field study conducted on Centennial Campus at North Carolina State University demonstrated that repeated defoliation of kudzu (average of five times per growing season) at a stocking rate of 40 goats per acre resulted in the elimination of kudzu after only two years. Use of goats can offer an environmentally-benign and viable alternative to achieve management and elimination of invasive species.

Additional information is available from:

<http://www.ipmcenters.org/IPMSymposiumV/sessions/12-0.pdf>.

Regional contacts for prescribed goat grazing are listed below:

- Brother Giovanni, The Symbiosis Experiment, P.O. Box 572, Goochland, VA 23063, (757)556-5269, dionysosi@hotmail.com.
- Eco-Goats, www.eco-goats.com, 443-458-5676 (office), 814-233-0305 (cell), central and southern MD, Northern VA
- Ron and Cheryl Searcy, Wells Farm Goats, 260 Annie Bell Lane, Horse Shoe, NC 28742, (828)877-5109, rssearcy@comporium.net, www.wellsfarmgoats.com

- Alan and Susan Fox, Fox Farms, 54 Labrador Lane, Burnsville, NC 28174, 828-682-1405, yanceyfoxfarms@verizon.net - An animal welfare approved farm offering goat rentals.

5.3 PREVENTING INTRODUCTIONS

Preventative measures to avoid or minimize introduction and spread of invasive plants can reduce the effects on natural resources at JEB Fort Story. The following guidelines are helpful to incorporate into routine operating activities.

- Prohibit purchases or acquisition of plants identified as invasive on the VDCR-DNH database list of Invasive Alien Plant Species in Virginia.
- Require anyone providing plant material on the base to inspect and certify that their shipments do not accidentally contain plants identified as invasive in Virginia.
- Provide a list of appropriate alternative native or noninvasive species for planting.
- Perform road maintenance when invasive plants are less likely to be spread (i.e., before germination or prior to seed set).
- Clean tires, vehicles, and equipment carefully after they have been in an area where invasive plants occur.
- Evaluate the potential to spread invasive plants in project reviews (i.e., do not permit on-base soil relocation).
- Require a follow-up plan to deal with invasive plants following completion of development projects.
- Continue to educate employees, users, and public (i.e., especially boundary neighbors) about invasive plants.

5.4 CONTROL RECOMMENDATIONS

Guidelines for ranking invasive species control efforts are species-based and site-based in order to eradicate species in a localized area, protect uninfested areas, limit dispersal along roads, and reduce the spread of invasive species (National Invasive Species Council 2005). The priority given in Table 2 first considers those species and sites that are most likely to be controlled with the recommended methods and then targets the routes of dispersal and operational areas. Refer to Figures 7 and 8 for prioritization of high- and low-ranking sites.

Table 2. Control Priority of Invasive Species at JEB Fort Story.

Priority	Species	Site (number or acres)	Control Method
1	Japanese stilt grass	1 point location	herbicide
2	Asiatic Sand Sedge	2 point locations	hand pulling
3	Multiflora rose	1 point locations	herbicide

4	Phragmites	2 point locations	hand pulling
5	Phragmites	11 point locations	NEPA project area
6	Phragmites	2 polygons (0.8 acres)	cutting and herbicide
7	Tree-of-heaven	all point locations (18)	cutting and herbicide
8	Kudzu	1-17 polygons (3.04 acres)	herbicide
9	Kudzu	18-30, 34-35 polygons (15.4 acres)	herbicide or grazing
10	Kudzu	31-33, 36-37 polygons (27.2 acres)	herbicide or grazing
12	Chinese privet	all point locations (17)	cutting and herbicide
13	Autumn olive	all point locations (88)	cutting and herbicide
14	Mimosa	all point locations (63)	cutting and herbicide
15	Autumn olive	1-3 polygons (1.8 acres)	cutting and herbicide
16	Chinese lespedeza	all point locations (40)	mowing
17	Sweet clovers	all point locations (2)	mowing
18	Japanese honeysuckle	coincident with kudzu sites	herbicide or grazing
19	English ivy	all point locations (19)	herbicide

6.0 SURVEY RECOMMENDATIONS

6.1 PURPOSE AND GOALS

Surveys provide the information necessary to assess and prioritize invasive plant management efforts and improve cost effectiveness. The basic purpose of surveying invasive species is to map their locations and display their distributions. Invasive species maps can be used in education and outreach efforts for the public and decision makers. Documenting the distribution and abundance of invasive plants facilitates the process of management decision making. The first step in managing invasive species is to know where they are and where they are not. The next step is to assess the status of invasive plant populations (e.g., location, distribution, and abundance), identify areas free of invasive plants, and detect new invasive plant species or populations. The final step is implementation of the control plan. Surveys can provide baseline data for developing control efforts and quantifying invasive plant status can help justify funding or support other requests.

6.2 SURVEY RECOMMENDATIONS

The layout of transects and points across JEB Fort Story (see Figure 3) should be used as the basis for continuing the invasive species surveys. A reconnaissance-level survey of all the paved and unpaved roads using an all-terrain vehicle (ATV) should be conducted each year during June to September to visit as many points as possible to document presence or absence of the target invasive species. The remaining points within the maritime forest areas should be surveyed by walking. Transects and points through the beaches should be surveyed using a combination of ATV and walking to efficiently cover the area. Incidental observations should be made for presence of any of the other species on the VDCR-DNH database list of Invasive Alien Plant Species in Virginia. Data recording and mapping should follow the methods presented herein. The findings from these surveys should be compared to the baseline data contained in this Plan to detect any change in the number of observation points with invasive species present (see Figure 5). This data point will help determine whether invasive species are increasing or decreasing in abundance and distribution at JEB Fort Story.

The area polygons identified in this Plan (see Figure 6) should be visited each year to assess the condition of infestations. Photographs should be taken to document success or failure of control measures where applied, compare site conditions between years, and inform decision makers of the invasive species control requirements at JEB Fort Story. The recommendations for surveying points and polygons will help in planning and executing control measures.

7.0 EDUCATION, TRAINING AND PUBLIC OUTREACH

Engaging volunteers to help control invasive species at JEB Fort Story would be beneficial. Use of volunteers can be leveraged to expand a project area and stretch limited project funds. Volunteers used for initial invasive plant control can subsequently provide long-term monitoring of project sites. In addition, volunteers will learn first-hand the impact of invasive plants on the environment and help inform others of the impact that invasive plants can have on the environment at JEB Fort Story.

Invasive Species Management at DoD Facilities in the Chesapeake Bay Watershed (Gundlach 2007) provides an excellent resource to assist JEB Fort Story with management of invasive plant species. The main goal of this document is to provide pertinent information to increase the efficiency and effectiveness of management activities while minimizing interference to the military mission.

The JEB Fort Story pamphlet (Appendix E) on invasive species provides a useful resource for education, training, and public outreach. The Alliance for the Chesapeake Bay (2003) provides a citizen's guide to the control of invasive plants that may be adapted for engaging volunteers in projects at JEB Fort Story.

8.0 LITERATURE CITED

Alliance for the Chesapeake Bay. 2003. Citizen's Guide to the Control of Invasive Plants in Wetland and Riparian Areas. <https://allianceforthebay.org/resources/publications-old/citizens-guide-to-the-control-of-invasive-plants-in-wetland-and-riparian-areas/>.

- Department of Defense. 2011. Commander's Guide on Invasive Species. Prepared by Booz Allen Hamilton. Prepared for DoD Legacy Resource Management Program, Washington, D.C.
- Department of the Navy. 2010. Integrated Natural Resources Management Plan Joint Expeditionary Base Fort Story Virginia Beach, Virginia. Prepared by Environmental Division NAVFAC MIDLANT Norfolk, VA.
- Department of the Navy. 2013. Integrated Natural Resources Management Plan Joint Expeditionary Base Fort Story Virginia Beach, Virginia. Prepared by Tetra tech, Inc. Arlington, VA. Prepared for Environmental Division NAVFAC MIDLANT Norfolk, VA.
- Dow Agrosciences. 2012. Invasive Plant Management with Milestone® and Other Herbicides: A practical and technical guide for natural area managers. http://static.squarespace.com/static/50d37c2ce4b09ff030bc2f7b/t/51378941e4b02119d1846542/1362594113040/2012IPguide_press.pdf.
- Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW). 2003. A National Early Detection and Rapid Response System for Invasive Plants in the United States. <http://www.fs.fed.us/ficmnew/>.
- Gundlach, A.M. 2007. Invasive Species Guidebook for Department of Defense Installations in the Chesapeake Bay Watershed: Identification, Control, and Restoration. Wildlife Habitat Council. Silver Spring, Maryland. Prepared for the Department of Defense Legacy Resource Management Program, Project 06-328.
- Heffernan, K.E. 1998. Managing Invasive Alien Plants in Natural Areas, Parks, and Small Woodlands. Natural Heritage Technical Report 98-25. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Richmond, Virginia.
- National Invasive Species Council. 2005. Guidelines for Ranking Invasive Species Control Projects. Version 1. Department of the Interior, Office of the Secretary (OS/SIO/NISC), Washington, DC. 13 pp.
- National Invasive Species Council. 2008. 2008-2012 National Invasive Species Management Plan. National Invasive Species Council Department of the Interior Office of the Secretary (OS/SIO/NISC), Washington, DC 20240. http://www.invasivespecies.gov/home_documents/2008-2012National_Invasive_Species_Management_Plan.pdf
- Pimentel, D. 2007. Environmental and Economic Costs of Vertebrate Species Invasions into the United States. Managing Vertebrate Invasive Species. Paper 38. <http://digitalcommons.unl.edu/nwrcinvasive/38>.
- Swearingen, J., B. Slattery, K. Reshetiloff, and S. Zwicker. 2010. Plant Invaders of Mid-Atlantic Natural Areas, 4th ed. National Park Service and U.S. Fish and Wildlife Service. Washington, DC. 168pp.
- Tu, M., Hurd, C. & J.M. Randall. 2001. Weed Control Methods Handbook, The Nature Conservancy. <http://tncweeds.ucdavis.edu>.

- U. S. Department of the Interior. 1993. Handbook for Ranking Exotic Plants for Management and Control. Prepared by Ronald D. Hiebert, National Park Service, Midwest Regional Office, Omaha, NE and James Stubbendieck, Department of Agronomy, University of Nebraska, Lincoln, NE. Prepared for the national Park Service. Natural Resources Report NPS/NRMWRO/NRR-93/08.
- Virginia Department of Conservation and Recreation (VDCR). 2009. Invasive Alien Plant Species of Virginia. Division of Natural Heritage, Richmond, Virginia 23219. http://www.dcr.virginia.gov/natural_heritage.
- Virginia Invasive Species Working Group. 2012. Natural Heritage Technical Document 12-13. Prepared by Virginia Invasive Species Advisory Committee. Richmond, VA. 55 pages.
- Westbrook, C. and Ramos, K. 2005. Under Siege: Invasive Species on Military Bases. Prepared by the National Wildlife Federation. Prepared for the Department of Defense. http://www.necis.net/2005/10/under_siege_inv/.

APPENDIX A
Stakeholder Coordination Memo

Invasive Plants Inventory and Control Plan for Joint Expeditionary Base Fort Story, Virginia

TO: Kevin Heffernan, Virginia Department of Conservation and Recreation, Division of Natural Heritage Program; Dave Bishop, Regional Invasive Species Biologist at US Fish and Wildlife Service; and Erik Molleen, Virginia Department of Conservation and Recreation, Resource Specialist, District 1 State Parks (First Landing State Park)

Date: 30 June 2013

SUBJECT: Invasive Plants Inventory and Control Plan for Joint Expeditionary Base Fort Story, Virginia

Task 1B Stakeholder Responses to Refining the Invasive Plant List

FROM: Joseph Campo, Tetra Tech, Inc.

As we discussed, the purpose of Task 1B is to refine the preliminary list of invasive plants at Fort Story. On behalf of the US Navy, Naval Facilities Engineering Command, Mid-Atlantic, Tetra Tech is seeking your input on invasive plant species that that may be present or may pose the greatest risk of becoming established at Fort Story to prioritize inventory and control efforts. Also, please comment on the species that may pose the greatest risk to natural resources at Fort Story. The resulting inventory and control plan will aid the Navy in ensuring compliance with applicable Federal, state, and local statutes and regulations, and with Department of Defense policies, instructions, and guidance regarding invasive plants.

Figures 1 and 2 provide general location and vicinity maps of Fort Story. The area covers 1,458 acres (590 hectares), a large portion of which is forested or undeveloped land managed for forest products and wildlife values. Table 1 provides a preliminary list of invasive plants that may be present and Table 2 provides a list of invasive plants that have been identified at Fort Story.

Please return your responses to me by 22 July 2013. Please feel free to contact me using the numbers and email below if you have any questions.

Thank you,

Joseph J. Campo, PhD | Senior Environmental Scientist

Direct: 757.466.4910 | Fax: 757.461.4148 | Cell: 571.232.1863

joseph.campo@tetrattech.com

Tetra Tech | Complex World, Clear Solutions™

Twin Oaks One 5700 Lake Wright Dr., Suite 309 | Norfolk, VA 23502

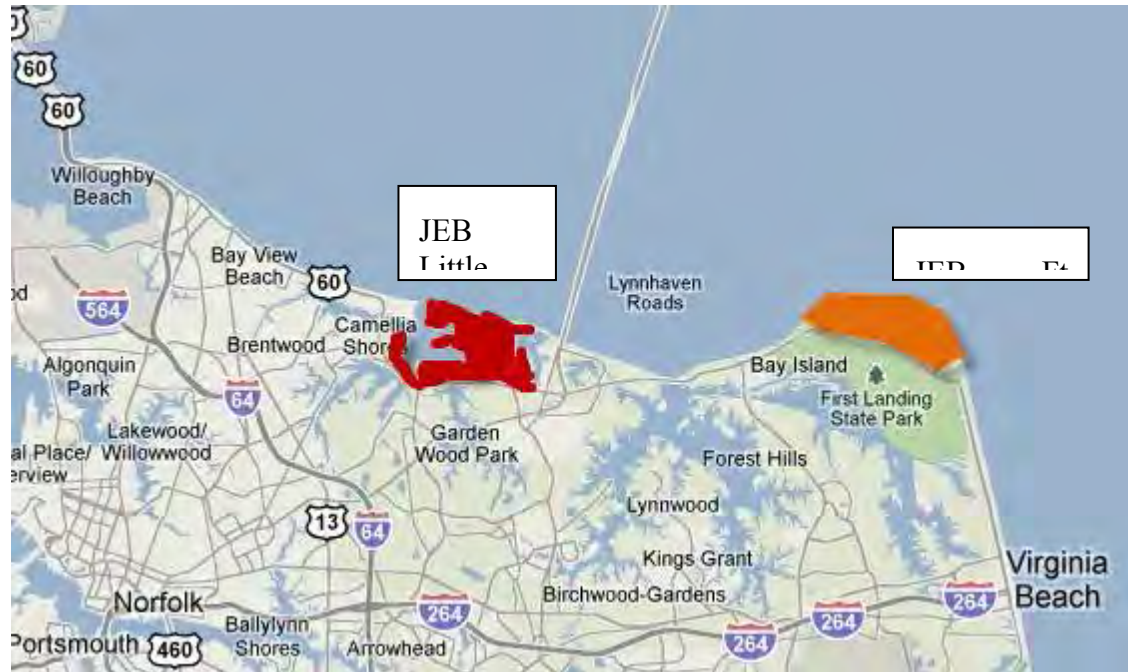


Figure 1. General location of Fort Story.

