

**INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN**  
**NAVAL SUPPORT FACILITY DAHLGREN**  
**DAHLGREN, VIRGINIA**



**Final**  
**November 2021**

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NAVAL SUPPORT FACILITY DAHLGREN  
DAHLGREN, VIRGINIA**



**Final  
November 2021**

Document cleared for public release  
Annual Updates Conducted by the NSF Dahlgren Natural Resources Manager  
Installation Natural Resources Manager: Mr. Travis Wray at 540-653-4186

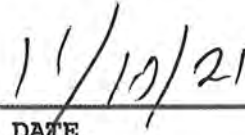
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Signature Page

The signatures below specify mutual consent for development and implementation of the Integrated Natural Resources Management Plan for Naval Support Facility Dahlgren.



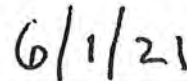
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NSF DAHLGREN NATURAL RESOURCES MANAGER



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U.S. FISH AND WILDLIFE SERVICE  
FIELD OFFICE SUPERVISOR



DATE



VIRGINIA DEPARTMENT OF WILDLIFE RESOURCES  
EXECUTIVE DIRECTOR



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## Wray, Travis W CIV USN NAVFAC WASHINGTON DC (USA)

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**From:** Brian D Hopper - NOAA Federal <brian.d.hopper@noaa.gov>  
**Sent:** Friday, July 30, 2021 8:19 AM  
**To:** Wray, Travis W CIV USN NAVFAC WASHINGTON DC (USA)  
**Subject:** [Non-DoD Source] 2021 NMFS INRMP review Dahlgren NSF

Hi Travis,

Thank you for the opportunity to review the INRMP for NSF Dahlgren. Under the Sikes Act Improvement Act of 1997 (SAIA), the Secretary of each military department is required to prepare and implement an integrated natural resources management plan for each military installation in the United States. The purpose is to provide for effective stewardship and management of land and water resources, and to promote outdoor recreation and education under the requirements of SAIA, while meeting the needs of the military mission of NSF Dahlgren.

We have reviewed the INRMP for NSF Dahlgren and it provides a thorough assessment of the natural features and amenities within the facility. In addition, this document constructs the framework for measuring success of the target management actions at NSF Dahlgren.

Based on our review, several in-water activities identified in the INRMP have the potential to impact listed species under our jurisdiction. If implemented, you should coordinate with us early so we can work together to minimize impacts to listed species and comply with section 7 of the Endangered Species Act.

Once again, we thank you for the opportunity to review and comment on the INRMP for NSF Dahlgren and appreciate your commitment to the conservation of natural resources. We look forward to our continued cooperation and coordination.

Regards,  
-Brian

--

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## EXECUTIVE SUMMARY

The Department of Defense (DoD) manages approximately 25 million acres of land in the United States. Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP)(USN 2019a). This INRMP was prepared for Naval Support Facility Dahlgren (NSFDL), Dahlgren, Virginia, in accordance with 16 U.S.C. §670a-§670o (Sikes Act); 32 Code of Federal Regulations (CFR) Part 190 (DoD Natural Resources Management Program); DoD Instruction 4715.03 (Natural Resources Conservation Program); DoD Manual 4715.03 (INRMP Implementation Manual); and Chief of Naval Operations Instruction (OPNAVINST) 5090.1E (Environmental Readiness Program).

This INRMP is a long-term planning document that guides implementation of the natural resources program to ensure support of the installation mission, while protecting and enhancing installation natural resources for multiple use, sustainable yield, and biological integrity. This plan documents the military mission, baseline condition of natural resources, impacts to natural resources due to the military mission, the management approaches to conserve and enhance natural resources, and lists specific projects aimed at protecting and enhancing natural resources.

In accordance with the Sikes Act, this INRMP was prepared in cooperation with the Secretary of the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service (USFWS), Secretary of the Department of Commerce, acting through the Director of the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NIMS), and the Director of the Virginia Department of Wildlife Resources (VDWR), formerly the Virginia Department of Game and Inland Fisheries (VDGIF) prior to July 1, 2020. Because of this coordination effort, the INRMP reflects the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources. Future involvement of the state and federal wildlife agencies will ensure continued mutual agreement and cooperation in managing the natural resources at NSFDL. The effectiveness of this INRMP will be evaluated annually in cooperation with the appropriate field-level offices of the USFWS, NOAA NMFS, and VDWR. Evaluation of the successes and issues resulting from INRMP implementation will be facilitated by

accessing the Navy Conservation website:  
(<https://conservation.dandp.com>) (USN 2019a).

Resource-specific natural resources program elements have been developed to address relevant issues at NSFDL. Existing conditions, baseline survey data, current management practices, and recommended management actions have been described for each program element. Natural resources program elements covered in this INRMP include:

- Rare Species Management
- Wetlands Management
- Fish and Wildlife Management
- Forest Management
- Vegetative Management
- Migratory Bird Management
- Invasive Species Management
- Land Management
- Agricultural Out-leasing
- Geographic Information Systems Management
- Outdoor Recreation
- Bird/Animal Aircraft Strike Hazard
- Wildland and Prescribed Fire Management
- Conservation Law Enforcement
- Training Requirements of Natural Resources Personnel
- Coastal/Marine Management
- Floodplains Management
- Cultural Resources Management
- Implementation

The management actions and projects identified for the NSFDL natural resources program are intended to help the Naval Support Activity South Potomac (NSASP) Installation Commanding Officer (ICO) manage natural resources effectively to ensure Navy lands remain available and in good condition to support the military mission and to ensure compliance with relevant environmental regulations. These actions incorporate the principles of ecosystem management and are consistent with Navy policy on sustainable, multiple use of natural resources on Navy property.

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**ACRONYMS AND ABBREVIATIONS**

AFSSS	Air Force Space Surveillance System
AOCs	areas of concern
BGEPA	Bald and Golden Eagle Protection Act
BASH	Bird/Animal Aircraft Strike Hazard
BMPs	best management practices
BTAG	Biological Technical Assistance Group
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIN	course identification number
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRMA	Commander Navy Region Mid-Atlantic
CSCS	Center for Surface Combat Systems
CWA	Clean Water Act
CWAP	Comprehensive Work Approval Process
CZMA	Coastal Zone Management Act
DBH	diameter at breast height
DMAP	Deer Management Assistance Program
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DoN	Department of Navy
DPOP	Deer Population Reduction Permit
EA	environmental assessment
EAP	Encroachment Action Plan
EFH	essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERL	Environmental Readiness Level
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FCD	Federal Consistency Determination
FEAD	Facilities Engineering and Acquisition Division
FONSI	finding of no significant impact
FR	Federal Register
GHz	gigahertz

GIS	Geographic Information System
GPS	global positioning system
INRM	Integrated Natural Resources Management Plan
IPM	integrated pest management
JWAC	Joint Warfare Analysis Center
KGC	King George County
KGCWB	King George County Wetlands Board
LID	low impact development
MAFMC	Mid-Atlantic Fishery Management Council
MBF	thousand board feet
MBTA	Migratory Bird Treaty Act
MHz	megahertz
MILCON	military construction
MMPA	Marine Mammal Protection Act
MPRSA	Marine Protection, Research and Sanctuaries Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSWMP	Mainside Stormwater Management Plan
mW/cm <sup>2</sup>	milliwatts per square centimeter
MWR	Morale, Welfare and Recreation
NAVFAC	Naval Facilities Engineering Systems Command
NAWMP	North American Waterfowl Management Plan
NDW	Naval District Washington
NEPA	National Environment Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NRM	Natural Resources Manager
NRO	Natural Resource Office
NSASP	Naval Support Activity South Potomac
NSFDL	Naval Support Facility Dahlgren
NSWCDD	Naval Surface Warfare Center Dahlgren Division
NWI	National Wetland Inventory
OB	open burns
OD	open detonation
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Instruction
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
PPA	Pollution Prevention Act
psu	Practical Salinity Units
ppt	parts per thousand