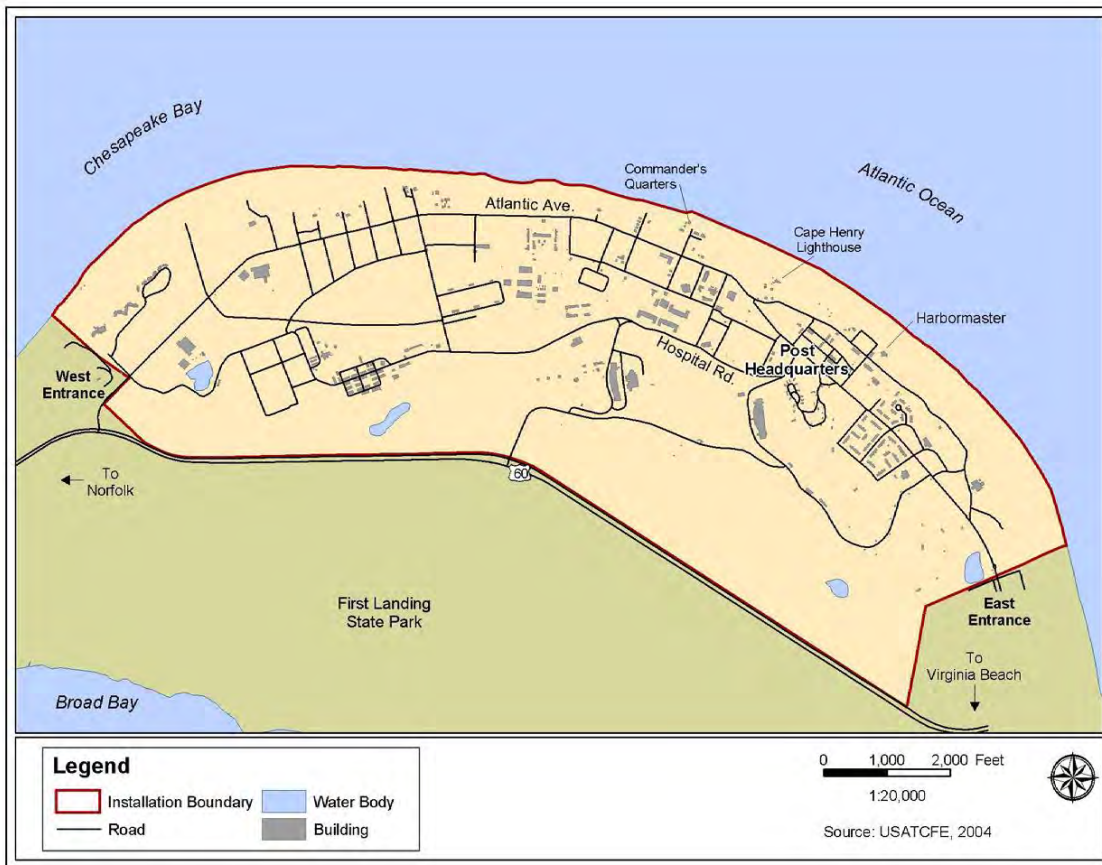


Figure 2. Vicinity map of Fort Story.

Table 1. Preliminary List of Invasive Floral Species for Joint Expeditionary Base Fort Story, Virginia (Source: VDCR highly or moderately invasive plant species of the Coastal Plain).

Highly Invasive Plant Species			
Tree-of-heaven	<i>Ailanthus altissima</i>	Musk thistle	<i>Carduus nutans</i>
Alligator weed	<i>Alternanthera philoxeroides</i>	Sickle pod	<i>Cassia obtusifolia</i>
Asiatic sand sedge	<i>Carex kobomugi</i>	Bull-thistle	<i>Cirsium vulgare</i>
Oriental bittersweet	<i>Celastrus orbiculata</i>	Field-bindweed	<i>Convolvulus arvensis</i>
Spotted knapweed	<i>Centaurea biebersteinii</i>	Common teasel	<i>Dipsacus sylvestris</i>
Canada thistle	<i>Cirsium arvense</i>	Brazilian water-weed	<i>Egeria densa</i>
Chinese yam	<i>Dioscorea oppositifolia</i>	Wintercreeper	<i>Euonymus fortunei</i>
Autumn olive	<i>Elaeagnus umbellata</i>	Tall fescue	<i>Festuca elatior (F. pratensis)</i>
Hydrilla	<i>Hydrilla verticillata</i>	Fennel	<i>Foeniculum vulgare</i>
Cogon grass	<i>Imperata cylindrica</i>	Gill-over-the-ground	<i>Glechoma hederacea</i>
Chinese privet	<i>Ligustrum sinense</i>	English ivy	<i>Hedera helix</i>
Japanese honeysuckle	<i>Lonicera japonica</i>	Velvet-grass	<i>Holcus lanatus</i>
Purple loosestrife	<i>Lythrum salicaria</i>	Japanese hops	<i>Humulus japonicus</i>
Japanese stilt grass	<i>Microstegium vimineum</i>	Ivy-leaved morning-glory	<i>Ipomoea hederacea</i>
Aneilema	<i>Murdannia keisak</i>	Common morning-glory	<i>Ipomoea purpurea</i>
Parrot feather	<i>Myriophyllum aquaticum</i>	Yellow flag	<i>Iris pseudacorus</i>
European water-milfoil	<i>Myriophyllum spicatum</i>	Blunt-leaved privet	<i>Ligustrum obtusifolium</i>
Common reed or Phragmites	<i>Phragmites australis</i>	Moneywort	<i>Lysimachia nummularia</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>	China-berry	<i>Melia azedarach</i>
Kudzu vine	<i>Pueraria montana</i>	Princess tree	<i>Paulownia tomentosa</i>
Lesser celandine	<i>Ranunculus ficaria</i>	Timothy	<i>Phleum pratense</i>
Multiflora rose	<i>Rosa multiflora</i>	Golden bamboo	<i>Phyllostachys aurea</i>
Wineberry	<i>Rubus phoenicolasius</i>	Canada bluegrass	<i>Poa compressa</i>
Johnson-grass	<i>Sorghum halepense</i>	Rough bluegrass	<i>Poa trivialis</i>
Beach vitex	<i>Vitex rotundifolia</i>	Bristled knotweed	<i>Polygonum cespitosum</i>
		White poplar	<i>Populus alba</i>
		Red sorrel	<i>Rumex acetosella</i>
Moderately Invasive Plant Species			
Norway maple	<i>Acer platanoides</i>	Giant foxtail	<i>Setaria faberi</i>
Quack grass	<i>Agropyron repens</i>	Common chickweed	<i>Stellaria media</i>
Five-leaf akebia	<i>Akebia quinata</i>	Ivy-leaved speedwell	<i>Veronica hederifolia</i>
Mimosa	<i>Albizia julibrissin</i>	Chinese wisteria	<i>Wisteria sinensis</i>
Wild onion	<i>Allium vineale</i>	Common cocklebur	<i>Xanthium strumarium</i>
Mugwort	<i>Artemisia vulgaris</i>		
Jointed grass	<i>Arthraxon hispidus</i>		
Giant reed	<i>Arundo donax</i>		
Japanese barberry	<i>Berberis thunbergii</i>		

Table 2. Invasive Plants Identified at JEB Fort Story (Source: USFWS inventory 2008).

<i>Albizia julibrissin</i>	Mimosa
<i>Alliaria petiolata</i>	Garlic mustard
<i>Allium vineale</i>	Field garlic
<i>Artemisia vulgaris</i>	Mugwort
<i>Centaurea biebersteinii</i>	Spotted knapweed
<i>Cirsium arvense</i>	Canada thistle
<i>Commelina communis</i>	Asiatic dayflower
<i>Coronilla varia</i>	Crown vetch
<i>Dipsacus sylvestris</i>	Common teasel
<i>Elaeagnus umbellata</i>	Autumn olive
<i>Eragrostis curvula</i>	Weeping lovegrass
<i>Glechoma hederacea</i>	Gill-over-the-ground
<i>Hedera helix</i>	English ivy
<i>Humulus japonicus</i>	Japanese hops
<i>Lespedeza cuneata</i>	Chinese lespedeza
<i>Ligustrum sinense</i>	Chinese privet
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Lotus corniculata</i>	Birdsfoot trefoil
<i>Lysimachia nummularia</i>	Moneywort
<i>Melilotus officinalis</i>	Yellow sweet clover
<i>Melilotus sinensis</i>	White sweet clover
<i>Microstegium vimineum</i>	Japanese stilt grass
<i>Phleum pratense</i>	Timothy
<i>Phragmites australis</i>	Common reed
<i>Pueraria montana</i>	Kudzu
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Rubus phoenicolasius</i>	Wineberry
<i>Stellaria media</i>	Common chickweed
<i>Vinca minor</i>	Periwinkle

APPENDIX B
Representative Photographs of Invasive Species
at JEB Fort Story

Representative Photographs of Invasive Species at Ft. Story



Autumn Olive at plot 3-5



English Ivy at plot 14-8

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 6-17



Kudzu at plot 6-17

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 6-17



Autumn Olive at plot 4-6

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 1-7



Kudzu at plot 1-7

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 1-7



Autumn Olive at plot 1-5

Representative Photographs of Invasive Species at Ft. Story



Chinese Lespedeza on Atlantic Avenue



Kudzu at plot 1-7

Representative Photographs of Invasive Species at Ft. Story



Autumn Olive at plot 2-5



Tree-of-heaven and Chinese Privet at plot 8-21

Representative Photographs of Invasive Species at Ft. Story



Tree-of-heaven at plot 8-21



Tree-of-heaven and
Kudzu at plot 8-21

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 8-18



Kudzu at plot 8-18

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 6-19



Kudzu at plot 6-19

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 7-17



Phragmites at Snake Lake

Representative Photographs of Invasive Species at Ft. Story



Chinese Lespedeza on
First Landing Road



Japanese Stilt Grass and
Kudzu on First Landing Road

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 6-19



Kudzu at plot 6-19

Representative Photographs of Invasive Species at Ft. Story



Autumn Olive in
secondary dunes



Kudzu in
primary dunes

Representative Photographs of Invasive Species at Ft. Story



Multiflora Rose at MWR



Chinese Privet at MWR

Representative Photographs of Invasive Species at Ft. Story



Mimosa at plot 6-2



Asiatic Dayflower on
Atlantic Avenue

Representative Photographs of Invasive Species at Ft. Story



Kudzu at plot 9-7



Mimosa at plot 6-12

Representative Photographs of Invasive Species at Ft. Story



Chinese Lespedeza on
Hospital Road



Phragmites at plot 2-3

APPENDIX C
Invasive Species Survey Field Data Forms

Invasive Plant Species Survey Field Data Form

Date: 7/16/2013

Transect/Plot 7-4

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	<1%	Single Plant
English Ivy	<1%	Single Plant

Level of Infestation N/S

Patch Shape Point

Spreading Vectors Rd

Habitat BD

Photograph: **Photographer** JC

Photo No. DSC02884.jpg **Direction**

GPS: Offset Yes No **Direction**

Comments
Individual plants, scattered

Transect/Plot 6-12

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
mimosa	single plant	single

Level of Infestation N/S

Patch Shape Point

Spreading Vectors Rd

Habitat MOW

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
Individual plant

Transect/Plot 8-21

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority
Tree of Heaven	6-25%	scattered plants
Chinese Privet	1-5%	scattered plants

Level of Infestation LG

Patch Shape Patch

Spreading Vectors

Habitat FOI

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
Kudzu hanging over bunker, Tree of Heaven and Chinese privet

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Invasive Plant Species Survey Field Data Form

Date: 7/16/2013

Transect/Plot ¹⁴⁻⁷ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	26-50%	MOD

Level of Infestation Moderate

Patch Shape Patch

Spreading Vectors La

Habitat FoM

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments
along both sides of road and around bunker

Transect/Plot ¹⁴⁻⁸ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
English Ivy	25/50%	MOD
Chinese Privet	6-25%	scattered plants

Level of Infestation MOD

Patch Shape Linear/Patch

Spreading Vectors Rd

Habitat FoM

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments
linear along the road, patch shape for English Ivy and scattered plants for Common Privet

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments

Invasive Plant Species Survey Field Data Form

Date: 7/16/2013

Transect/Plot ¹⁰⁻¹³ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	75%	Majority

Level of Infestation ^{LG} _____

Patch Shape ^{Linear/Patch} _____

Spreading Vectors Rd _____

Habitat ^{La} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Along road, dense patch in vegetated area between paved roads invading into housing area.

Transect/Plot ¹⁰⁻¹⁴ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Phragmites	1-5%	Scattered Plants

Level of Infestation ^{N/S} _____

Patch Shape ^{Patch} _____

Spreading Vectors ^{LA} _____

Habitat ^{LP} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

In storm water pond area within housing area, 0.01 acre patch limited in the mowed area to the stormwater pond.

Transect/Plot ¹²⁻⁶ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority

Level of Infestation ^{LG} _____

Patch Shape ^{Patch} _____

Spreading Vectors _____

Habitat ^{FoM} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Covers the entire landfill, Kudzu limited to open area and woodland edges, wetland, and dense woods.

Transect/Plot ¹²⁻⁷ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority
Chinese Privet	1-5%	

Level of Infestation ^{LG} _____

Patch Shape ^{Patch} _____

Spreading Vectors _____

Habitat ^{FoM} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Covers the entire landfill. Chinese Privet mixed in and covered by Kudzu.

Invasive Plant Species Survey Field Data Form

Date: 7/18/2013

Transect/Plot 1-4

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	<1%	Single Plant
Tree of Heaven	<1%	Single Plant

Level of Infestation N/S

Patch Shape Point

Spreading Vectors La

Habitat BD

Photograph: **Photographer** JC

Photo No. DSC02884.jpg **Direction**

GPS: Offset Yes No **Direction**

Comments

Scattered plants may occur in the dune areas, not exhibiting invasive characteristics

Transect/Plot 1-7

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors LA, Rd

Habitat B/D

Photograph: **Photographer**

Photo No. DSC02885-2890.jpg **Direction**

GPS: Offset Yes No **Direction**

Comments

Widespread Kudzu area, large patch shape, extending to the beach

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Invasive Plant Species Survey Field Data Form

Date: 7/23/2013

Transect/Plot 7-16

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority
Mimosa	1-5%	scattered plants

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat Fol

Photograph: Photographer JC

Photo No. 2906-2908 **Direction**

GPS: Offset Yes No **Direction**

Comments
Kudzu covering large area around tower-Mimosa scattered in the area , few plants

Transect/Plot 6-17

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat FoM

Photograph: Photographer

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
Large Kudzu area covering bunker area

Transect/Plot 6-19

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat FoM

Photograph: Photographer

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
start of large area that expands to transect # 8-18 ~ 300 meters to the south

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: Photographer

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Invasive Plant Species Survey Field Data Form

Date: 7/23/2013

Transect/Plot 7-17

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat Fol

Photograph: Photographer JC

Photo No. DSC02906-2908.jpg Direction

GPS: Offset Yes No Direction

Comments
around tower and inside fence

Transect/Plot 8-15

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority
Chinese lespedeza	6-25%	scattered plants

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat FoM

Photograph: Photographer JC

Photo No. DSC02912 Direction

GPS: Offset Yes No Direction

Comments
Dense patch area of Kudzu, Chinese lespedeza along roadside, linear and dense scattered plants

Transect/Plot 8-18

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	100%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors Rd

Habitat FoM

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments
Dense area of Kudzu on both sides of the road and into trees

Transect/Plot 9-7

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	6-25%	

Level of Infestation N/S

Patch Shape Patch

Spreading Vectors Rd

Habitat Fol/La

Photograph: Photographer

Photo No. Direction

GPS: Offset Yes No Direction

Comments
small patch along road sides

Invasive Plant Species Survey Field Data Form

Date: 7/23/2013

Transect/Plot 11-11

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority
Chinese Privet	6-25%	Moderate

Level of Infestation LG

Patch Shape Point

Spreading Vectors Rd

Habitat FoM

Photograph: **Photographer** JC

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
Kudzu around bunker, along roadsides.
Common Privet mixed in with Kudzu.

Transect/Plot 13-9

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	26-50%	Moderate

Level of Infestation MOD

Patch Shape Patch

Spreading Vectors La/Rd

Habitat FoM

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments
Patches on both sides of the road near Bldg 216

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Transect/Plot

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation

Patch Shape

Spreading Vectors

Habitat

Photograph: **Photographer**

Photo No. **Direction**

GPS: Offset Yes No **Direction**

Comments

Invasive Plant Species Survey Field Data Form

Date: 7/24/2013

Transect/Plot ³⁻¹⁹ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	<1%	Single Plant

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors Rd _____

Habitat ^{BD} _____

Photograph: **Photographer** ^{JC} _____

Photo No. ^{DSC02884.jpg} **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Scattered single plants may be landscape plants that were planted as part of road development.

Transect/Plot ⁴⁻²⁴ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority
Autumn Olive	<1%	Single Plant
English Ivy	<1%	

Level of Infestation ^{LG} _____

Patch Shape ^{Patch} _____

Spreading Vectors Rd _____

Habitat ^{BD} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Dense Patch surrounding the lighthouse area, covering the dune area

Transect/Plot ²⁻⁹ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	<1%	Single Plant

Level of Infestation ^{N/S} _____

Patch Shape ^{Pont} _____

Spreading Vectors Rd _____

Habitat ^{La} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Scattered plants appear to be planted along roadsides as part of road development, not exhibiting invasive characteristics.

Transect/Plot ⁶⁻² _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Mimosa	single	single plant

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors Rd _____

Habitat ^{FoM} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Scattered plants may occur along roadsides as part of road development, not exhibiting invasive characteristics. Some evidence of die-back from Mimosa tree blight (Fusarium).

Invasive Plant Species Survey Field Data Form

Date: 7/24/2013

Transect/Plot 8-5

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Mimosa	<5%	6 trees
Tree of Heaven	.40 acre	46 trees
English Ivy	.02 acre	
Autumn Olive	<1%	Single Plant

Level of Infestation MOD

Patch Shape Mx

Spreading Vectors La

Habitat FoM

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments
Single Plants. Scattered plants may occur along roadside and wood side edges, not exhibiting invasive characteristics.

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Invasive Plant Species Survey Field Data Form

Date: 8/6/2013

Transect/Plot ³⁻⁴ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants
Chinese lespedeza	<1%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{B/D} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, scattered plants throughout the housing area

Transect/Plot ³⁻⁵ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants
Mimosa	<1%	Single Plant
Chinese lespedeza	<1%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{B/D} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, scattered plants throughout the housing area

Transect/Plot ⁴⁻⁴ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants
Chinese lespedeza	<1%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{B/D} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, scattered plants throughout the housing area

Transect/Plot ⁴⁻⁶ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	single	single plant

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors Rd _____

Habitat ^{La} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
Scattered plants may occur along roadsides, may have been planted as part of the road development.

Invasive Plant Species Survey Field Data Form

Date: 8/6/2013

Transect/Plot ⁴⁻⁹ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
mimosa	<1%	Single Plants

Level of Infestation ^{N/S} _____

Patch Shape ^{point} _____

Spreading Vectors Rd _____

Habitat ^{FoM} _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments
along roadside

Transect/Plot ⁵⁻⁹ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
phragmites	6-25%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{Fi/Wetland} _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments
along wetland edge, part of the same area that extends to transect # 5-10.

Transect/Plot ⁵⁻¹⁰ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
phragmites	6-25%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{Fi/Wetland} _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments
along wetland edge, wetland area to be displaced by training development project (~November 2013).

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Invasive Plant Species Survey Field Data Form

Date: 8/6/2013

Transect/Plot ²⁻⁴ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants
Chinese Lespedeza	<1%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{La} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, the housing area is becoming over run with expanding clumps of Autumn Olive and open areas are starting to fill-in with Chinese lespedeza.

Transect/Plot ²⁻⁵ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants
Chinese Lespedeza	<1%	Scattered Plants

Level of Infestation ^{MOD} _____

Patch Shape ^L _____

Spreading Vectors ^{La} _____

Habitat ^{B/D} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, linear, individual Autumn Olive plants and scattered patches of Chinese lespedeza.

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Transect/Plot ²⁻⁷ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	6-25%	Scattered Plants

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
all along road, scattered plants along roadsides.

Invasive Plant Species Survey Field Data Form

Date: 8/14/2013

Transect/Plot 11-9

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	26-50%	Moderate
Autumn Olive	<1%	Single Plant

Level of Infestation Moderate

Patch Shape Linear/Patch

Spreading Vectors La

Habitat FoM

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments
Large Kudzu patch behind housing area.

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Invasive Plant Species Survey Field Data Form

Date: 9/11/2013

Transect/Plot ¹⁻³ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Tree of Heaven	<1%	Single Tree

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors _____

Habitat ^{BD} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Transect/Plot ¹⁻⁵ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Autumn Olive	<1%	Single Plant

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors _____

Habitat ^{BD} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Transect/Plot ¹⁻⁹ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Chinese Privet		

Level of Infestation ^{N/S} _____

Patch Shape ^{Point} _____

Spreading Vectors _____

Habitat ^{BD} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments

Transect/Plot ²⁻³ _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Phragmites	>75%	Majority

Level of Infestation ^{LG} _____

Patch Shape ^{Patch} _____

Spreading Vectors ^{La} _____

Habitat ^{Wet} _____

Photograph: **Photographer** _____

Photo No. _____ **Direction** _____

GPS: Offset Yes No **Direction** _____

Comments
Large phragmites patch across wetland behind housing.

Invasive Plant Species Survey Field Data Form

Date: 9/11/2013

Transect/Plot 8-16

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	SinMajority
Chinese Lespedeza	1-5%	Scattered Plants

Level of Infestation LG

Patch Shape Patch

Spreading Vectors La

Habitat FOI

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot 11-8

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density
Kudzu	>75%	Majority

Level of Infestation LG

Patch Shape Patch

Spreading Vectors La

Habitat FOI

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

Transect/Plot _____

Are any invasive plants present? Yes No

Invasive Plants Observed	Cover Class	
	Abundance/Coverage	Density

Level of Infestation _____

Patch Shape _____

Spreading Vectors _____

Habitat _____

Photograph: Photographer _____

Photo No. _____ Direction _____

GPS: Offset Yes No Direction _____

Comments

APPENDIX D
Invasive Species Fact Sheets

Invasive Alien Plant Species of Virginia

Asiatic Sand Sedge (*Carex kobomugi*) Ohwi

Description

Asiatic sand sedge is a perennial sedge which grows to about a foot in height. The stem is triangular, and the base of the stem is covered with brown scales. Young leaves are yellow-green in color and stiff with a rough texture along their edges. Older, basal leaves are somewhat wider, darker green in color and leathery to the touch. The leaves are often taller than the flowering heads of the plant. Flowering heads are either male or female, and are crowded into dense clusters at the tops of the stems. Female flower clusters are longer and more slender than the more cylindrical male flower clusters. The fruits are triangular nutlets known as achenes and are enclosed in a papery sac surrounded below by scales and bracts. Asiatic sand sedge spreads rapidly by underground stems.



Asiatic Sand Sedge (*Carex kobomugi*)

Distribution

Asiatic sand sedge is an east Asian native which was introduced into coastal sands from New Jersey to Virginia in the 1930's for erosion control and as a sand stabilizer. The plant is typically found on coastal dunes and berms, although it is also occasionally found in dry, sandy inland areas. In Virginia, it was introduced into the Sandbridge area and has recently been documented in Accomack County and the cities of Virginia Beach and Chesapeake. Its tolerance for salt spray and high winds allows it to survive in dune habitats occupied by unique native vegetation.

Threats

The stems of Asiatic sand sedge form low, dense mats in dunes which crowd out native dune species such

as American beach grass, coastal spurge, sea oats, and sea-coast marsh elder. Once established, Asiatic sand sedge dramatically changes the profile of a dune. Tall, native plants such as sea oats buffer the dune from the strong forces of wind and salt spray. When native plants are crowded out by the low-growing Asiatic sand sedge, the dunes are vulnerable to shifting sands and blowouts.

Control

Early detection of this invasive plant is important for successful control, as small populations are easier to manage than larger ones. Removal by pulling or digging out the plants is recommended only for very small infestations. Large patches of this invasive are best controlled by the application of a biodegradable glyphosphate herbicide to individual

plants. Herbicide application is best accomplished at the end of the growing season when plants are actively transporting nutrients from stems and leaves to root systems. Glyphosphate herbicides affect all green vegetation and should be used sparingly so as not to contact desirable species which may be growing with the Asiatic sand sedge. As with hand pulling control methods, follow-up treatments may be needed in subsequent years to remove plants that have sprouted from remaining seeds.

Reference

Fernald, M. L. 1950. Gray's Manual of Botany, eighth edition. American Book Company, New York. 1632 pp.

For more information, contact the Department of Conservation and Recreation, or the Virginia Native Plant Society.



1500 East Main Street, Suite 312
Richmond, VA 23219



Virginia Native Plant Society
P.O. Box 844
Annandale, VA 22003

Invasive Alien Plant Species of Virginia

Autumn Olive (*Elaeagnus umbellata* Thunberg)

Russian Olive (*Elaeagnus angustifolia* L.)

Description

Autumn olive is a deciduous shrub or small tree in the Oleaster family. Leaves are alternate, oval to lanceolate, and untoothed. The underside of the dark green leaf is covered with silver-white scales. The plant may grow to a height of 20 feet. The small, light yellow flowers are borne along twigs after the leaves have appeared early in the growing season. The small, round, juicy fruits are reddish to pink, dotted with scales, and produced in great quantity. Autumn olive is easily confused with a closely related species, Russian olive (*Elaeagnus angustifolia*), which is also an invasive species. Russian olive has elliptic to lanceolate leaves, its branches are usually thorny, and its fruit is yellow, dry and mealy. Identification should be confirmed by a specialist.

Habitat

Autumn olive has nitrogen-fixing root nodules which allow it to thrive in poor soils. Typical habitats are disturbed areas, roadsides, pastures and fields in a wide range of soils. Autumn olive is drought tolerant and may invade grasslands and sparse woodlands. It does not do well on wet sites or in densely forested areas.

Russian olive can be found in dry to moist soils, but does particularly well in sandy floodplains.

Distribution

Autumn olive was introduced to the United States from east Asia in the 1830s. It is found from Maine south to Virginia, and west to Wisconsin. Autumn olive was planted in the eastern and central United States for revegetation of disturbed areas. Birds forage on its fruit and contrib-

ute to seed dispersal. It is widely distributed in Virginia, having been recorded in 46 counties.

Russian olive, native to Eurasia, was planted as an ornamental and escaped cultivation in the central and western United States. At this time, Russian olive is rare in Virginia, where it has been reported only from Accomack, Fairfax, Northumberland and Warren counties.

Threats

Autumn olive is a very troublesome invasive species in Virginia. In addition to its prolific fruiting, seed dispersal by birds, rapid growth and ability to thrive in poor soil, Autumn olive resprouts vigorously after cutting or burning. It creates heavy shade which suppresses plants that require direct sunlight.

Although rare in Virginia, Rus-



Autumn Olive (*Elaeagnus umbellata*)

sian olive poses similar threats. In the western United States it has be-

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219
(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

Invasive Alien Plant Species of Virginia

Autumn Olive Russian Olive

come a major problem in riparian woodlands, threatening even large, hardy native plants such as cottonwood.