PPV	Public Private Venture
PWD	Public Works Department
QDM	quality deer management
RCRA	Resource Conservation and Recovery Act
RDT&E	research, development, test, and evaluation
REC	Regional Environmental Coordinator
RMAs	Resource Management Areas
ROICC	Resident/Regional Officer in Charge of Construction
RPAs	Resource Protection Areas
RPM	Remedial Project Manager
SAV	submerged aquatic vegetation
SCA	Student Conservation Association
SECNAVINST	Secretary of the Navy Instruction
SHPO	State Historic Preservation Office
SIA	screening site areas
SOP	standard operating procedure
SWAP	State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
USTs	underground storage tanks
UXO	unexploded ordnance
VDCR-DNH	Virginia Department of Conservation and Recreation, Division of Natural Heritage
VDCR-DSWC	Virginia Department of Conservation and Recreation, Department of Soil and Water Conservation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VDOF	Virginia Department of Forestry
VDWR	Virginia Department of Wildlife Resources
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VPDES	Virginia Pollutant Discharge Elimination System

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## 1. OVERVIEW

### A. PURPOSE

In accordance with 16 U.S.C. §670a-§670o (Sikes Act); 32 Code of Federal Regulations (CFR) Part 190 (DoD Natural Resources Management Program); DoD Instruction 4715.03 (Natural Resources Conservation Program); DoD Manual 4715.03 (INRMP Implementation Manual); and Chief of Naval Operations Instruction (OPNAVINST) 5090.1E (Environmental Readiness Program), Naval Support Facility Dahlgren (NSFDL) is required to develop and implement an Integrated Natural Resources Management Plan (INRMP) that ensures a balanced and integrated program for the management of natural resources. The purpose of this INRMP is to ensure no net loss in the capability to support the military mission of NSFDL while providing for the biological integrity and sustainable multipurpose use of natural resources. This INRMP must also ensure that natural resources management practices comply with all pertinent laws and regulations and are in accordance with Navy policy which, as summarized in OPNAVINST 5090.1E, is to incorporate ecosystem management as the basis for planning and management. All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 U.S.C. 1341 *et seq.*).

### B. SCOPE

This INRMP addresses natural resources management on those lands and near-shore areas at NSFDL that are:

- Owned by the U.S. and administered by the Navy
- Used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility
- Withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility
- Leased lands on the installation and areas occupied by non-DoD entities

The INRMP is primarily concerned with natural resources management in the undeveloped, natural areas at NSFDL, but also applies to natural resource issues in military training and operational areas, such as range clearance areas; developed areas such as support and administrative areas; and recreational areas. The ten required Sikes Act elements that must be included in all INRMPs are:

- 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 resource management goals and objectives and time frames for proposed action
- 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 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 military installation lands to support the military mission of the installation
- Such other activities as the Secretary of the Military Department determines appropriate

### **C. GOALS AND OBJECTIVES**

The INRMP is a long-term planning document that guides implementation of the natural resources program to help ensure support for the installation mission, while protecting and enhancing natural resources and providing a variety of outdoor recreational opportunities for installation personnel, their dependents and guests. Overarching goals and objectives of the NSFDL INRMP are provided below and additional goals and objectives specific to the described mission operations and management programs are detailed later in the INRMP.

Goals of the INRMP are (USN 2019a):

- Integrate natural resources management responsibilities with military activities, installation planning and programming, and other activities to ensure no net loss to the Navy mission (Appendix 1A, G1)



- Ensure sustainable multipurpose use of the resources and public access when consistent with the mission, safety, and security requirements (Appendix 1A, G2)
- Ensure natural resources management requirements are implemented by or coordinated with professionally trained natural resources managers (Appendix 1A, G3)
- Apply ecosystem-based principles to natural resources management by shifting from single-species to multiple-species conservation; forming partnerships necessary to consider and manage ecosystems that cross installation boundaries; and using the best available scientific information and scientifically sound strategies for adaptive management (Appendix 1A, G4)

Objectives of the INRMP are:

- Identify the responsible parties and stakeholders concerned with natural resources management at NSFDL (Appendix 1A, O1)
- Describe the current and future military mission and its requirements and constraints on natural resources (Appendix 1A, O2)
- State the policies, management philosophy, and objectives of natural resources management at NSFDL (Appendix 1A, O3)
- Provide information regarding the existing biological and physical conditions and the desired future conditions of the installations and the surrounding area (Appendix 1A, O4)
- Identify key natural resource management issues and concerns at the installations and in the surrounding area (Appendix 1A, O5)
- Identify and describe projects and management actions required to meet the objectives of natural resources management while ensuring no net loss in the capability of installation lands to support the military mission (Appendix 1A, O6)

- Identify scheduling priorities and funding opportunities for the implementation of natural resources projects and management actions (Appendix 1A, 07)
- Ensure training requirements for the Natural Resources Manager (NRM) are met per OPNAVINST 5090.1E (Appendix 1A, 08)
- Provide review of all construction and demolition projects, training, mission operations and environmental restoration remediation sites to ensure impacts to natural resources are avoided and/or minimized (Appendix 1A, 09)
- Develop partnerships with state and federal resource agencies as well as local conservation and academic institutions to better manage natural resources (Appendix 1A, 010)
- Coordinate events to promote environmental education and outreach with installation personnel and the local community (Appendix 1A, 011)

#### **D. ECOSYSTEM MANAGEMENT**

Navy policy on natural resources management, as summarized from OPNAVINST 5090.1E, is to manage natural resources to support and be consistent with the military mission, while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity. Land use practices and decisions must be based on scientifically sound conservation procedures and techniques, and use scientific methods and an ecosystem management approach.

The USN has operated NSFDL since 1919 and natural resources at the installation have been managed under written management plans since 1965. Natural resources management programs at NSFDL have continuously evolved to meet changing mission requirements and management challenges, as well as changes in scientific information, technology, and the overall DoD management philosophy.

Historically, management programs primarily focused on consumptive management of natural resources and separate management plans were produced for individual resource areas (e.g., forestry, fish and wildlife, outdoor recreation). The initial forest management plans for the installation focused on timber production and achieving a

self-supporting program based on revenues generated from timber sales. Fish and wildlife management initially focused on management of individual game species.

The management philosophy has gradually evolved from one of commodity production and individual species management to one of sustainable, multiple use of natural resources, biodiversity protection, and ecosystem management. DoD has had an official policy on ecosystem management since 1994 when the Deputy Under Secretary of Defense for Environmental Security issued a memorandum promoting ecosystem management on military installations.

In 1996, DoD Instruction 4715.03 further stated that natural resources under the stewardship and control of DoD should be managed using an ecosystem approach and that "employing ecosystem management will help maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations."

The basic principles and guidelines of ecosystem management are to:

- Preserve the function and integrity of natural ecosystems;
- Integrate human social and economic interests with environmental considerations;
- Involve all interested parties (stakeholders) in identifying management goals; and
- Adapt to changing conditions and requirements.

Ecosystem function is a result of interactions of its various components: geologic and soil features, climatic elements, plants, animals, humans, and current and past disturbances (including past management practices). The function and integrity of an ecosystem are measured in terms of diversity, nutrient availability (productivity), and structural complexity. Assessing ecosystem health and sustainability requires objectively measuring a set of parameters that can be used to describe conditions.

Biodiversity is defined as the variety of life and its processes, including living organisms, the differences among them, and the communities and ecosystems in which they occur. Protecting and enhancing biodiversity is an overall natural resources management goal of NSFDL. Biodiversity consists of many elements of the

natural environment including indigenous ecological communities, native species and their associations, as well as ecosystem functions such as predation, grazing, nutrient cycling, and fire. Biodiversity is best measured or defined in terms of the variety of natural communities or ecosystems and the various natural functions that occur within and among these communities or ecosystems, rather than simply by the numbers of species present. Management for maximum biodiversity helps to ensure ecosystem health that in turn, ensures sustainable use of lands to accomplish military missions.

The first integrated management plan for NSFDL, titled *Integrated Natural Resources Conservation Plan*, was approved in September of 1997 (USN 1997a). This integrated approach encourages management decisions to be made on the community or ecosystem level rather than at a single species level. Maintaining or improving the quality, integrity, and connectivity of the ecosystem benefits both natural communities and individual species. In addition, this approach provides for sustainable use of the installation to accomplish its military mission, while ensuring that the natural resources remain healthy and available for use by future generations. Updated plans followed in 2001, 2007 and 2014 (USN 2001a, USN 2007a, USN 2014a).