Control

Seedlings and sprouts can be hand-pulled when the soil is moist to insure removal of the root system. On larger plants, cutting alone results in thicker, denser growth. Burning during the dormant season also results in vigorous resprouting.

A glyphosate herbicide can be used to control larger plants. Foliar application has proven effective in controlling these species. Since glyphosate is nonselective and will affect all green vegetation, care should be taken to avoid impacting native plant species. At sites where this is a concern, application of the herbicide to the freshly cut stumps of the invasive shrub should achieve the desired results. This method

minimizes damage to other plants. Glyphosate herbicides are recommended because they are biodegradable, breaking down into harmless components on contact with the soil. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. Consult an agricultural extension agent or a natural resource specialist for more details on herbicide control measures.

Suggested Alternative Plantings

There are many native species which are attractive as ornamentals, stabilize soils, and provide food and cover for wildlife. Winterberry (*Ilex verticillata*), black haw (*Viburnum prunifolium*), gray dogwood (*Cornus racemosa*) and shining sumac (*Rhus copallina*) all provide a winter source of food for birds.

Serviceberry (*Amelanchier* spp.) blooms early in the spring and its fruits are quickly eaten by birds. Other alternatives are evergreens such as American holly (*Ilex opaca*), bayberry (*Myrica pennsylvanica*) and wax myrtle (*Myrica cerifera*). All are available at local nurseries.

References

Alliance for the Chesapeake Bay. 1993. Environmentally Sound Landscape Management for the Chesapeake Bay.

Eckardt, N. 1987. *Elaeagnus umbellata*-Autumn olive. Element Stewardship Abstract. The Nature Conservancy, Minneapolis.

Harvill, A., et. al. 1992. Atlas of the Virginia Flora. Virginia Botanical Associates. Burkesville.

Szafoni, B. 1994. Autumn olive (*Elaeagnus umbellata*). Vegetation Management Guideline, Vol. 1, No. 3, Illinois Department of Conservation, Charleston.

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219
(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

U.S. National Early Detection and Rapid Response System for Invasive Plants

EDRR Fact Sheet

Randy G. Westbrooks, U.S. Geological Survey. Whiteville, North Carolina. USA.

Common Name: Beach Vitex

Scientific Name: *Vitex rotundifolia* L. f

Family: Verbenaceae

Description: A deciduous woody vine that grows up to 12 or more feet in diameter, and can produce rooting runners up to 60 feet long. **Leaves** round, silvery gray-green, 1-2 in. long, with a spicy fragrance. **Flowers** purplish-blue, 1 in. in width, produced in small clusters at the ends of branches. **Fruits** round, 1/4 in. in diameter, purplish-black when ripe. Reproduction is by seeds and by stem fragments that root at the nodes.



Habitat: Beach vitex occurs naturally on oceanfront dunes in its native range. It prefers sandy soil, but will grow well in a variety of soil types and climates.

Native Range: China, Korea, Taiwan, and Japan south to Malaysia, India, Sri Lanka, Mauritius, and Australia.

NOTE: Beach vitex is also said to be native to Hawaii (Wagner et al. 1999). However, due to the extreme isolation of this island chain, Beach vitex was, no doubt, unintentionally introduced there through human activities at some time in the past.

Pathways of Introduction and Spread: Beach vitex was introduced to the Southeastern United States in the mid-1980's by the N.C. State University Arboretum for use as an ornamental and for coastal dune stabilization. By the mid-1990's, dune restoration specialists with the U.S. Army Corps of Engineers began to notice beach vitex spreading from original plantings on South Carolina beaches, crowding out native dune plants, spreading along beaches by seeds and vegetative fragments. The brittle stems tend to break off during high tides and are carried away by long shore currents to infest new areas.

U.S. and Canada Distribution:

Ecological and Economic Impacts: Beach vitex forms monoculture infestations that displace native beach dune species and degrade sea turtle habitat. The plant also releases allelopathic compounds from the root system that inhibits the growth of other plants. Due to chemical alkanes (hydrocarbons with single bonds between the atoms) in the cuticles of leaves and fruits, soil beneath the plant becomes strongly hydrophobic. This prevents the establishment and growth of other plants. In addition to being drought tolerant, salt tolerant, and fast-growing, beach vitex is a prolific seed producer. Seed production can be as high as 10,000 to 20,000 seeds per square meter. The round



seeds are rolled along the beach by strong winds, and are move to other areas by long shore currents. Beach vitex is also a major threat to sea turtle reproduction. The roots grow around sea turtle nests and sometimes prevent hatchlings from emerging. Hatchlings that do emerge can become trapped in the thick tangle of vegetation and perish before reaching the ocean.

Control Strategies: Experience has shown that it is difficult – *if not impossible* - to remove single plants or scattered populations of Beach Vitex plants by hand –the plant readily grows back from roots that remain deep in the soil. The only effective way to eliminate the plant is to cut back the plant to the surface and treat the cut stumps with an approved herbicide such as imazapyr (Habitat and others). Plants that are cut for removal should be properly disposed of to avoid infesting new areas.

Regulatory Status: Beach vitex is regulated as a state noxious weed in the coastal counties of North Carolina and Virginia.

Town/County Ordinances that prohibit the planting of Beach Vitex have been established by Bald Head Island, Caswell Beach, Ocean Isle Beach, North Topsail Beach, Topsail Island, and Pine Knoll Shores in North Carolina. Ordinances have been established in Pawleys Island, Georgetown County, Isle of Palms, Kiawah Island, Folly Beach, and the Town of Edisto Beach, in South Carolina.

A Weed Risk Assessment was conducted for listing Beach Vitex as a U.S. Federal Noxious Weed in 2006. *However, it has not been officially listed as an FNW because it is considered by some scientists to be native to Hawaii**.* Otherwise, Beach vitex meets the definition of a quarantine significant pest because it occupies a very small portion of its potential ecological range in the United States, and because it poses a serious threat to certain natural and biological resources (the stability of ocean front dunes and the plant and animal communities that occupy them), as well as the value of beach front property.

Based on the APHIS Weed Risk Assessment, the overall pest risk potential of beach Vitex in the United States is **medium-high**. The likelihood of introduction is **high**. The consequences of introduction are **medium**, since the plant has serious environmental impacts, but a low potential for economic impacts on agricultural production systems. But, if permitted to spread unabated, the plant could have a very significant impact on the value of beachfront properties in the Carolinas and elsewhere.

Wagner, W., D. Herbst, and S Shomer. 1999. Manual of the Flowering Plants of Hawaii. University of Hawaii Press. Bishop Museum Press. Volume 1 – 988 pp. Volume 2 - 1919 pp.

Online Resources:

Beach Vitex Task Force Website.

URL: <http://www.beachvitex.org/>

Beach Vitex Image - U-GA Bugwood Image Gallery.

URL: <http://www.invasive.org/species/subject.cfm?sub=11609>

Beach Vitex Profile - USDA Plants Database.

URL: <http://plants.usda.gov/java/profile?symbol=VIRO80>

Invasive Alien Plant Species of Virginia

Chinese Lespedeza (*Lespedeza cuneata* (Dumont) G. Don)

Description

A member of the pea family, Chinese lespedeza is an herbaceous to somewhat woody perennial. Stems have numerous ascending branches which may grow 3 to 5 feet high. Leaves are compound; each leaf has three leaflets. Leaflets are wedge-shaped to oblong, and are green or sometimes silvery. Flowers occur close to the stem at the bases of the upper and median leaves. The flowers may be solitary or in clusters of 2 - 4. Petals are less than half an inch long, creamy white with violet-purple streaks or veins. The seed pod, called a legume, is flattened and oval. Another common name for Chinese lespedeza is sericea, a name which refers to the silky silvery undersides of the leaves.

Habitat

Chinese lespedeza is commonly found in sparse woodlands, fields, meadows, roadsides and disturbed open ground. Chinese lespedeza may form dense stands on sterile eroded slopes. It is drought-resistant.

Distribution

This plant was first introduced into the southern United States from eastern Asia. It has been used for erosion control, soil improvement, and as a source of food and cover

for wildlife. Chinese lespedeza has spread throughout the south and parts of the Midwest. In Virginia, it is found in most of the state, but is particularly common in the piedmont and coastal plain.

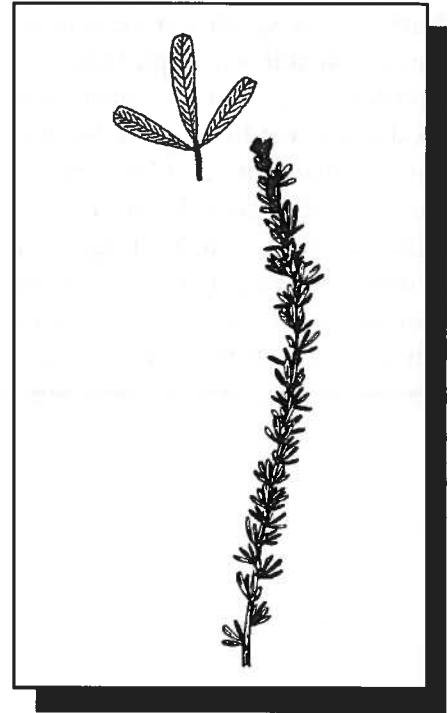
Threats

Chinese lespedeza forms dense stands which choke out native plant species. Like many other members of the pea family, it adds nitrogen to the soil resulting in a richer soil. This may encourage further infestation by other non-native plant species to the exclusion of native species adapted to poor soil conditions.

Control

Chinese lespedeza's root reserves are low during the flower bud period. Mowing at this time will reduce plant vigor and prevent the production of more seed. This process repeated for 2 - 3 years should reduce the intensity of the infestation.

Foliar application of a glyphosate herbicide is effective late in the growing season while plants are still green. Glyphosate herbicides are recommended because they are biodegradable. However, glyphosate is a nonselective systemic herbicide that affects all green vegetation. To be safe and effective herbicide use requires careful knowledge of the chemicals, appropriate concentra-



Chinese Lespedeza (Lespedeza cuneata (Dumont) G. Don)

tions, and the effective method and timing of their application.

Chinese lespedeza seeds can remain viable in the soil for many years. Fire appears to break seed dormancy in Chinese Lespedeza in seedlings with lower viability. Therefore, prescribed burning used to force the seeds to germinate followed by mechanical or chemical treatments may provide long term control.

Contact an agricultural extension agent or natural resource specialist for more information.

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES
203 Governor Street, Richmond, VA 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>

Invasive Alien Plant Species of Virginia

Chinese Lespedeza (*Lespedeza cuneata* (Dumont) G. Don)

Alternatives to Chinese Lespedeza

Native plant species are commercially available which provide erosion control, soil improvement, and food and cover for wildlife but are not invasive to natural landscapes. Roundheaded bushclover (*Lespedeza capitata*) and partridge pea (*Cassia fasciculata*) are two native species which enrich the soil with nitrogen as well as provide forage

for wildlife. Big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and sideoats grama (*Bouteloua curtipendula*) are native warm season grasses which provide food and cover for wildlife such as quail, rabbit and songbirds.

More information on native warm season grasses recommended for wildlife can be obtained from the Virginia Department of Game and

Inland Fisheries, P.O. Box 11104, Richmond, VA 23230-11041.

For more information on this and other invasive plant species, contact the Virginia Native Plant Society or the Virginia Department of Conservation and Recreation at the addresses below.

Illustration from *New Britton & Brown Illustrated Flora of the Northeast U.S. and Adjacent Canada*, by H.H. Gleason, New York Botanical Gardens Scientific Publications. Used with permission.

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES
203 Governor Street, Richmond, VA 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>

Invasive Alien Plant Species of Virginia

Chinese Privet (*Ligustrum sinense*)

Description

A member of the olive family, Chinese privet is a shrub which can grow to twelve feet in height. Leaves are oval or elliptical, two inches long, and opposite. Chinese privet is distinguished from other privets by the presence of fine hairs on the twigs and underside of leaves. Small, white, four-petaled flowers grow in clusters at the ends of branches. The fleshy blue fruits, less than a quarter-inch in diameter, contain a hard seed. Several other privet species have been introduced into Virginia, but none have proven as invasive as Chinese privet.

Habitat

Chinese privet prefers wet damp habitat. It is usually found in low woods, bottomlands, streamsides, and disturbed areas.

Distribution

Native to China, Chinese privet is found in Virginia, North Carolina, Georgia, Tennessee, and Kentucky. This plant is found throughout most of Virginia.

Threats

Chinese privet can dominate the shrub layer of an invaded habitat, thus altering species composition and natural community structure by choking out native plant species. It shades out all herbaceous

plants. Thousands of acres have been invaded by Chinese privet in North Carolina.

Control

Controlling plants by hand is effective for plants with stems one inch or less in diameter. The entire root must be removed. Mechanical methods such as cutting or plowing will result in an increase of growth.

Chinese privet can be controlled with use of a glyphosate herbicide. Glyphosate herbicides are recommended because they are biodegradable. However, glyphosate is a nonselective systemic herbicide that affects all green vegetation. To be safe and effective herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. For Chinese privet, a foliar application in late summer is recommended. To avoid killing desirable plant species, spray in late fall after most natives have dropped their leaves. A combination of cutting followed immediately by application of glyphosate to the stump is reported to be the most effective in ensuring control.

For more information on native plant conservation, contact the



Chinese Privet (*Ligustrum sinense*)

Virginia Native Plant Society at the address below. For information on Virginia's natural areas and natural heritage resources contact the Virginia Department of Conservation and Recreation's Division of Natural Heritage (see address below).

Illustration from *New Britton and Brown Illustrated Flora of the Northeast U.S. and Adjacent Canada*, by H.H. Gleason, New York Botanical Gardens Scientific Publications. Used with permission.

12/97

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



217 Governor Street, Richmond, Virginia 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society
Blandly Experimental Farm
400 Blandly Lane, Unit 2
Boyce, Virginia 22620
(540) 837-1600
<http://www.vnps.org>

Invasive Alien Plant Species of Virginia

Common Reed (*Phragmites australis*)

Description

Common reed is a tall perennial wetland grass ranging in height from three to thirteen feet. Strong leathery horizontal shoots, called rhizomes, growing on or beneath the ground surface give rise to roots and tough vertical stalks. These stalks support broad sheath-type leaves that are one-half to two inches wide near the base, tapering to a point at the ends. The foliage is gray-green during the growing season, with purple-brown plumes appearing by late June. The plant turns tan in the fall and most leaves drop off, leaving only the plume-topped shoot. Big cordgrass (*Spartina cynosuroides*), a non-invasive species, is sometimes confused with common reed. It can be distinguished from common reed by its sparse flowering structure and long narrow leaves.