Ecosystem management is a tool for NSFDL to use in its efforts to protect and enhance biodiversity. This tool encourages management decisions to focus on natural resources at a community or ecosystem level rather than at a single species level. By maintaining or improving the quality, integrity, and connectivity of the ecosystem, individual species should prosper. Individual rare species are not neglected by this management approach. Consideration must be given to rare species during project planning because these species contribute to ecosystem health and biodiversity and, in many instances, are provided legal protection.

In accordance with the Sikes Act, the major components of the INRMP include managing natural resources for multiple use and sustainable yield and to support the military mission; identifying natural resources inventory and monitoring needs; protecting, enhancing, and restoring fish and wildlife habitat, including wetlands; and enforcing natural resources laws and regulations. Each of these components is essential to the success of an ecosystem management plan that aims to achieve sustainable use and promote biodiversity.

The following are guiding principles for implementing ecosystem management at NSFDL:

- 1) Native flora and fauna may be restored and maintained
- 2) Damaged ecosystems may be repaired
- 3) Ecological processes, structures and functions may be restored and maintained
- 4) Forest fragmentation should be avoided
- 5) Rare, threatened and endangered species should be preserved
- 6) Development should be directed to areas of lower environmental sensitivity
- 7) Human use compatible with all of the above may be allowed and encouraged

#### **E. ADAPTIVE MANAGEMENT**

Adaptive management, or management by experiment, offers a solution to the complexity and unpredictability of natural systems. It can provide answers to questions whether management actions or prescriptions are achieving their desired effect, and what to do if they are not. It involves monitoring, research, analysis, and feedback. When applying management prescriptions or undertaking significant actions, natural resources managers should follow steps in the model process for adaptive management, as shown below:

- Integrate management actions and monitoring within experimental framework
- Develop monitoring objectives and methods based on management objectives and desired future scenarios
- Predict trends and results
- Include ecological, social, compliance and military mission metrics
- Include both implementation and effectiveness metrics
- Implement monitoring program
- Integrate incoming information in contextual analysis and in models
- Involve experts and stakeholders in analysis of information

- Compare expected results to actual results
- Report and communicate results to decision-makers
- Adapt vision, policies and models
- Adapt objectives, strategies, management actions, organizational structure and monitoring protocols

#### **F. RESPONSIBILITIES**

The responsibility for the development, revision, and implementation of INRMPs is shared by several command elements. The roles and responsibilities for Navy natural resources management are described in OPNAVINST 5090.1E and in the Navy guidance for INRMP development and implementation (USN 2006d). A summary of responsibilities for natural resources management at NSFDL follows (USN 2019a).

The Chief of Naval Operations (CNO) Environmental Readiness Division (OPNAV N45) serves as the principal leader, overall Navy program manager and policy advisor for the Navy in all matters related to natural resources. This includes providing policy, guidance, and resources for the development, revision, and implementation of INRMPs. OPNAV N45 represents the Navy on issues and resolves high-level conflicts regarding development and implementation of INRMPs.

The Commander, Navy Installations Command (CNIC) is the Echelon II command under CNO and is responsible for Navy-wide shore installation management. The CNIC has overall shore installation management responsibility and authority as the budget submitting office (BSO) for installation support and is the Navy point of contact for installation policy and program execution oversight (CNIC 2007). The CNIC must ensure that the 2006 Navy guidance on INRMP preparation and implementation is utilized; ensure the programming of resources necessary to maintain and implement INRMPs; participate in the development and revision of INRMPs; and provide oversight for all natural resources program elements. Ultimate responsibility for INRMPs rests with the CNIC. CNIC Regional Commanders (REGCOM) are tasked with ensuring that installations under their command comply with Navy policies on INRMP preparation, implementation, review, updates, and revisions. Lastly, the CNIC REGCOMs ensure that the annual INRMP reviews are completed and endorse the results prior to submittal to CNIC via the Navy Conservation Website.

The DoD Regional Environmental Coordinators (REC) and/or Area Environmental Coordinators (AEC) support the DoD/Navy mission through coordination, communication, and facilitation of environmental issues and activities when these activities affect two or more DoD installations within an Environmental Protection Agency (EPA) region. The Commander Navy Region Mid-Atlantic (CNRMA) is the DoD/Navy REC for military installations within Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington, D.C. (CNRMA 2007).

Naval Facilities Engineering Systems Command Washington (NAVFAC Washington) is the regional facilities engineering systems command and supports the mission of CNIC and Naval District Washington (NDW) with technical authority, project management, and contracts management as requested. In addition, NAVFAC Washington provides natural resources technical expertise and services, using professionally trained natural resources personnel, to assist CNIC, other BSOs, and RECs/AECs with their roles and responsibilities. NAVFAC Washington serves its many Supported Commands through Public Works Departments. NAVFAC Washington also provides technical oversight for forest management, agricultural outlease, and fishing and hunting permit projects; facilitates agency review and cooperative agreement of INRMPs; and reviews and signs INRMPs to ensure technical sufficiency. Lastly, NAVFAC Washington is responsible for the acquisition and execution of contracts and services that ensure adequate support of the Navy environmental program.

Naval District Washington (NDW) is one of eleven current naval regions responsible to CNIC for the operation and management of Naval shore installations in the Washington D.C. Metropolitan Area. NDW is the regional provider of common operating support to naval installations within a 100-mile radius of the Pentagon. Services provided include public affairs, public works, public safety, community support, human resources, information technology, morale, welfare and recreation, supply, air and port operations, ceremonial support and environmental and safety. NDW reports to CNIC as an Echelon III commander over seven commands, including Naval Support Activity South Potomac (NSASP).

The Naval Support Activity South Potomac (NSASP) Installation Commanding Officer (ICO) is responsible for commanding both NSF DL and NSF Indian Head. The ICO must ensure that all assigned properties have been evaluated for significant natural resources, and where found, an INRMP has been prepared. Furthermore, the ICO must ensure preparation, completion, and implementation of the INRMP and should systematically apply conservation practices set forth in the plan. It is his/her responsibility to act as steward

of installation natural resources and integrate natural resources requirements into the day-to-day decision-making process; involve appropriate natural resource managers, operational and training commands, and other tenant commands in the INRMP review process to ensure no net loss of military mission and capabilities that support mission functions; and endorse INRMPs for operation and effect via CO signature. Finally, the CO must participate in the annual Natural Resource Conservation (NRC) Program and NRC Metrics Review to ensure adequate and appropriate conservations support for mission requirements. The NRC Program and INRMP review is completed with internal installation stakeholders prior to review by Federal and State regulators. This review serves to ensure ongoing coordination between natural resources management and the installation mission.

The NSFDL NAVFAC Public Works Officer (PWO) is involved in the review of NSFDL natural resources projects. This review includes oversight during the planning and implementation phases to ensure the projects do not impact mission operations and meet Navy and installation specific safety requirements. Project status updates are provided throughout the duration of the project to ensure safety is followed and to determine if there are changes to the mission that may require delay of projects until further notice.

The NSFDL NAVFAC Safety Officer is involved in the review of NSFDL natural resources projects. This review includes the approval of Accident Prevention Plans (APP) and Accident Hazard Analysis (AHA) for each project proposed on the installation. The NAVFAC Safety Officer may also visit project sites to ensure the APP and AHA are being implemented appropriately and he/she has the authority to report safety violations to the PWO and/or shut down project work if deemed necessary.

The NSASP Public Affairs Officer (PAO) provides review of natural resources related activities and documents for both NSFDL and NSF Indian Head. As requested, the NSASP PAO will review data and documents prior to public release. Installation activities that involve public outreach/participation are coordinated through the NSASP PAO for command approval and visibility.

#### **G. AUTHORITY**

16 U.S.C. §670a-§670o (Sikes Act); 32 Code of Federal Regulations (CFR) Part 190 (DoD Natural Resources Management Program); DoD Instruction 4715.03 (Natural Resources Conservation Program); DoD Manual 4715.03 (INRMP Implementation Manual); and Chief of Naval Operations Instruction (OPNAVINST) 5090.1E (Environmental Readiness Program); Title 10 U.S.C.; and U.S. Navy Regulation 1990,



Chapter 8, Section 1, Subsection 0832 Environmental Pollution are the main authorities for the development and implementation of the INRMP for NSFDL.

**(1) Sikes Act (16 U.S.C §670a-§670o, as amended)**

Originally enacted in 1960, the Sikes Act states that to facilitate the program, the Secretary of each military department shall prepare and implement an INRMP for each military installation in the United States under the jurisdiction of the Secretary, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate. INRMPs, prepared in cooperation with the USFWS, state fish and wildlife agencies and National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) (when appropriate), integrate natural resource management activities with other installation activities, including military operations and training. INRMP implementation should benefit the capability of DoD lands to support military testing, training, and operations.

**H. SUSTAINABILITY AND COMPLIANCE**

The INRMP strives to ensure that natural resources management on NSFDL considers both compliance requirements and environmental stewardship objectives. Compliance requirements are those that are driven by state or federal regulations, such as the Clean Air Act (CAA), Clean Water Act (CWA), Coastal Zone Management Act (CZMA), Sikes Act, Endangered Species Act (ESA), National Environment Policy Act (NEPA), and Migratory Bird Treaty Act (MBTA); DoD Instructions; Executive Orders (EOs); and Memorandum of Agreements or Understandings (MOAs or MOUs). Environmental stewardship projects are those that enhance the installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

Natural resources stewardship is the management of natural resources with the goal of maintaining or increasing the resource's value indefinitely into the future. The stewardship goal of NSFDL is to sustain multiple uses of natural resources over the long term while promoting the health of the ecosystems in which these activities occur (Appendix 1A, G5). Multiple uses include, but are not limited to, mission activities, forestry, outdoor recreation, aesthetics, and ecosystem preservation.

This INRMP identifies both stewardship and compliance projects that help meet natural resources management goals. However, funding priority will be given to projects that are required to

meet compliance criteria. Stewardship efforts that rely on volunteer labor and enjoy the support of the military community or have available alternate funding sources are also likely to be implemented.

## **I. INRMP REVIEW AND REVISION PROCESS**

INRMPs are long-term planning documents that require periodic reviews of management goals and practices in order to provide the opportunity to incorporate new science and information as well as assess the performance of management actions. In accordance with the Sikes Act, INRMPs must be reviewed annually and if necessary, revised at intervals of not more than five years (Appendix 1B, P19; Appendix 1C, M1). Per DoDM 4715.03, INRMP revisions are only required when the existing INRMP is determined to be inadequate for the conservation and rehabilitation of the natural resources on base, installation mission or physical features have changed significantly (such as following BRAC actions), new species are listed or listed species are identified on the installation, if the mission intensity or training is dramatically changed or increased or other factors that were not addressed in the existing INRMP are identified.

### **(1) INRMP Revision**

The INRMP revision process is multi-stepped and begins with notification of internal and external stakeholders and assembling a working group to draft and revise the INRMP. A description of the key steps to the revision of the NSFDL INRMP, as outlined in the 2006 INRMP Guidance for Navy Installations, follows:

1. When beginning the revision process, NDW and NSFDL, will advise all appropriate internal and external stakeholders of the intent to prepare or revise the INRMP within 30 days of starting such the action. When providing this notification to USFWS and VDWR, the installation should concurrently request that the USFWS and VDWR participate cooperatively in the development or revision of the INRMP.
2. During the draft development process, NSFDL will coordinate with all internal and external stakeholders. NSFDL should notify USFWS and VDWR of its intent to provide a draft INRMP for review and coordination at least 60 days prior to delivering the document.
3. NSFDL will provide the public with an opportunity to review and comment upon the draft INRMP through the NEPA process.

The public should be afforded a minimum of 30 days to review and comment.

4. NSFDL will send an initial draft INRMP to the USFWS field office and VDWR for review and comment.
5. The USFWS field office will provide written comments to the installation and to the VDWR director's office and will furnish copies of the letter to the Sikes Act Coordinator at the USFWS regional office.
6. VDWR will provide written comments to the installation and furnish copies of the letter to the Sikes Act Coordinator at the USFWS regional office.
7. NSFDL shall consider all comments received and shall send a final draft of the INRMP to the USFWS regional office and VDWR director's office with a letter documenting the actions taken on the draft comments. NSFDL will furnish a copy of the letter to the USFWS field office.
8. NSFDL will request that the USFWS and the state director provide an opportunity for all appropriate offices and divisions to review the final draft INRMP within 60 days of receipt, unless the participants mutually agree upon a longer review period because the installation has a particularly large or complex INRMP. Written concurrence will constitute "Mutual Agreement."

## **(2) INRMP Updates**

Per DoDM 4715.03, an INRMP may be simply updated to accommodate changes to the information contained in the INRMP that do not require substantial changes in the way natural resources are managed on the base. The DoD will provide a means to easily identify all such updates when forwarding the INRMP to the other internal and external parties for review.

## **(3) Annual Reviews**

Navy policy requires that INRMPs be reviewed annually by the installation with the cooperation of the appropriate field-level offices of the USFWS and state fish and wildlife agency (Appendix 1C, M2). Annual reviews will enable project tracking and assessment, will help facilitate adaptive management, and will be used to inform changes to future INRMP updates and revisions. Reviews may be accomplished via correspondence or in a meeting

between appropriate parties and is facilitated by the Metrics tool located on the Navy Conservation website.

The annual review is to assess and verify:

- INRMP effectiveness in preventing net loss capability of military installation lands to support the military mission,
- Current information on all conservation metrics is available,
- All "must fund" projects and activities have been budgeted for and implementation is on schedule,
- All required trained natural resources positions are filled or are in the process of being filled,
- Projects and activities for the upcoming year have been identified and included in the INRMP (an updated project list does not necessitate revising the INRMP),
- All required coordination has occurred
- All significant changes to the installation's mission requirements or its natural resources have been identified, and
- The INRMP for operation and effect by the field-level office of the USFWS, NOAA NMFS and VDWR

a. NOAA NMFS Cooperative Preparation and Review

While cooperative preparation with the NOAA NMFS is not required by the Sikes Act, cooperative preparation with NOAA NMFS is appropriate and should be a priority at installations adjacent to river, bay, and ocean waters when the near-shore environment will benefit from INRMP implementation. NOAA NMFS will take INRMPs into consideration when making critical habitat determinations for listed species under their jurisdiction and when critical habitat exclusions in the near-shore environment may be necessary to support the installation mission. Mutual agreement by NOAA NMFS is not required to complete an INRMP. While it must be sought when appropriate, failing to obtain mutual agreement by NMFS must not be considered an impediment to finalizing or implementing an INRMP (USN 2019a).

**(4) Annual Metrics**

Metrics have been developed to assess INRMP review and implementation, measure conservation efforts, ensure no net loss of military testing and training lands, understand the

conservation program's installation mission support, and indicate the success of partnerships with the USFWS, NOAA NMFS and VDWR. The metrics provide the means to evaluate performance in seven focus areas including Natural Resources management, Listed species and critical habitat, Recreation use and access and conservation law enforcement, Sikes Act cooperation, Team adequacy, INRMP implementation and INRMP support of the installation mission. This evaluation is accomplished on the Navy Conservation website.

Navy Conservation  
website:  
<https://conservation.dandp.com>

The data gathered in the annual metrics are used to support the DoD's Environmental Management Review and also informs the Defense Environmental Program's Annual Report to Congress.

As noted previously in Responsibilities, the ICO is required to participate in the annual natural resources program and INRMP metrics review. The ICO must further send a written report to USFWS, NOAA NMFS and VDWR following the annual INRMP metric review no later than 31 January of each year. The report must include the following:

1. A copy of the invitation to the annual INRMP metric meeting, including a list of participants,
2. An explanation and summary of INRMP metric results for the previous fiscal year,
3. Description of INRMP actions implemented in the previous fiscal year,
4. Description of benefits INRMP implementation provided to federally threatened and endangered species and/or benefits provided by the INRMPs Ecosystem Management for species that are proposed for listing or are candidates for listing under the ESA,
5. Description of changes to be made to the INRMP as a result of the annual review, if any, and
6. Whether agreement was obtained with the USFWS to recognize the annual meeting as a review of the INRMP for operation and effect.