Habitat

Common reed thrives in sunny wetland habitats. It grows along drier borders and elevated areas of brackish and freshwater marshes and along riverbanks and lakeshores. The species is particularly prevalent in disturbed or polluted soils found along roadsides, ditches and dredged areas.

Distribution

Found throughout the temperate regions of North America, common reed is widespread in eastern Virginia and also can be found in some western areas of the state. It is

strongly suspected that a non-native, aggressive strain of the species was carried to North America in the early 20th century.

Life History

Common reed spreads to a new area by sprouting from a rhizome fragment or from seed. New upright stems grow from the rhizome each spring. Rhizomes spread horizontally in all directions during the growing season. Flowering begins in late June, and seeds are formed by August. In early autumn, food reserves move from leave and stems to the rhizome system. The leaves die and fall off, with only the dead brown vertical shoots remaining. The accumulation of dead leaves and stems, as well as the pervasive rhizome system, prohibits the growth of desirable plant species.

Threats

Common reed has become a destructive weed in Virginia, quickly displacing desirable plants species such as wild rice, cattails, and native wetland orchids. Invasive stands of common reed eliminate diverse wetland plant communities, and provide little food or shelter for wildlife.

Prevention

Minimizing land disturbances and water pollution helps deter this invasive species. Land management practices that guard against erosion, sedimentation, fluctuating water

levels and nutrient loading in wetlands are the best long-term protection.

Control

Once established, common reed is very difficult to completely eradicate.

However, careful planning and long-term management can yield varying levels of control. Herbicide use in combination with burning has generally proven to be the most effective means of control, and results in minimal disturbance to wetlands. Only a biodegradable herbicide that is licensed for use in wetlands and non-toxic to animals can be used. Because a healthy wetland ecosystem is generally resistant to invasive species, long-term control of common reed depends upon restoration of the health of the ecosystem.

For more information on native plant conservation, contact the Virginia Native Plant Society at the address below. For information on Virginia's natural areas and natural heritage resources, contact the Virginia Department of Conservation and Recreation's Division of Natural Heritage (see address below).

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

217 Governor Street, Richmond, Virginia 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society
Blandly Experimental Farm
400 Blandly Lane, Unit 2
Boyce, Virginia 22620
(540) 837-1600
<http://www.vnps.org>



English Ivy

Hedera helix L.

Ginseng family (Araliaceae)

NATIVE RANGE

Europe, western Asia, and northern Africa

DESCRIPTION

English ivy is an evergreen climbing vine that attaches to the bark of trees, brickwork, and other surfaces by way of small rootlike structures which exude a sticky substance that helps the vines adhere to various surfaces. Older vines have been reported to reach 1 foot in diameter. Leaves are dark green with white veins, waxy to somewhat leathery, and arranged alternately along the stem. Leaf forms include a 3 to 5-lobed leaf (the most common) and an unlobed rounded leaf often found on mature plants in full sun that are ready to flower. Vines may grow for up to ten years before producing flowers. Under sufficient light conditions, terminal clusters of small, pale yellow-green flowers are produced in the fall. The flowers are attractive to flies and bees in search of late season nectar sources. The black-purple fruits have a thin fleshy outer covering, contain one to three hard, stone-like seeds and may persist through the winter if not eaten first.



NOTE: The leaves and berries of English ivy contain the glycoside hederin which could cause toxicosis if ingested. Symptoms include gastrointestinal upset, diarrhea, hyperactivity, breathing difficulty, coma, fever, polydipsia, dilated pupils, muscular weakness, and lack of coordination. This feature also helps ensure effective seed dispersal by birds.

Poison ivy may be confused with English ivy in the winter because they both have hairy stems. However, poison ivy is deciduous and has no leaves during the winter time (English ivy has leaves all year round). During the growing season the three-leaved foliage and clusters of whitish berries help to distinguish poison ivy.

ECOLOGICAL THREAT

English ivy is a vigorous growing vine that impacts all levels of disturbed and undisturbed forested areas, growing both as a ground cover and a climbing vine. As the ivy climbs in search of increased light, it engulfs and kills branches by blocking light from reaching the host tree's leaves. Branch dieback proceeds from the lower to upper branches, often leaving the tree with just a small green "broccoli head". The host tree eventually succumbs entirely from this insidious and steady weakening. In addition, the added weight of the vines makes infested trees much more susceptible to blow-over during high rain and wind events and heavy snowfalls. Trees heavily draped with ivy can be hazardous if near roads, walkways, homes and other peopled areas. On the ground, English ivy forms dense and extensive monocultures that exclude native plants. English ivy also serves as a reservoir for Bacterial Leaf Scorch (*Xylella fastidiosa*), a plant pathogen that is harmful to elms, oaks, maples and other native plants.



DISTRIBUTION IN THE UNITED STATES

English ivy has been reported to be invasive in natural areas in 18 states and the District of Columbia.

HABITAT IN THE UNITED STATES

English ivy infests woodlands, forest edges, fields, hedgerows, coastal areas, salt marsh edges, and other upland areas, especially where some soil moisture is present. It does not grow well in extremely wet conditions and tolerates a wide range of soil pH but prefers slightly acid (pH=6.5). English Ivy is often associated with some form of land disturbance, either human-caused or natural.

BACKGROUND

English ivy was probably first introduced to the U.S. by European immigrants for its ornamental appeal. It persists as a popular plant for homeowners, businesses, landscape designers and others. Cooperative Extension offices continue to recommend English ivy for use as a low maintenance alternative to lawns because it is evergreen, relatively pest free, very cold hardy and fast-growing groundcover that requires little care once established.



BIOLOGY & SPREAD

English ivy spreads locally through vegetative growth and new plants can grow from cut or broken pieces of stems that are able to root in the soil. It disperses longer distances via seed which is carried to new areas by frugivorous birds including the Cedar Waxwing, Northern Robin, Stellar Jay, Mockingbird, European Starling, and House Sparrow.

MANAGEMENT OPTIONS

Manual, mechanical and chemical control methods are all effective in removing and killing English ivy. Employing a combination of methods often yields the best results and may reduce potential impacts to native plants, animals and people. The method you select depends on the extent and type of infestation, the amount of native vegetation on the site, and the time, labor and other resources available to you. Whenever possible and especially for vines climbing up trees or buildings, a combination of cutting followed by application of concentrated systemic herbicide to rooted, living cut surfaces is likely to be the most effective approach. For large infestations of ivy spanning extensive areas of ground, a foliar herbicide may be the best choice rather than manual or mechanical means which could result in soil disturbance.

Biological

There are no biological controls currently available for English ivy.



Chemical

Systemic herbicides like triclopyr (e.g., Garlon® 3A and Garlon® 4) and glyphosate (e.g., Accord®, Glypro®, Rodeo®) are absorbed into plant tissues and carried to the roots, killing the entire plant within about a week. The evergreen nature of English ivy means that it continues to grow through the winter months although at a reduced rate. Herbicide applications can be made any time of year as long as temperatures are above 55 or 60 degrees Fahrenheit for several days and rain is not expected for at least 24 hours. Fall and winter applications will avoid or minimize impacts to native plants and animals. Repeated treatments are likely to be needed. Follow-up monitoring should be conducted to ensure effective control. Herbicidal contact with desirable plants should always be avoided. In areas where spring wildflowers or other native plants are interspersed, application of herbicides should be conducted prior to their emergence, or delayed until they have died back. If native grasses are intermingled with the ivy, triclopyr should be used because it is selective for broad-leaved plants and will not harm grasses.

Glyphosate products referred to in this fact sheet are sold under a variety of brand names (Accord®, Rodeo®, Roundup Pro® Concentrate) and in three concentrations (41.0, 50.2 and 53.8% active ingredient). Other glyphosate products sold at home improvement stores may be too dilute to obtain effective control. Triclopyr comes in two forms – triclopyr amine (e.g., Garlon® 3A, Brush-B-Gone®, Brush Killer®) and triclopyr ester (e.g., Garlon® 4, Pathfinder®, and Vinex®). Because Garlon® 3A is a water-soluble salt that can cause severe eye damage, it is imperative that you wear protective goggles to protect yourself from splashes. Garlon® 4 is soluble in oil or water, is highly volatile and can be extremely toxic to fish and aquatic invertebrates. It should not be used in or near water sources or wetlands and should only be applied under cool, calm conditions.

Basal bark application

Use a string trimmer or hand saw to remove some of the foliage in a band a few feet from the ground at comfortable height. To the exposed stems, apply a 20% solution of triclopyr ester (Garlon® 4) (2.5 quarts per 3-gallon mix) in commercially available basal oil with a penetrant (check with herbicide distributor) to vine stems. As much as possible, avoid application of herbicide to the bark of the host tree. This can be done year-round although efficacy may vary seasonally; temperatures should be above 50° F for several days.

Cut stem application

Cut each vine stem close to the ground or at a comfortable height and cut again a little higher up. Remove cut pieces to make a vine-free band around the tree trunk. The upper portions of cut vines will eventually die, rot and fall off the host tree. To the freshly cut surfaces of the living rooted stems apply a 25% solution of triclopyr amine (Garlon® 3A) or glyphosate (e.g., Accord®) mixed in water. Homeowners can apply products like Brush-B-Gone®, Brush Killer® and Roundup Pro Concentrate® undiluted to cut stems. Using a paint brush or a plastic spray bottle, apply herbicide to the cut surface especially the perimeter inside the bark which is the living portion of plant.



Foliar application

From summer to fall, apply 2 to 5% solution (8 to 20 oz. per 3-gallon mix) of triclopyr ester (Garlon® 4) mixed in water with a non-ionic surfactant to the leaves. Thoroughly wet the foliage but not to the point of runoff. Some control may be achieved with glyphosate as a 2 to 4-percent solution (8 to 16 oz. per 3-gallon mix) mixed in water with a 0.5 to 1.0 % non-ionic surfactant, but repeat applications are likely to be necessary. During foliar applications some of the herbicide is also absorbed through the stem for additional (basal bark) effect. Because English ivy is evergreen, the ideal time to treat it is during mild spells in winter when most native plants are dormant, to avoid affecting non-target species. However, winter treatments may be less effective than summer through fall applications.

Manual and Mechanical

Vines growing as groundcover can be pulled up by hand, with some difficulty, and left on-site or bagged and disposed of as trash. Always wear gloves and long sleeves to protect your skin from poison ivy and barbed or spined plants. For climbing vines, first cut the vines near the ground at a comfortable height to kill upper portions and relieve the tree canopy. A large screw driver or forked garden tool can be used to pry and snap the vines away from the tree trunks. Vines can be cut using a hand axe or pruning saw for larger vines or a pruning snips for smaller stems. Try to minimize damage to the bark of the host tree. Rooted portions will remain alive and should be pulled, repeatedly cut to the ground or treated with herbicide. Because cutting will likely result in vigorous regrowth, vigilance is required to ensure long term control.

Mulching

Mulching may be an effective choice for smaller infestations when herbicides are not appropriate. Cover the entire infestation with several inches of mulch. This may include wood chips, grass clippings, hay or similar degradable plant material. Shredded or chipped wood may be the best option since hay and grass may potentially carry weed seeds. Covering the area with cardboard may improve the effectiveness and longevity of this method. The mulch should stay in place for at least two growing seasons and may need to be augmented several times. Mulching can also be done following herbicide treatment.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS

For more information on the management of English ivy, please contact:

- * Jil Swearingen, National Park Service, jil_swearingen@nps.gov
- * Sandra Diedrich, sdivy@teleport.com
- * Kris Johnson, National Park Service, kris_johnson@nps.gov
- * Sue Salmons, National Park Service, sue_salmons@nps.gov
- * Ron Dean, National Park Service, ron_dean@nps.gov
- * James Akerson, National Park Service, james_akerson@nps.gov

SUGGESTED ALTERNATIVE PLANTS

A wide variety of attractive and ecologically adapted and beneficial native plants can be substituted for English ivy. Select plants adapted to the level of light available on the site (i.e., full sun, shade, part-shade). Plants that will eventually spread to cover an area of ground include flowering plants like eastern prickly pear cactus (*Opuntia humifusa*), blue phlox (*Phlox*

divaricata), wild ginger (*Asarum canadense*), Allegheny spurge (*Pachysandra procumbens*), and green and gold (*Chrysogonum virginianum*); ferns like Christmas fern (*Polystichum acrostichoides*), northern maidenhair fern (*Adiantum pedatum*), northern lady fern (*Athyrium filix-femina*), sensitive fern (*Onoclea sensibilis*), and cinnamon fern (*Osmunda cinnamomea*); grasses like red fescue (*Festuca rubra*), wild oats (*Chasmanthium latifolium*), bottlebrush grass (*Elymus hystrix*) and switch grass (*Panicum virgatum*); and sedges like Pennsylvania sedge (*Carex pennsylvanica*) and tussock sedge (*Carex stricta*). Native vines that are good replacements for English ivy include trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), passionflower vine (*Passiflora lutea*), Dutchman's pipe (*Aristolochia macrophylla*), and native wisteria (*Wisteria frutescens*)*.

*NOTE: If you wish to plant wisteria, make certain that it is the native species. Two commonly planted ornamental wisterias, Chinese wisteria (*Wisteria sinensis*) and Japanese wisteria (*Wisteria floribunda*), are exotic and aggressive invaders. Please consult the native plant society in your state for more information on species native to your particular area.