#### **(5) Streamlined INRMP Update Review**

The July 2013 tripartite MOU between the DoD, USFWS, and the Association of Fish and Wildlife Agencies streamlined the review

process for INRMP updates. The mutual DOD and USFWS *Guidelines for Streamlined Review of INRMP Updates* (July 2015) clarifies and describes the process for reviewing and concurring on updates to existing INRMPs. Per the MOU, specific procedures for the streamlined review process will be as follows:

- Installations will contact the appropriate USFWS regional or field office. Usually (but not always), signature authority for INRMPs is at the field office level of Ecological Services; therefore, installations should contact their local Ecological Services field office first.
- When preparing an updated or revised INRMP for USFWS review, installations will clearly identify all changes made (e.g., highlight, track changes, written summary) when forwarding it for review.
- Once the appropriate USFWS office has received the updated INRMP, the USFWS office will acknowledge receipt and send the installation a proposed timeline for the expedited review with fifteen (15) days. This communication may be electronic, by fax, or in a written letter.
- The reviewing USFWS and state(s) offices will focus their review on those parts of the INRMP that reflect changes from the previously reviewed version, as indicated.

a. INRMP NEPA - Environmental Assessment

The Council on Environmental Quality (CEQ) defines an INRMP as a major federal action requiring NEPA analysis. As a result, the Navy Office of General Counsel has determined that Sikes Act requirements for INRMP implementation necessitate the preparation of NEPA documentation prior to INRMP approval. It is expected that annual updates and revisions would be covered under the original NEPA documentation unless there has been a major change in installation mission or program scope.

An Environmental Assessment (EA) was conducted for the implementation of the INRMP for NSFDL in September 2001 (USN 2001b). The INRMP and EA were made available for public review for 30 days. Public notices announcing availability were published in a major regional newspaper. The EA resulted in a Finding of No Significant Impact (FONSI) in November 2001.

Per ASN memo as of 07 February 2020, National Environmental Policy Act (NEPA) Streamlining, Waivers, and New Department of the Navy NEPA Regulations and 32 CFR Part 775, the DoN provided revised NEPA regulations for revisioning or updating INRMPs. CATEX 48 states that revisions or updates to INRMP's that do not involve substantially new or different land use or natural resources management activities and for which an EA or Environmental Impact Statement (EIS) was previously prepared that does not require supplementation pursuant to 40 CFR 1502.9(c)(1).

As a result, updates to the NSFDL INRMP will not require the development of a subsequent EA unless substantially new or different land use or natural resources management activities are proposed. During the next 5-year INRMP update, the need for another EA will be reviewed at that time based on the current mission and installation natural resources management. Individual projects and actions identified in the INRMP, however, may require further NEPA documentation.

**(6) Identifying Natural Resources Issues and Concerns**

Natural resources issues and concerns, which are discussed in detail for each management program element in Section 3, are defined as any action, process, activity, program, etc., that might present constraints to NSFDL operations and mission activities, readiness, and future planning at NSFDL. The NSFDL NRM is responsible for identifying issues and concerns by assessing current programs and evaluating the status and trends of natural resources.

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## **2. CURRENT CONDITIONS AND USE**

### **A. INSTALLATION INFORMATION**

#### **(1) General Description**

NSFDL is located on approximately 4,320 acres in the Northern Neck area of Virginia along the western shoreline of the Potomac River (Figure 2-1 and Figure 2-2). NSFDL is in King George County approximately 23 miles east of Fredericksburg, Virginia, 53 miles south of Washington, DC, and 65 miles northeast of Richmond, Virginia.

NSFDL is divided into two land masses by Upper Machodoc Creek. Mainside encompasses 2,678 acres on the northern side of Upper Machodoc Creek and is used for operational and support activities and military housing. Pumpkin Neck, located to the south of Upper Machodoc Creek, is 1,641 acres and supports two large testing areas and scattered testing facilities.

In addition, NSFDL maintains real estate transactions for 18 small range stations located along the Potomac River Test Range (PRTR) to support their primary tenant's, Naval Surface Warfare Center, Dahlgren Division (NSWCDD), over water testing activities. The stations range in size from 0.01 to 0.58 acres and support as little as a geodetic marker up to a fenced structure. From a natural resources program perspective, oversight is provided to address shoreline and erosion issues that may arise. The PRTR is 51 nautical miles long and covers 169 square nautical miles. Its availability for conducting overwater testing is the primary reason for the location of NSFDL.

#### **(2) Military Mission**

NSFDL is under the host command of the NSASP, which is also responsible for providing shore installation management for NSFDL. The mission of NSASP is to sustain combat readiness through effective and efficient shore installation management and support.



**Figure 2-1. Naval Support Facility Dahlgren General Location Map**

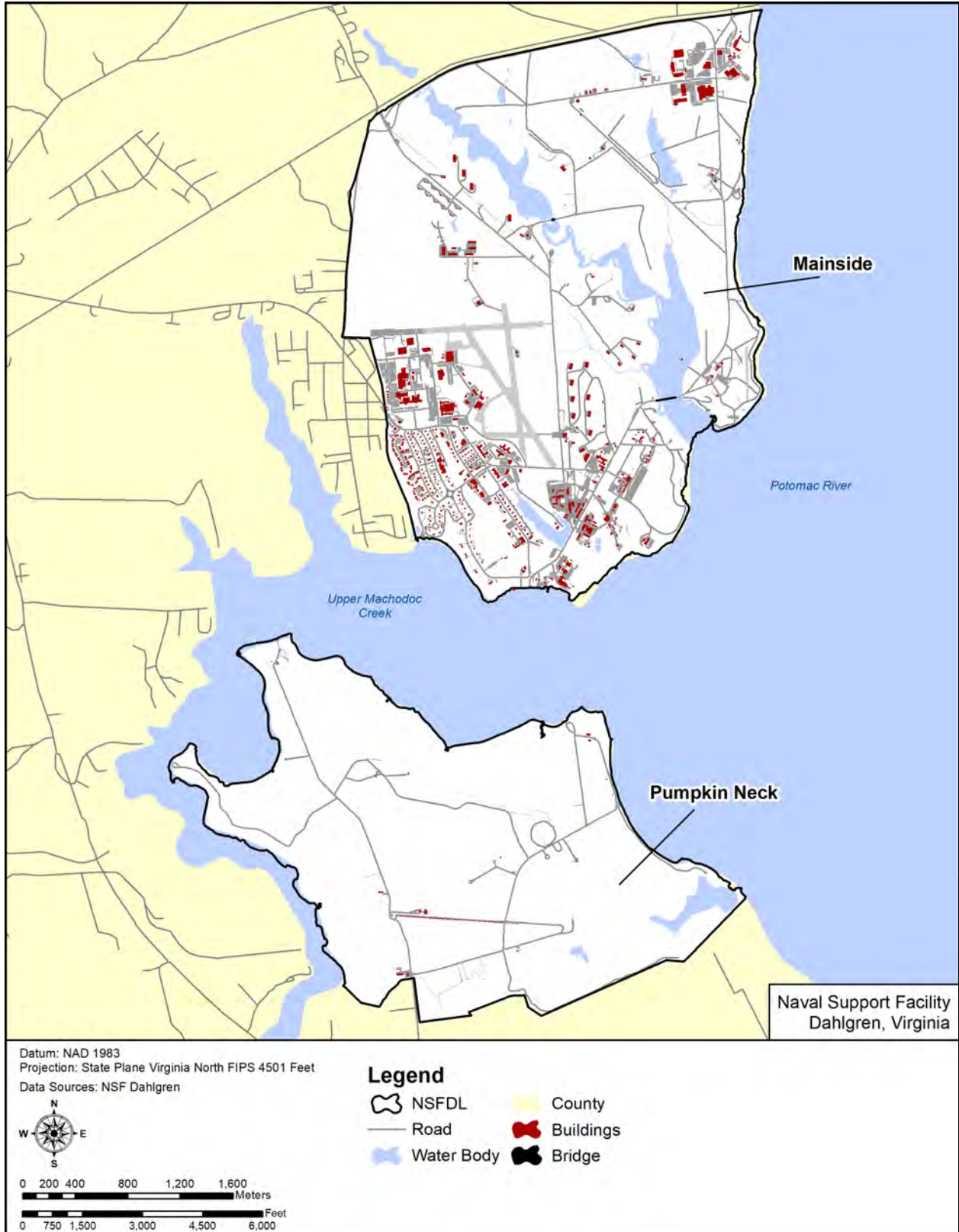


Figure 2-2. Naval Support Facility Dahlgren Installation Boundary

Shore installation management functions under NSASP authority encompass all land, buildings, and support services. As the landlord, NSASP provides management functions for all tenants of the base, including:

- Personnel Support—Quality of Life
- Morale, Welfare and Recreation
- Child Care
- Public Safety—Physical Security
- Law Enforcement, Fire Department
- Environmental Protection
- Occupational Safety and Health
- Waste Management
- Supply—Materials management
- Property disposal and warehousing
- Public Affairs

NSFDL hosts the leading naval facility for scientific and technological research, development, testing, and evaluation in such diverse areas as surface ship combat systems, ordnance, strategic and strike systems, and theater warfare. The installation continues to support the major testing area for naval gun ballistics and has six ranges and test areas for accomplishing this mission. The installation also supports an airfield that is currently used for helicopter operations. The 4,191-foot asphalt runway, once used to support fixed-wing aircraft, has been decommissioned.

### **(3) NSFDL Supported Commands and Tenant Activities**

NSFDL supports several tenant commands. NSWCDD is the major tenant at NSFDL. The mission of NSWCDD focuses on research, development, test, and evaluation (RDT&E) in the fields of:

- Military safety testing
- Integrated warfare systems
- Weapons and ammunition
- Sensors and directed energy
- Homeland and force protection

Another tenant command includes Aegis Ballistic Missile Defense, which is the sea-based element of the Missile Defense Agency's Ballistic Missile Defense System. Aegis Ballistic Missile Defense leverages and builds upon capabilities inherent in the Aegis Weapon System, Standard Missile, and Navy Ballistic Missile Command, Control, Communications, Computers, and Intelligence systems. The Aegis Combat System (known as "the Shield of the Fleet") is an advanced, automatic detect-and-track, multi-function three-dimensional passive electronically scanned radar array.

The Center for Surface Combat Systems (CSCS) & Aegis Training and Readiness Center are broadly responsible for the Navy's Surface Combat Systems and Operations Training for Officers and Enlisted sailors. CSCS holds the training for 10 Enlisted Ratings, to include Fire Controlmen, Electronic Technicians, Interior Communications, Sonar Technician (Surface), Torpedomen, Minemen, Operations Specialists, Boatswain's Mate, and Quartermasters.

The Joint Warfare Analysis Center (JWAC) is a science and engineering institution that contributes to our nation's security by recommending strategic technical solutions. JWAC uses social and physical science techniques and engineering expertise to assist our nation's warfighters.

#### **(4) Constraints**

The INRMP development and implementation process at NSFDL must address various constraints to ensure compatibility with the military mission, safety, and various federal, state, and Navy regulations (Appendix 1C, M3). Current and future land uses at NSFDL are limited by a number of constraining factors. Natural and cultural resources constraints to the military mission include wetlands, habitat for rare, threatened, and endangered species, and sites on which significant cultural resources occur. Other restrictions on mission and land use are due to operational, environmental, and safety constraints. When combined, nearly 78 percent of Mainside and 92 percent of Pumpkin Neck have some type of constraint on the military mission and land use activities (Figure 2-3). The INRMP development and implementation process at NSFDL must address various constraints to ensure compatibility with the military mission, safety, and various regulations. Descriptions of constraints to the military mission and land use at the installation follow.

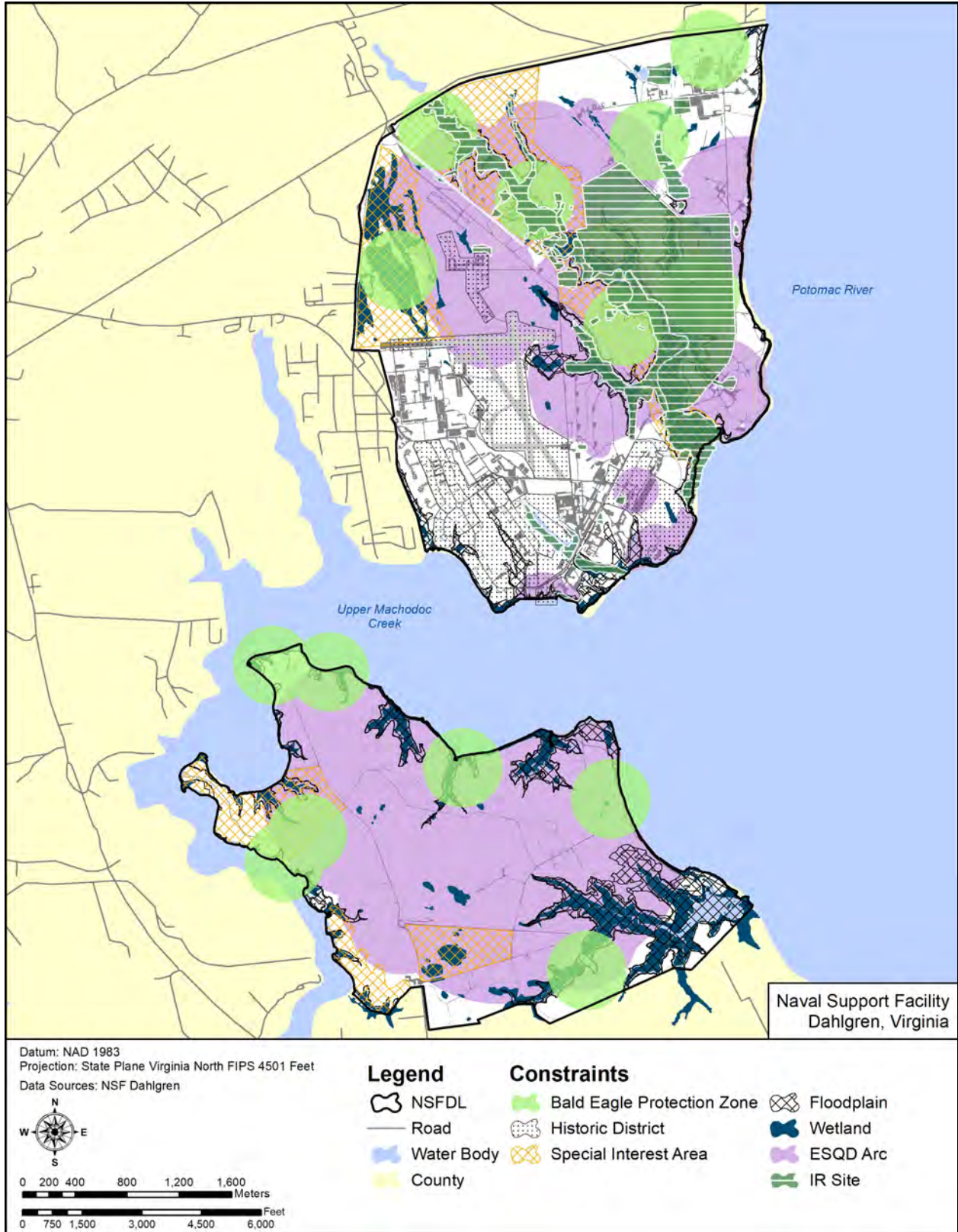


Figure 2-3. Naval Support Facility Dahlgren Constraints Map

a. Mission and Safety Related Constraints

An important component of the NSFDL mission involves testing of naval gun ballistics. Therefore, the installation has facilities for storage, testing, and detonation of explosives. Testing and evaluation of energetic products is accomplished on designated ranges. In accordance with DoD Directive 4715.11, it is NSWC policy to ensure the long-term viability of its ranges while protecting human health and the environment. Accordingly, natural resources program activities are designed to help ensure sustainable use of NSWC ranges.