OTHER LINKS

- <http://www.invasive.org/search/action.cfm?q=Hedera%20helix>
- http://www.hear.org/starr/hiplants/images/thumbnails/html/hedera_helix.htm

AUTHORS

Jil M. Swearingen, National Park Service, Washington, DC
Sandra Diedrich

REVIEWERS

James Akerson and Ron Dean

PHOTOGRAPHS

Jil M. Swearingen, National Park Service, Washington, DC

REFERENCES

- Animal Poison Control Center. <http://www.aspc.org/toxicplants/M01879.htm>
- Assiut University (Egypt). English ivy. <http://www.aun.edu.eg/distance/pharmacy/poison/hedera.htm>
- Collins, Christi. 1994. Some notes on *Hedera helix* The English ivy. The Nature Conservancy.
- Czarapata, E. J. 2005. Invasive plants of the upper midwest: an illustrated guide to their identification and control. The University of Wisconsin Press. 215 pp.
- Dirr, Michael A. 1990. Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation and uses. Stipes Publishing Company, Champaign, IL.
- Fernald, M.L. 1970. Gray's Manual of Botany. Eighth ed. D. Van Nostrand Co., New York, N.Y. p.1078.
- Harty, Francis M. 1993. How Illinois kicked the exotic species habit. In B.N. McKnight (ed.), Biological Pollution. Indiana Academy of Science, Indianapolis, Indiana. Pp. 195-209.
- Holloran, P., A. Mackenzie, S. Ferrell, & D. Johnson. 2004. The Weed Workers' Handbook: A Guide to Techniques for Removing Bay Area Invasive Plants. The Watershed Project and California Invasive Plant Council. 120 pp.
- Lewis, W.H., and M. Elvin-Lewis. 1977. Medicinal Botany: Plants Affecting Man's Health. John Wiley and Sons, Inc.
- McElrone, A., Sherald, J. L. and Pooler, M. R. Identification of alternative hosts of *Xylella fastidiosa* in the Washington, DC area using nested polymerase chain reaction (PCR). J. Arboric. (In press)
- Miller, James H. 2003. Nonnative invasive plants of southern forests: a field guide for identification and control. Gen. Tech. Rep. SRS-62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 p.

- Pennisi, B.V., et al. 2001. Commercial Production of English Ivy. University of Georgia College of Agriculture and Environmental Sciences. Bulletin 1206. <http://pubs.caes.uga.edu/caespubs/pubcd/B1206.htm>
- Radford, A.E., H.E. Ahles, and C. Ritchie Bell. 1968. Manual of the Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, NC. Pp. 758-9.
- Randall, J. M., and Marinelli, J. 1996. Invasive Plants: Weeds of the Global Garden. Brooklyn Botanic Garden, Handbook #149. p. 7-11.
- Salmons, S. 2000. Rock Creek Park Invasive Non-native Plant Mitigation Program, Final Report. January, 23 pp.
- Sherald, J. L. and Kostka, S. J. 1992. Bacterial leaf scorch of landscape trees caused by *Xylella fastidiosa*. J. Arboric. 18: 57-63.
- Slattery, B. E., K. Reshetiloff, and S. Zwicker. 2003. Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed. U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis MD. 82 pp. Call: (410) 573-4500.
- Southeast Exotic Pest Plant Council. 2004. Invasive Plant Control Manual.
- Swearingen, J. 2009. WeedUS Database of Plants Invading Natural Areas in the United States: English Ivy (*Hedera helix*). <http://www.invasive.org/weedus/subject.html?sub=3027>.
- Thomas, L.K., Jr. 1980. The Impact of Three Exotic Plant Species on a Potomac Island. National Park Service Scientific Monograph Series, no. 13. 179 pp.
- USDA, NRCS. 2009. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- Uphof, J.C.T. 1968. Dictionary of Economic Plants. J. Cramer Publishing Co., Lehre, Germany.
- Virginia Native Plant Society. 1995. Invasive Alien Plant Species of Virginia: English ivy (*Hedera helix*). Virginia Department of Conservation and Recreation.
- Virginia Native Plant Society Potomac Chapter. 2004. Native Alternatives to English Ivy.

Invasive Alien Plant Species of Virginia

Japanese Honeysuckle (*Lonicera japonica* Thunberg)

Description

Japanese Honeysuckle is a trailing or twining woody vine that can grow to more than 30 feet in length. Young stems are often hairy; older stems are hollow with brownish bark that may peel off in shreds. The simple, opposite leaves are oval to oblong in shape and range from 1.5 to 3 inches in length. In much of Virginia, leaves of Japanese honeysuckle are semievergreen and may persist on vines year-round. The extremely fragrant, two-lipped flowers are borne in pairs in the axils of young branches and are produced throughout the summer. Flowers range from 1 to 2 inches in length and are white with a slight purple or pink tinge when young, changing to white or yellow with age. The fruit is a many-seeded, black, pulpy berry that matures in early autumn. Japanese honeysuckle is distinct from our two native honeysuckles, the trumpet honeysuckle (*Lonicera sempervirens*), and wild honeysuckle (*Lonicera dioica*). These natives both bear red to orange-red berries, and their uppermost pair of leaves is joined together.

Habitat

Japanese honeysuckle occurs primarily in disturbed habitats such as roadsides, trails, fencerows, abandoned fields and forest edges. It often invades native plant communities after natural or human induced disturbance such as logging, roadbuilding, floods, glaze and windstorms, or pest and disease outbreaks.

Distribution

Japanese honeysuckle is native to eastern Asia. Introduced to cultivation in 1862 on Long Island, Japanese honeysuckle is now widely naturalized in the eastern and central United States. Japanese honeysuckle was, and in some areas still is, planted as an ornamental ground

cover, for erosion control, and for wildlife food and habitat. In Virginia, Japanese honeysuckle is naturalized statewide, being most abundant in piedmont and coastal plain forests.

Threats

Where light levels are optimal, such as in forest edges, canopy gaps or under sparse, open forest, newly established Japanese honeysuckle vines grow and spread rapidly. Suppressed vines growing in dense shade, however, are capable of rapid growth and spread when light levels in a habitat are increased by disturbance. In forests, Japanese honeysuckle vines spread both vertically and horizontally by climbing up tree trunks and/or by trailing or clamber-



Japanese Honeysuckle (*Lonicera japonica*)

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219
(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

Invasive Alien Plant Species of Virginia

Japanese Honeysuckle

ing over the forest floor and associated vegetation. Trailing vines produce stolons which root when they contact soil, aiding the vegetative spread and persistence of the species.

Dense, strangling growths of Japanese honeysuckle can impact desirable vegetation by decreasing light availability within the habitat, depleting soil moisture and nutrients, or by toppling upright stems through the sheer weight of accumulated vines. Negative effects of Japanese honeysuckle invasion include development of malformed trunks in trees, suppression of plant growth, inhibition of regeneration in woody and herbaceous plants, and alteration of habitats used by native wildlife.

Control

Small populations can be controlled by careful hand-pulling, grubbing with a hoe or a shovel, and removal of trailing vines. In old fields and roadsides, twice yearly mowing can slow vegetative spread, however, due to vigorous resprouting, stem density may increase.

In pine plantations or in fire-dependent natural communities, Japanese honeysuckle can be controlled

by prescribed burning. Burning can greatly decrease the abundance of Japanese honeysuckle within a habitat and limit its spread for one or two growing seasons.

Where prescribed burning or mowing is difficult or undesirable, Japanese honeysuckle may be treated with a glyphosate herbicide. Glyphosate is recommended because it is biodegradable and will begin to break down into harmless components on contact with the soil. However, it is nonselective and will affect all green vegetation. Therefore it is best applied to the semi-evergreen leaves with a spray or wick applicator in late autumn when other vegetation is dormant but Japanese honeysuckle is still physiologically active. Reapplication may be necessary to treat plants missed during the initial treatment. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. Consult a natural resource specialist for more information on herbicide use and prescribed burning techniques.

Suggested Alternatives

Some native alternatives to Japanese

honeysuckle for use in home landscaping include trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and trumpet honeysuckle (*Lonicera sempervirens*). Wild ginger (*Asarum canadensis*) makes an excellent ground cover in shady areas. All these species are easy to cultivate, have wildlife and aesthetic value, and can generally be obtained from commercial sources or propagated by wild-collected seeds or cuttings.

*Written by Dr. Charles E. Williams,
Department of Biology, Clarion
University*

References

- Evans, J. E. 1982. Japanese honeysuckle (*Lonicera japonica*): A literature review of management practices. *Natural Areas Journal* 4:4-10.
- Harvill, A. M., Jr., et al. 1992. *Atlas of the Virginia Flora*, 2nd ed. Virginia Botanical Associates. Farmville, Va.
- Sather, N. 1988. *Lonicera japonica*: Element stewardship abstract. The Nature Conservancy, Minneapolis.
- Spongberg, S. 1990. The first Japanese plants for New England. *Arnoldia* 50(3): 2-11.

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219
(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

Invasive Alien Plant Species of Virginia

Japanese Stilt Grass (*Microstegium vimineum*)

Description

Japanese stilt grass, also known as eulalia, is an annual grass which forms dense mats. The somewhat reclining stems grow up to 40 inches long and may root at the stem nodes. The lime green leaves, four to five inches in length and half an inch wide, taper at both ends. The inflorescence may be at the end of the stem, or arise from leaf axils. Japanese stilt grass is similar to jointed grass (*Arthraxon hispidus*), another invasive alien grass species. Consult a natural resource specialist for accurate identification.

Habitat

Japanese stilt grass prefers moist soils that are shaded from full sun. It is found in marshes, ditches, low woods, floodplains, woodland borders, damp fields, woodland thickets, lawns, and along streambanks, roadsides. Wet soils that have periods of standing water are not suitable for Japanese stilt grass, though its seeds can survive and germinate after extended periods of inundation.

Distribution

Native to Asia from India to Japan, Japanese stilt grass was first

discovered in the United States in 1919 in Tennessee. Since then, it has spread to all states east of the Mississippi and south of and including Connecticut. Japanese stilt grass was used as a packing material for porcelain from China, and this was the likely means of its introduction to our area. Japanese stilt grass is found in every county in Virginia.

Threats

Japanese stilt grass can spread rapidly following a disturbance such as flooding or mowing. Within three to five years it can form dense monotypic stands which crowd out native herbaceous vegetation. Although Japanese stilt grass does not produce prolific amounts of seed, a single plant typically giving rise to 100 to 1000 seeds, the seeds remain viable in the soil for three to five years. It is also well adapted to low light levels and is able to grow and produce seed in 5 percent of full sunlight.

Control

The best strategy for controlling Japanese stilt grass is removal of the plant by hand or mechanical means late in the growing season before seed production. This



Japanese Stilt Grass (*Microstegium vimineum*)

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



217 Governor Street, Richmond, Virginia 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society
Blandly Experimental Farm
400 Blandly Lane, Unit 2
Boyce, Virginia 22620
(540) 837-1600
<http://www.vnps.org>

Invasive Alien Plant Species of Virginia

Japanese Stilt Grass (*Microstegium vimineum*)

practice must be carried out for seven consecutive years due to the long seed bank viability. Mowing or burning early in the season does not control the plant; new seeds germinate following such measures and can still set seed by the end of the season. Glyphosate herbicide is effective against Japanese stilt grass, but its use in a natural area may also affect desirable species. Glyphosate herbicides are recommended because they are biodegradable. However, glyphosate is a nonselective systemic herbicide that affects all green vegetation. To be safe and effective herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and

timing of their application.

For more information on native plant conservation, contact the Virginia Native Plant Society at the address below. For information on Virginia's natural areas and natural heritage resources contact the Virginia Department of Conservation and Recreation's Division of Natural Heritage (see address below).

Illustration from *New Britton and Brown Illustrated Flora of the Northeast U.S. and Adjacent Canada*, by H. H. Gleason, New York Botanical Gardens Scientific Publications. Used with permission.

12/97

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



217 Governor Street, Richmond, Virginia 23219
(804) 786-7951
<http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society
Blandy Experimental Farm
400 Blandy Lane, Unit 2
Boyce, Virginia 22620
(540) 837-1600
<http://www.vnps.org>

Invasive Alien Plant Species of Virginia

Kudzu (*Pueraria lobata* (Willd.) Ohwi)

Description

Kudzu is a perennial, trailing or climbing vine of the legume family. Dark green leaves, starchy fibrous roots, and elongated purple flowers with a fragrance reminiscent of grapes readily identify this aggressive vine. A dense stand of identically colored plants growing on and around everything in its path is also a familiar field mark. Rarely flowering, kudzu stems and roots spread out in all directions from root crowns, with new plants beginning every one to two feet at stem nodes. This dense packing of kudzu can result in tens of thousands of plants occupying a single acre of land. Kudzu leaves are hairy beneath, often tri-lobed, and in groups of three on the vine. The 1/2 to 3/4 inch purple flowers are pea-like in shape and are produced on plants exposed to direct sunlight. Kudzu fruits, present in October and November, are hairy, bean-like pods which produce only a few viable seeds in each pod cluster. It is thought that some seeds can remain dormant for several years before they germinate. During the peak growing season in early summer, this prolific vine can grow at a rate of a foot a day, easily covering and choking trees and understory vegetation.

Habitat

A hardy opportunist, kudzu grows in a variety of habitats and environmental conditions, but does best on deep, well-drained, loamy soils. Almost any disturbed area is suitable habitat for this vine. Roadsides, old fields, vacant lots and abandoned yards are all prime spots for new kudzu growth.

Distribution

A native of Japan, kudzu was brought to the southeastern United States at the turn of the century for

use as a soil stabilizer, animal fodder, and ornamental vine. Due to its prolific nature and lack of natural insect or disease controls, kudzu quickly made a pest of itself and was considered a nuisance by the early 1950s. In 1970 it was listed as a common weed by the Soil Conservation Service. Today, kudzu is spread along the Atlantic coast; north to Illinois and Massachusetts, west to Texas and Oklahoma, and south to Alabama, Georgia and Mississippi where the heaviest infestations occur. It has also recently been




Kudzu (*Pueraria lobata*)

found in Florida where it has begun to invade the Everglades. Throughout Virginia, kudzu stands are a common sight along roadways and bordering agricultural fields.

Threats

Where it grows, kudzu has the ability to out-compete and eliminate native plant species and upset the natural diversity of plant and animal communities. Its extremely rapid growth rate and habit of growing over objects threatens natural areas by killing native vegetation through crowding and shading, and can seriously stifle agricultural and timber production. In addition, al-

For more information, contact the Department of Conservation and Recreation, or the Virginia Native Plant Society.


Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES
1500 East Main Street, Suite 312
Richmond, VA 23219



Virginia Native Plant Society
P.O. Box 844
Annandale, VA 22003

This fact sheet was funded in part by the Department of Environmental Quality's Coastal Resources Management Program through Grant #NA270Z0312-01 of the National Oceanic and Atmospheric Administration Office of Coastal Resource Management Act of 1972 as amended.

Invasive Alien Plant Species of Virginia

Kudzu

though edible by many grazing animals, its viney nature makes it difficult to cut and bale, making it undesirable as a hay crop. Grazing can eliminate kudzu fields in just a few years making them unsuitable for use as pastures except over a short time period. Because of its hardy nature and lack of natural enemies, kudzu is able to colonize diverse habitats and achieve a widespread distribution.