Explosive Safety Quantity Distance (ESQD) arcs have been established around these facilities to protect personnel and real property. Restrictions are placed on the types and timing of activities that can occur within these ESQD arcs to ensure safety. Approximately 2,094 acres on Mainside and 1,507 acres on Pumpkin Neck are constrained by ESQD arcs.

b. Natural Resources Constraints

The primary biological constraints include issues relating to rare species and wetlands protection, which are driven by federal and state regulatory requirements. In 2020, active bald eagle (*Haliaeetus leucocephalus*) nest protection zones constrained approximately 482 acres on Mainside and 323 acres on Pumpkin Neck when considering the current national Bald Eagle Protection Guidelines. The larger buffers zones are sought for protection when feasible. Specific land use restrictions are described in the Installation Bald Eagle Management Plan (USN 2007b) and maps are updated annually to reflect nest status. Wetlands, water bodies, and floodplains constrain an additional 540 acres at Mainside and 380 acres at Pumpkin Neck. Areas with Significant resources, designated as Special Interest Areas (SIAs), can potentially constrain an additional 1,042 acres. Portions of the SIAs that are not constrained by wetlands or eagle protection zones, however, may be available for compatible land uses.

c. Contamination Related Constraints

Ordnance contaminants and Solid Waste Management Units (SWMU's) or hazardous waste sites represent constraints for the implementation of natural resources management activities throughout NSFDL. Past land uses have rendered certain areas on NSFDL as safety concerns due to potential unexploded munitions. Entry to certain areas is prohibited and all ground disturbing activities must consider the potential for live munitions. Areas of low and high potential for ordnance contamination have been identified and mapped. Ordnance contamination restricts land use on approximately 770 acres (47 percent) of Pumpkin Neck.

A number of past activities at NSFDL have generated and released hazardous wastes. Prior to 1980, some wastes were disposed of on base in landfills or disposal areas, buried, or burned during ordnance disposal activities. Wastes included solvents, fuel, oils, battery acid, paint, ammunitions, and explosives. In addition, leaks from underground storage tanks (USTs), oil water separators, vehicle maintenance and repair, and ordnance testing activities have caused inadvertent releases of hazardous materials. As a result of past activities, environmental contaminants have been detected in the soil, surface water, and sediment at some sites.

As of Dec 2020, the Navy has identified 73 potentially contaminated sites. Of the 73 sites identified for environmental investigation, 55 underwent clean-up, remediation, or removal actions and were subsequently closed out or require no further action. Three of the sites are on active ranges which defers investigation/remediation actions until the range is closed or transferred. Of the 15 remaining sites, ten are in the Long Term Monitoring program and five are open and under investigation (USN 2017a). The NRM provides land management support for certain closed restoration sites to ensure compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements and to benefit natural resources.

d. Cultural Resources Related Constraints

The presence of cultural resources places a constraint upon mission implementation and land use activities. Portions of NSFDL are eligible for listing as Historic Districts on the National Register of Historic Places and several archaeological sites have been identified at the installation. Due to the installation's location on Virginia's Northern Neck, areas that have not yet been surveyed are likely to yield information on a variety of prehistoric and historic contexts from several developmental periods. The National Historic Preservation Act (NHPA) and the Archaeological Resources Protection Act (ARPA) mandate protection of significant cultural resources. Therefore, cultural resources protection must be addressed for all ground disturbing activities. When necessary, appropriate surveys are conducted, and the State Historic Preservation Office is consulted in accordance with Section 106 of the National Historic Preservation Act. Similar to the INRMP, the Cultural Resources program is managed using the Integrated Cultural Resources Management Plan (ICRMP) which was updated in 2020 (USN 2020a).



## **(5) Opportunities**

Areas with little or no restrictions on RDT&E provide the best opportunities for mission growth and change. At NSFDL these areas are largely restricted to undeveloped lands in the northern portion of Mainside and at the north end of Pumpkin Neck Road on Pumpkin Neck (Figure 2-4). The total area of unconstrained land is approximately 590 acres at Mainside and 125 acres at Pumpkin Neck. Given the current mission of the installation, however, these lands provide valuable additional buffers for noise and safety issues. Access to these areas may also be limited by existing mission activities.

Additional constraints on RDT&E activities and the military mission at NSFDL could occur through land development and other types of encroachment in the area surrounding NSFDL. The best potential opportunities to prevent future encroachment will involve partnering with adjacent land owners and municipalities to prevent the development of incompatible land uses before they become established. Potential encroachment partnering areas may exist on the undeveloped lands to the north and west of Mainside and to the south of Pumpkin Neck (Figure 2-4). An Encroachment Action Plan (EAP) that identifies potential partnering opportunities was prepared for NSFDL (USN 2015).

## **(6) Operations and Activities**

### **a. Ranges and Test Areas**

NSFDL maintains a complex of land and water ranges for the RDT&E of live and inert ordnance, weapon system integration, and weapon system components. As such, the installation has six land ranges and one water range to accomplish this mission (Figure 2-5). The five land ranges on Mainside are located on the eastern side of the installation adjacent to the Potomac River and include Main Range, Terminal Range, Missile Test Range, AA Fuze Range, and Machine Gun Range (Table 2-1). The Potomac River Test Range, which is adjacent to and south of the installation, encompasses 169 square nautical miles. The Pumpkin Neck Range consists of approximately 1,641 acres and includes two major operational areas: Churchill and Harris. The Range Management Plan (USN 2017b) establishes and defines procedures, necessary actions and action proponents for the comprehensive management of NSWCDD ranges at NSFDL. The Range Condition Assessment (USN 2016a) and Water Range Sustainability Environmental Program Assessment (USN 2012) obtains and reevaluates information needed to assess and manage the present environmental condition of each land and water based range, respectively.