Control

Control of well established kudzu stands can take up to 10 years. Persistent eradication of all roots is the key to the control of this pest, keeping in mind that a single kudzu patch may extend past landowner boundaries. The most effective method of control will depend on several factors; size of the infested area, proximity to sensitive species or other desirable vegetation, and accessibility of the patch. Small patches of kudzu that are not well established (usually ones less than ten years old)

can be eliminated by persistent weeding, mowing, or grazing during the growing season over a period of three to four years. Unfortunately, with root systems that can be up to 12 feet deep, eradication by direct root removal is not practical.

Long-term treatment of heavily infested sites usually requires the application of herbicides over a period of up to five years to inhibit the growth of new shoots. Biodegradable glyphosphate herbicides are recommended for control of kudzu in natural areas. These herbicides break down rapidly into harmless components when exposed to soil. Because glyphosphate is a systemic, non-selective herbicide that affects all green vegetation, treatments should be carefully timed and applied by trained applicators. The best time for application of these herbicides is at the end of the growing season when the plants are actively transporting nutrients from leaves and stems to root systems. When applied at the proper time, herbi-

cides are transported to the roots where they are able to kill the entire plant.

In some areas, prescribed burning may be used as a follow-up treatment after herbicide application. Although it should be carefully and professionally handled, this two step process is effective in clearing out leaf litter and speeding recolonization of an area by desirable native plant species.

References

- Fernald, M. L. 1950. *Gray's Manual of Botany*, Eighth edition. American Book Company, New York. 1632 pp.
- Gleason, H. A., and A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, second edition. The New York Botanical Garden, New York. 910 pp.
- Harvill, A. M., Jr., et al. 1992. *Atlas of the Virginia Flora*, fifth edition. Virginia Botanical Associates, Farmville. 135 pp.
- Kudzu in Alabama - History, Uses, and Control. Alabama Cooperative Extension, Circular ANR 65, Auburn. 8 pp.

For more information, contact the Department of Conservation and Recreation, or the Virginia Native Plant Society.



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 East Main Street, Suite 312
Richmond, VA 23219



Virginia Native Plant Society
P.O. Box 844
Annandale, VA 22003

This fact sheet was funded in part by the Department of Environmental Quality's Coastal Resources Management Program through Grant #NA270Z0312-01 of the National Oceanic and Atmospheric Administration Office of Coastal Resource Management Act of 1972 as amended.

Silk Tree

Albizia julibrissin Durz.

Pea family (Fabaceae)

NATIVE RANGE

Iran to Japan (according to Hortus 3rd. ed.)

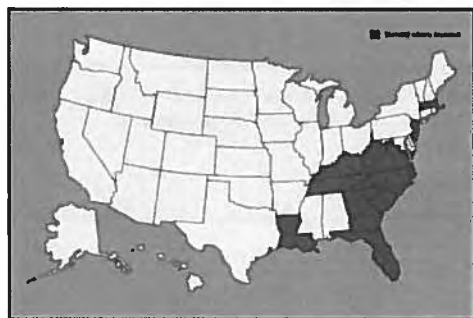
DESCRIPTION

Silk tree, also known as mimosa, or silky acacia, is a small to medium-sized tree that can grow up to 20-40 feet tall. The bark is light brown, nearly smooth, and generally thin with lens shaped areas along the stem. The attractive fern-like leaves of mimosa are finely divided, 5-8 inches long by about 3-4 inches wide, and alternate along the stems. Silk tree has showy and fragrant pink flowers, about 1½ inches long, that resemble pom-poms and are arranged in panicles at the ends of branches. Fruits are flat, straw-colored pods about 6 inches long containing light brown oval-shaped seeds about ½ inch in length. Pods ripen in August to September and begin to disintegrate soon after, but remain on the trees into winter.



ECOLOGICAL THREAT

Because silk tree can grow in a variety of soils, produce large seed crops, and resprout when damaged, it is a strong competitor to native trees and shrubs in open areas or forest edges. Dense stands of mimosa severely reduce the sunlight and nutrients available for other plants.



DISTRIBUTION IN THE UNITED STATES

Silk tree is naturalized from New Jersey to Louisiana and in California.

HABITAT IN THE UNITED STATES

Silk tree takes advantage of disturbed areas, often spreading by seed from nearby ornamentals or from contaminated fill dirt. It prefers full sun and is often seen along roadsides and open vacant lots in urban/suburban areas. Silk tree can tolerate partial shade but is seldom found in forests with full canopy cover, or at higher elevations (above 900 m or 3,000 ft), where cold hardiness is a limiting factor. It can, however, become a serious problem along riparian areas, where it becomes established along scoured shores and where its seeds are

easily transported in water. Like many successful exotics, it is capable of growing in a wide range of soil conditions.

BACKGROUND

Silk tree was introduced to the U.S. in 1745. Silk tree continues to be a popular ornamental because of its fragrant and showy flowers.

BIOLOGY & SPREAD

Silk tree reproduces both vegetatively and by seed. Silk tree seeds have impermeable seed coats that allow them to remain dormant for many years. One study showed that 90% of the seeds were viable after five years and, for another species of mimosa, a third of its seeds germinated after 50 years in open storage. Seeds are mostly dispersed below or around the parent plant, but can be dispersed further by water. Silk trees grow rapidly under good conditions but are short-lived and have weak, brittle wood. If cut or top-killed, trees resprout quickly and sprouts can grow over three feet in a season.

MANAGEMENT OPTIONS

Silk tree can be controlled using a variety of mechanical and chemical controls.

Mechanical

Trees can be cut at ground level with power or manual saws. Cutting is most effective when trees have begun to flower to prevent seed production. Because mimosa spreads by suckering, resprouts are common after treatment. Cutting is an initial control measure and will require either an herbicidal control or repeated cutting for resprouts.

Girdling is effective on large trees where the use of herbicides is impractical. Using a hatchet, make a cut through the bark encircling the base of the tree, approximately six inches above the ground. Be sure that the cut goes well below the bark. This method will kill the top of the tree but resprouts are common and may require a follow-up treatment with a foliar herbicide. Hand pulling will effectively control young seedlings. Plants should be pulled as soon as they are large enough to grasp, but before they are old enough to flower. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may resprout.

Chemical

Silk tree seedlings and small trees can be controlled by applying a 2% solution of glyphosate (e.g., Roundup®) or triclopyr (e.g., Garlon®) and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Systemic herbicides such as glyphosate and triclopyr can kill entire plants because the chemicals travel through a plant from the leaves and stems to the actively growing roots, where they prevent further cell growth. Use a low pressure and a coarse spray pattern to reduce damage from spray drift on non-target species. Use caution when applying these products, as glyphosate is a non-selective herbicide that may kill non-target plants that are only partially contacted. Triclopyr is a selective herbicide for many broadleaf plant species. Triclopyr is a selective herbicide for many broad-leaved plant species and should be considered for sites where native or other desirable grasses are meant to be conserved.

The cut-stump and basal bark herbicidal methods should be considered when treating individual trees or where the presence of desirable species preclude foliar application. Stump treatments can be used as long as the ground is not frozen. Horizontally cut stems at or near ground level. Immediately apply a 25% solution of glyphosate or triclopyr and water to the cut stump making sure to cover the outer 20% of the stump. Basal bark applications are effective throughout the year as long as the ground is not frozen. Apply a mixture of 25% triclopyr and 75% horticultural oil to the base of the tree trunk to a height of 12-15 inches from the ground. Thorough wetting is necessary for good control; spray until run-off is noticeable at the ground line.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACT

For more information on the management of silk tree, please contact:

- Kris Johnson, Great Smoky Mountains National Park, Gatlinburg, TN

SUGGESTED ALTERNATIVE PLANTS

Many small to medium-sized trees make excellent alternatives to silk tree. A few examples include serviceberry (*Amelanchier arborea*), redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), river birch (*Betula nigra*), fringe tree (*Chionanthus virginicus*), American holly (*Ilex opaca*), and sweetgum (*Liquidambar styraciflua*). Check with the native plant society in your state for plant recommendations for your particular area.

OTHER LINKS

- <http://www.invasive.org/search/action.cfm?q=Albizia%20julibrissin>

AUTHORS

Tom Remaley, Great Smoky Mountains National Park, Gatlinburg, TN

EDITORS

Jil M. Swearingen, National Park Service, Washington, DC
Larry Morse, The Nature Conservancy, Arlington, VA

PHOTOGRAPHS

Tom Remaley, Great Smoky Mountains National Park, Gatlinburg, TN

REFERENCES

- Bonner, F.T., M.S. Hooda, D.P. Singh. 1992. Moisture determination on seeds of honey locust and mimosa. *Tree Plant Note*, USDA Forest Service 43(3):72-75.
- Bransby, D.I., S.E. Sladden, G.E. Aiken. 1992. Mimosa as a forage plant: a preliminary evaluation. *Proceedings of the Forage Grasslands Conference*. Georgetown, Texas; American Forage and Grassland Council 1:28-31.
- Gleason, H.A., A. Cronquist. 1991. *Manual of vascular plants of northeastern United States and adjacent Canada*. 2nd ed. The New York Botanical Garden, 910.
- Hartel, P.G., B.L. Haines. 1992. Effects of potential plant CO₂ emissions of bacterial growth in the rhizosphere. *Journal of Soil Biological Biochemistry and Science* 24(3).
- Panizzi, A.R., F. Slansky, Jr. 1991. Suitability of selected legumes and the effect of nymphal and adult nutrition in the southern green stink bug (Hemiptera: Heteroptera: Pentatomidea). *Journal of Econ-Entomology* 84(1):103-113.
- Swearingen, J. 2009. WeedUS Database of Plants Invading Natural Areas in the United States: Mimosa (*Albizia julibrissin*). <http://www.invasive.org/weedus/subject.html?sub=3004>.
- USDA, NRCS. 2009. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Invasive Alien Plant Species of Virginia

Multiflora Rose (*Rosa multiflora* Thunberg)

Description

Multiflora rose is a perennial, thorny shrub of medium height. Its arching or trailing stems can root at the tip, forming dense thickets. The compound leaves alternate along the stems; each leaf has 5-11 oval leaflets, the edges of which are toothed. In late spring, multiflora rose blooms in tapering clusters of white flowers. As in other rose species, the fruits are small, red hips. The seeds found in the hips of multiflora rose are sought after by many different bird species during winter.

Habitat

Usually found in fields, pastures and along roadsides, multiflora rose can also appear in dense forest where fallen trees have opened a gap in the forest canopy. It is adaptable to a wide range of environments but is not found in standing water or in extremely dry habitats.

Distribution

Multiflora rose is native to Asia and was brought to the United States from Japan in the 1880s by horticulturists. Later, wildlife managers planted it for wildlife food and cover. Once used for control of soil erosion and on highway medians to reduce headlight glare, multiflora rose is now found throughout most

of the United States. It has established itself in all but a dozen counties of Virginia. The Virginia Department of Agriculture and Consumer Services has listed this plant as a noxious weed.

Threats

Multiflora rose forms dense thickets which can choke out native plant species. These thickets act as living fences, impenetrable by man or large animals. Results from studies done on multiflora rose suggest it is highly competitive for soil nutrients.

Control

Lightly infested areas may be cleared with a shovel or grubbing hoe provided the entire root is removed. Severe infestations of multiflora rose are effectively controlled by mowing or cutting. However, this treatment must be repeated 3-6 times a year for 2-4 years. Applying a glyphosate herbicide directly to freshly cut stumps helps insure kill of the root system. This method is most effective if done late in the growing season. Foliar application of a glyphosate herbicide will also kill multiflora rose. Glyphosate herbicides are recommended because they are biodegradable. However, glyphosate is a nonselective, systemic herbicide and will affect all



Multiflora Rose (Rosa multiflora Thunberg)

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES
217 Governor Street, Richmond VA 23219
(804) 786 7951 <http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society

Blandy Experimental Farm
400 Blandy Farm Lane Unit 2
Boyce, VA 22620
(540) 837 1600
<http://www.vnps.org>

Jim Gilmore, Governor • John Paul Woodley, Jr., Secretary of Natural Resources • David G. Brickley, Director, Department of Conservation and Recreation

Invasive Alien Plant Species of Virginia

Multiflora Rose (*Rosa multiflora* Thunberg)

green vegetation. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of application. Consult a natural resource specialist or agricultural extension agent for more information before attempting any herbicide control program.

In some situations, a prescribed burn during the early growing season may be an appropriate method for controlling severe infestations of multiflora rose. As with mechanical control methods, follow-up burn

treatments may be necessary for several years to remove plants sprouting from stems or seed. Seek the advice of an agricultural extension agent or natural resource specialist before implementing this control method.

Suggested Alternatives

Some native shrubs with attractive flowers and/or fruit production useful to wildlife include Carolina rose (*Rosa carolina*), high-bush blueberry (*Vaccinium corymbosum*), black haw (*Viburnum prunifolia*), winterberry (*Ilex verticillata*) and American holly (*Ilex opaca*) (dioe-

cious, female plant for fruit). These species should be available at most large nurseries and garden centers.

References

Evans, J. and N. Ekhardt. 1987. Element Stewardship Abstract: *Rosa multiflora*. The Nature Conservancy, Minneapolis.

Szafoni, R. 1990. Vegetation Management Circular: Multiflora rose. Illinois Nature Preserves Commission, Charleston.

Harvill, A., et al. 1992. Atlas of Virginia Flora. Virginia Botanical Association, Burkeville.

Illustration by Donna Smith

5/99

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES
217 Governor Street, Richmond, VA 23219
(804) 786-7951. <http://www.state.va.us/~dcr/vaher.html>



Virginia Native Plant Society

Blandy Experimental Farm
400 Blandy Farm Lane, Unit 2
Boyce, VA 22620
(540) 837-1600
<http://www.vnps.org>

Jim Gilmore, Governor • John Paul Woodley, Jr., Secretary of Natural Resources • David G. Brickley, Director, Department of Conservation and Recreation

INVASIVE PLANTS OF OHIO

Fact Sheet 16

White and Yellow Sweet-clover

Melilotus alba, *M. officinalis*



Yellow Sweet-clover

Division Photo

DESCRIPTION:

Both white and yellow sweet-clover are erect, herbaceous, non-native biennials that are members of the pea family. In their first year of growth, the plants are small with a smooth multi-branched stem. The leaves are alternate and divided into 3 finely toothed leaflets. The second year of growth is characterized by rapid growth of the root system and an overall bushy appearance with the plant reaching 3-5 feet tall by May. From May to September, flowers are produced on the second year plants. Flowers are borne on irregular spikes on the ends of elongated stems. Each flower spike will bear 40-80 flowers. The flowers are either white or yellow, the most obvious difference between these two species. Seed is set in summer with up to 350,000 seeds per plant.

HABITAT:

White and yellow sweet-clovers grow in open, disturbed areas such as roadsides, old fields, and utility easements. Intolerant of shade, sweet-clover invades upland habitats such as prairies, savannas, dunes, alvars, and meadows. They seem to grow best in, but are not limited to, calcareous soil. The roots of sweet-clover fix nitrogen in the soil, allowing the plants to live in nutrient poor areas.

DISTRIBUTION:

White and yellow sweet-clover are native to the Mediterranean region, central Europe, and Asia. They were brought to the United States in the 1600s as a forage crop for livestock and for honey production. They are now found in all 50 states and are used as a soil builder because of their nitrogen fixing capability. They are also often planted as wildlife cover. Both sweet-clovers are found throughout Ohio especially near agricultural regions.

PROBLEM:

The seeds of white and yellow sweet-clover have been shown to be viable for over 30 years. The plants are drought resistant and winter hardy. Because of their large size in the second year of growth, they tend to overtop and shade native sun-loving species. They are problematic in recovering prairies and savannas where they out-compete native species for water and nutrients.



White Sweet-clover

Division Photo

CONTROL:

Mechanical: Prescribed burning in 2 or more consecutive years has been effective in reducing populations of white and yellow sweet-clover. However, burning in only 1 year tends to increase populations. In small areas, hand pulling of first year plants when roots are small is also quite effective.

Chemical: Spraying with systemic herbicides such as Roundup® or Glypro® can be effective. Care must be taken to prevent over-spray to non-target species.

Biological: The native sweet-clover weevil can help control white and yellow sweet-clover if the weevil is present in high concentrations. Unfortunately, this is not a reliable form of control.

ADDITIONAL INFORMATION SOURCES:

Eckardt, N. 1987. Element Stewardship Abstract for White and Yellow Sweetclover. The Nature Conservancy.

Turkington, R.A., P.B. Cavers, and E. Rempel. 1978. The Biology of Canadian Weeds: *Melilotus alba* Desr. and *M. officinalis* (L.) Lam. Canadian Journal of Plant Science 58: 523-537.

March 2001

FOR MORE INFORMATION:



Ohio Division of Natural Areas and Preserves
1889 Fountain Square Dr., Bldg. F-1
Columbus, Ohio 43224
(614) 265-6453 www.dnr.state.oh.us/odnr/dnap/dnap.html



The Nature Conservancy, The Ohio Chapter
6375 Riverside Drive, Suite 50
Dublin, Ohio 43017
(614) 717-2770 www.tnc.org



Columbus and Franklin County Metro Parks
1069 W. Main Street
Westerville, Ohio 43081
(614) 891-0700 www.metroparks.net

Funding Provided by an Ohio EPA Environmental Education Grant

FS16JJ

Invasive Alien Plant Species of Virginia

Tree-of-Heaven (*Ailanthus altissima* (Miller) Swingle)

Description

Tree-of-heaven is a small to medium-sized tree in the mostly tropical Quassia family. It has smooth gray bark. Leaves are compound, alternate, odd-pinnate, with 11-25 lanceolate leaflets. Most leaflets have one to three coarse teeth near their base. Tree-of-heaven leaves may be confused with those of sumac or black walnut. Flowers occur in panicles at the ends of branches; male flowers produce a strong odor which has been described as "the smell of burnt peanut butter." The leaves when crushed also produce this distinctive, offensive odor. Seeds are centered in a papery sheath called a samara. The samaras are slightly twisted or curled, and twirl as they fall to the ground. They can be borne on the wind great distances from the parent plant.

Habitat

Tree-of-heaven establishes itself readily on disturbed sites. These include vacant lots of the inner city, railroad embankments, highway medians, fence rows and roadsides. In naturally forested areas, disturbance created by severe storms or insect infestations can open the way for tree-of-heaven infestation.

Distribution

Tree-of-heaven is native to a region extending from China south to Australia. It was imported into the United States in 1784 by a Philadelphia gardener. In the western states it was brought over by Chinese immigrants who use it for medicinal purposes. Due to its rapid growth and prolific seed production, it quickly escaped from cultivation.

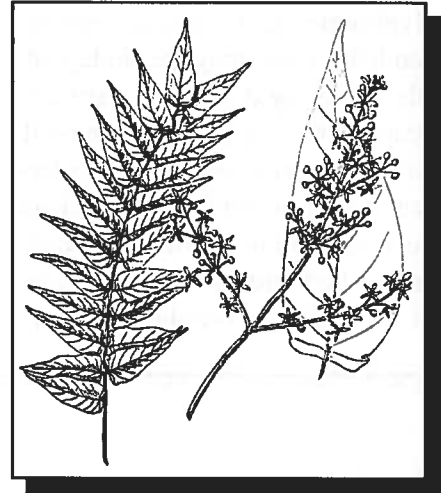
Threats

One tree-of-heaven can produce up to 350,000 seeds in a year. Seedlings

establish a taproot three months from germination. Thus they quickly outrace many native plant species in competition for sunlight and space. Tree-of-heaven also produces a toxin in its bark and leaves. As these accumulate in the soil, the toxin inhibits the growth of other plants. This toxin is so effective it is being studied as a possible source for a natural herbicide. These factors combine to make tree-of-heaven a very aggressive invasive plant able to displace native tree and herb species. Furthermore, the root system is capable of doing damage to sewers and foundations.

Control

Tree-of-heaven is very difficult to remove once it has established a taproot. It has persisted in certain areas despite cutting, burning and herbiciding. Therefore, seedlings should be removed by hand as early



Tree-of-Heaven (*Ailanthus altissima*)

as possible, preferably when the soil is moist to insure removal of the entire taproot. Larger plants should be cut; two cuttings a year may be necessary, once in the early growing season and once in the late growing season. Initially, this will not kill the plant; it will vigorously resprout from the roots, but seed production will be prevented and the plants will be lowered in stature. If continued over a period of several years, cutting during the growing season stresses the plants and may eventually kill them.

A glyphosate herbicide, either sprayed onto the leaves or painted onto a freshly cut stump will kill the plant. However, to insure the herbicide gets into the root system, it is best to apply this herbicide in the late

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219

(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

Invasive Alien Plant Species of Virginia

Tree-of-Heaven

growing season while the plant is translocating nutrients to its roots. Glyphosate herbicides are recommended because they are biodegradable, breaking down into harmless components on contact with the soil. However, glyphosate is a nonselective, systemic and will affect all green vegetation. To be safe and effective, herbicide use requires careful knowledge of the chemicals, ap-

propriate concentrations, and the effective method and timing of their application. Consult a natural resource specialist or agricultural extension agent for more information before attempting herbicide control of tree-of-heaven.

References

Hoshovsky, M. 1986. TNC Element Stewardship Abstract: *Ailanthus altissima*

and *Ailanthus glandulosa*. The Nature Conservancy, San Francisco.

Hu, S. 1979. *Ailanthus*. *Arnoldia* 39(2):29-50.

Illustration reprinted by permission from *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*, vol. 2, pg. 469, H. Gleason, copyright 1952, The New York Botanical Garden.

For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

1500 E. Main Street, Suite 312, Richmond, VA 23219
(804) 786-7951



Virginia Native Plant Society
P.O. Box 844, Annandale, VA 22030

APPENDIX E
Invasive Species Pamphlet for JEB Fort Story



■ Kudzu (*Pueraria montana*)

photo courtesy of Tetra Tech

Early Detection Reporting Tools

DoD Natural Resources, Invasive Species Management (www.dodinvases.org)

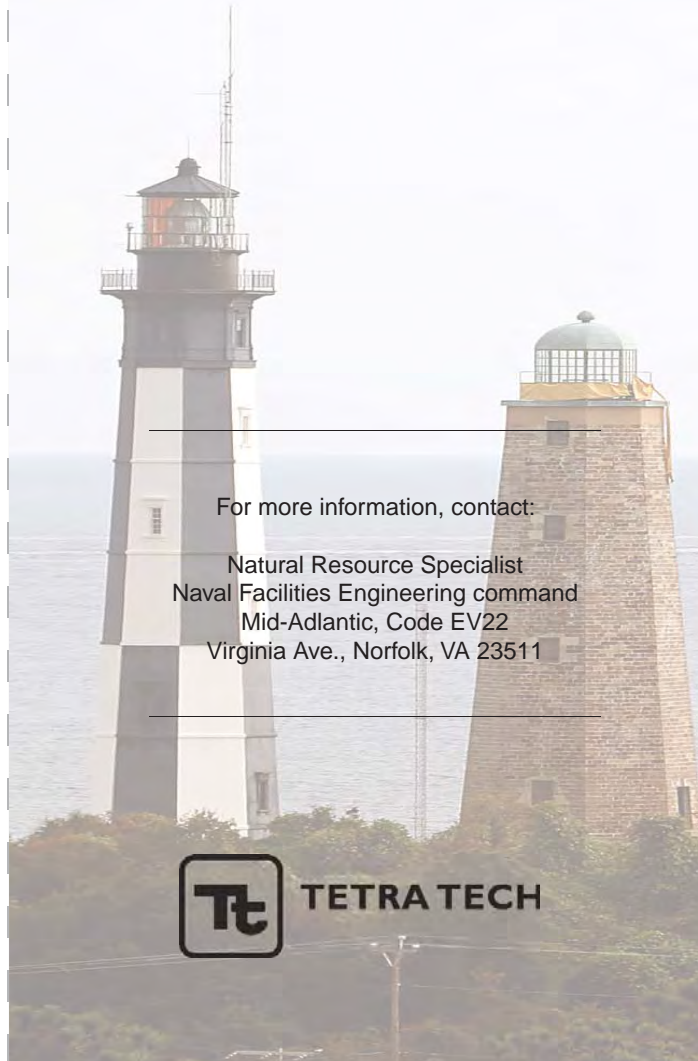
National Invasive Species Council (www.invasivespecies.gov)

Virginia Invasive Species (www.vainvasivespecies.org)

Citizen Scientists (www.imapinvasives.org)

Early Detection and Distribution Mapping (www.eddmaps.org)

Center for Invasive Species and Ecosystem Health (www.invasive.org)



For more information, contact:

Natural Resource Specialist
 Naval Facilities Engineering command
 Mid-Atlantic, Code EV22
 Virginia Ave., Norfolk, VA 23511



invasive plant species



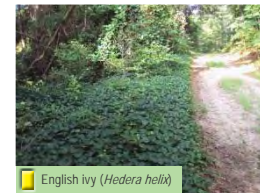
■ Tree-of-heaven (*Allanthurus altissima*)

photo courtesy of Tetra Tech

“...the homeland is vulnerable to a different type of asymmetric attack, a biological attack from invasive species.”

— Col. Robert J. Pratt

Common invasive plants at:
**Joint Expeditionary Base
 Fort Story, Virginia**



■ English ivy (*Hedera helix*)

photo courtesy of Tetra Tech



■ Kudzu (*Pueraria montana*)

photo courtesy of Tetra Tech



■ Japanese still grass (*Microstegium vimineum*)

photo courtesy of Tetra Tech



■ Mimosa (*Albizia julibrissin*)

photo courtesy of Tetra Tech

The purpose of this brochure is to provide a basic understanding of the most common invasive plants occurring at Fort Story in Virginia Beach, the threats they pose, and what you can do to help control and prevent their spread.

what are invasive plants?

Invasive plant species are plants that have either been intentionally introduced or have escaped cultivation. These plants threaten our natural ecosystems by displacing native plants. Invasives outcompete our native plants because they lack the natural forces that keep them in balance with the habitat.

The Department of Defense and other federal and state agencies have instituted policies and guidelines to prevent and control the introduction and spread of invasive species.

why are invasive plants a problem?

Invasive species can interfere with military operations and readiness, kill or shade out native plants, harm fish and wildlife and their habitats, and have negative economic impacts on crop yields and forest productivity. Further, invasive species are a threat to availability of training areas, increase risk of wildfires, and pose serious health and safety issues for people.

Economic losses and control costs in the U.S. have been estimated to exceed \$120 billion per year.



Chinese privet (*Ligustrum sinense*)

Tree-of-heaven (*Ailanthus altissima*)



Autumn olive (*Elaeagnus umbellata*)

photo courtesy of Tetra Tech

invasive plant species prioritization

The assignment of invasive species to the National Park Service model given below is based on the current distribution and abundance of invasive species occurring at Fort Story.

		Invasive Plants		
Significance of Impact	Serious Threat Hard to Control	Kudzu Chinese privet Priority 2	Serious Threat Easy to Control Tree-of-heaven Japanese stilt grass Phragmites Multiflora rose Asiatic sand sedge Priority 1	
	Lesser Threat Hard to Control	Japanese honeysuckle English ivy Priority 4	Lesser Threat Easy to Control Asiatic dayflower Mimosa Autumn olive Chinese lespedeza Yellow sweet clover White sweet clover Priority 3	
			Feasibility of Control	

The logical species to give the highest priority are those that seriously threaten natural resources and appear to be easy to control. The lowest priority should be given to those species that pose little threat and would be difficult to control.

Additional resources for photos and detailed descriptions of these invasive plants are listed on the back of this brochure. Additional information on controlling invasive plants is available from Natural Resources Managers.

what you can do about invasive plants

You can help stop invasive plants by identifying these species and taking actions to prevent their introduction and spread:

- Learn about the invasive species that are in your area and what is being done about them
- Be able to identify invasive plants
- Report new invasive species and infestations to the Natural Resources Manager
- Remove invasive plants from your property
- Plant non-invasive plants on your property
- Clean boats and trailers, off-road vehicles, boots, waders, and other pathways of spread to stop hitchhiking invasive species
- Use certified “weed-free” forage, firewood, hay, mulch, and soil
- Volunteer for organized efforts to remove invasive species from natural areas and support organizations that work with invasive species

**Natural Resources Managers
need your help to prevent
and contain the spread
of these invaders.**

**Early Detection and Rapid
Response (EDRR) is critical to
identify new areas of infestation,
rapidly respond, and increase the
chances of success.**

**The Department of Defense is
a leader in natural resources
management and controlling
invasive species.**