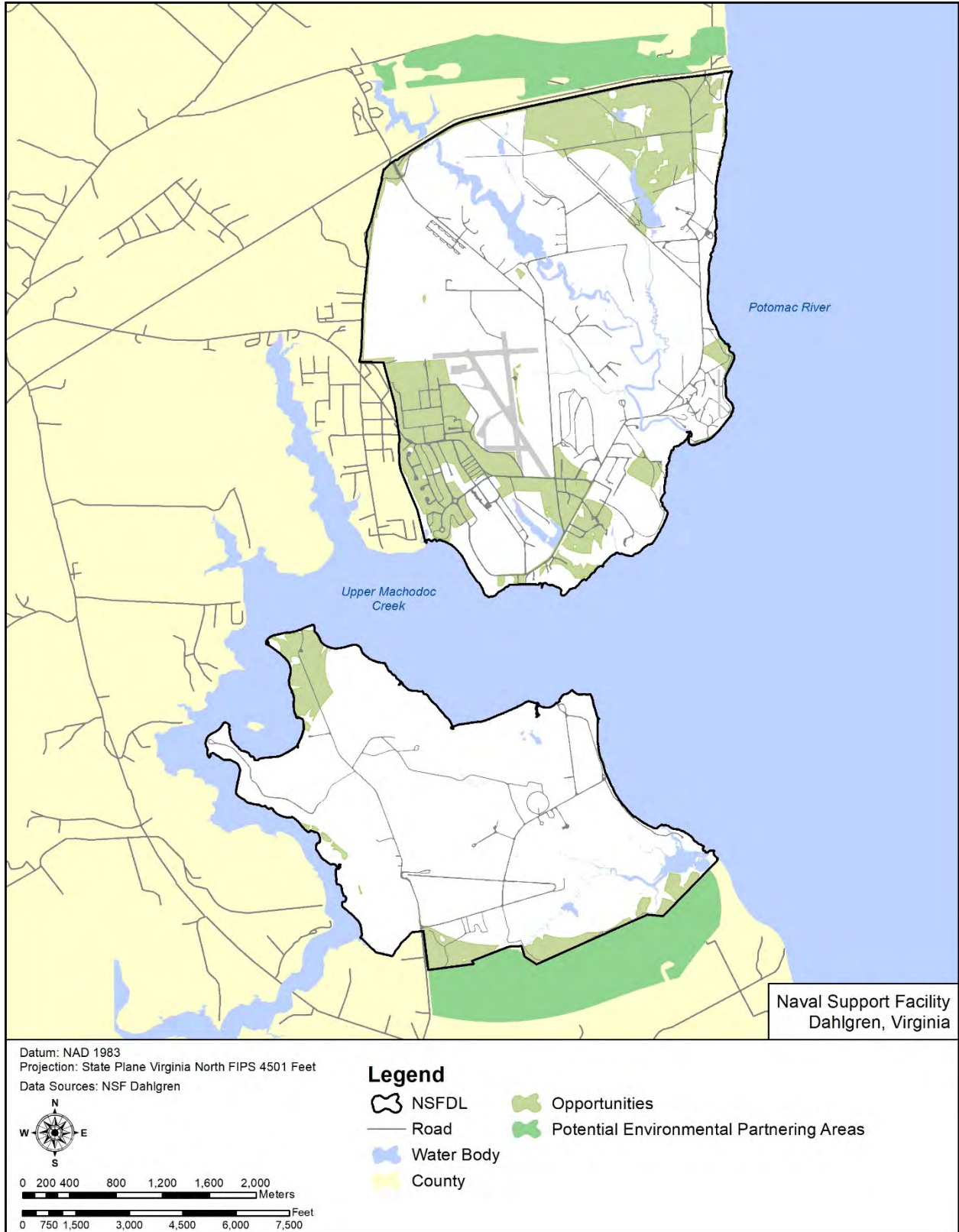
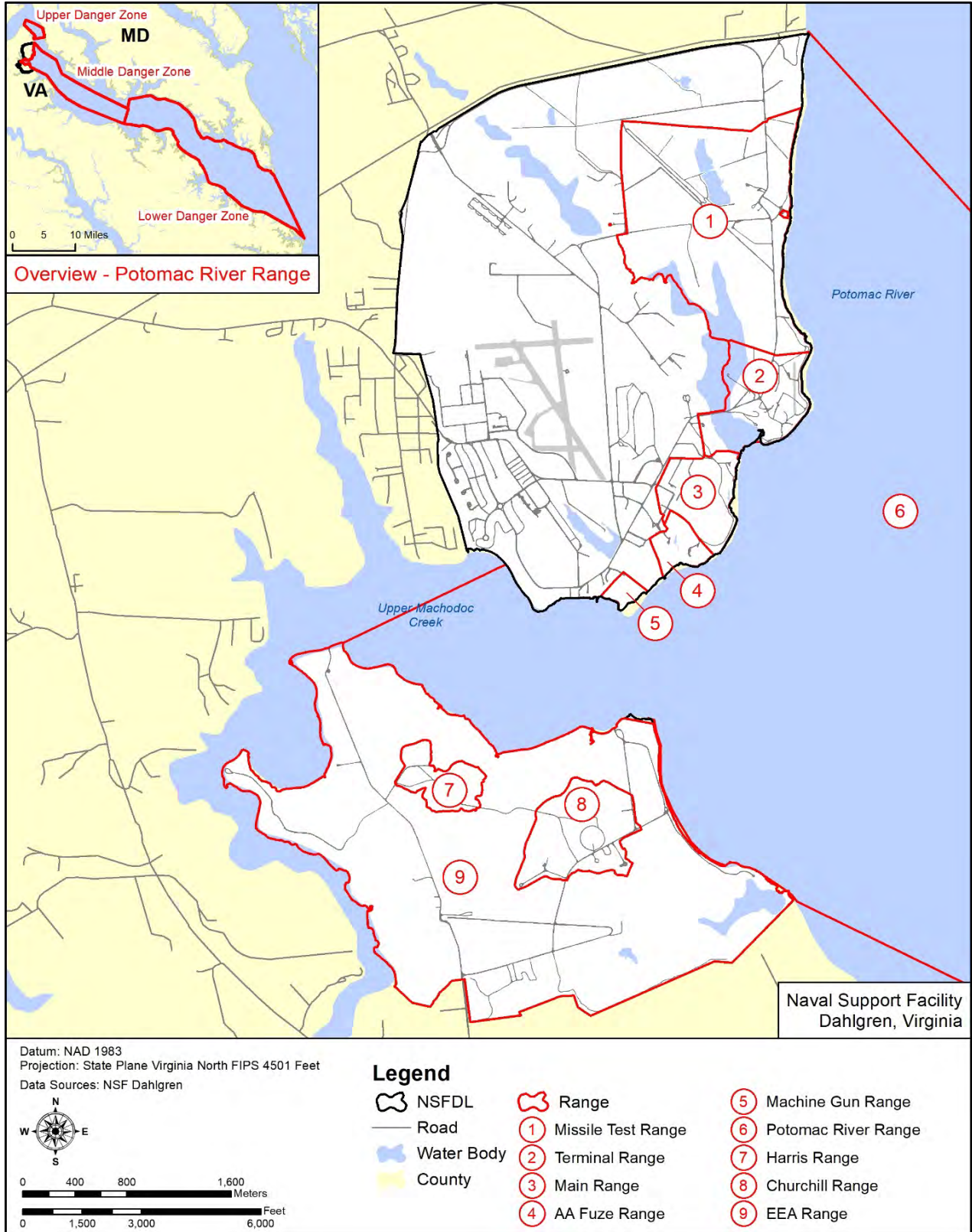


Figure 2-4. Naval Support Facility Dahlgren Opportunities Map

**Table 2-1. Test Ranges at Naval Support Facility Dahlgren**

Range	Purpose
<b>Mainside (Potomac River Test Range)</b>	
Main Range	Proof testing gun barrels and assemblies; gun fire control testing; weapon system integration and testing; and passive and active Radio Frequency (RF) and electro-optical sensors.
Terminal Range	RDT&E of emerging technology projectiles and weapon systems; Unmanned Air Vehicle (UAV) integration; ballistics evaluation and High Energy Laser (HEL) testing
Missile Test Range/ EOD Training Range	EOD training (non-fragment producing); overland T&E of vehicles and special weapon components; HEL, electromagnetics, radar and sensor testing
Machine Gun/Small Arms Range	Indoor and outdoor ranges for small arms training, testing and evaluation; and HEL testing
AA Fuze Range	Explosive fuze and gun testing; HEL testing
Potomac River	Testing of long-range naval gun ballistics over a 20-mile reach of the Potomac River; warfare systems integration; ordnance, lasers, EM energy, sensors, unmanned systems and chemical and biological simulant testing; and RDT&E of directed energy systems/weapons
<b>Pumpkin Neck</b>	
Pumpkin Neck/EEA Range	RDT&E and safety testing of ordnance, weapon systems and components; thermal treatment of explosives; and RDT&E of directed energy weapons, electromagnetics, sensors, unmanned systems and HEL.



**Figure 2-5. Naval Support Facility Dahlgren Ranges**

**Mainside Firing Ranges.** Most test firing that occurs on Mainside is conducted over the Potomac River in the PRTR. The ranges are used for research, development, test, and evaluation purposes that include the firing of inert and occasionally live munitions into the Potomac River. Firing originates from the Potomac River Test Ranges with approximately 4,700 primarily inert rounds fired annually in recent years. The impact area extends 27,000 yards down river, although most impacts occur at 10,000 to 12,000 yards. Patrol boats, manned range stations, and cameras are used to clear the river prior to and during testing. Radar is also used to scan the Special Use Airspace above the PRTR when tests require firing above 2,000 feet.

Potential impacts to the environment include the release of small arms ammunition, naval projectiles, and other test material into the Potomac River, oil and gas leaks from patrol boats, and incidental take of wildlife during test firing. Impacts from these activities are addressed in the NSWCDD Environmental Impact Statement (EIS) for outdoor RDT&E activities at NSFDL (USN 2013a). The EIS evaluated the potential environmental effects of baseline (existing) range operations and from expanding range operations. Issues evaluated include the following areas: (1) land use, plans, and coastal zone consistency; (2) physical resources—air quality and water quality; (3) noise from detonations and the firing of guns; (4) biological resources including wildlife, submerged aquatic vegetation (SAV), threatened and endangered species and otherwise protected species (shortnose and Atlantic sturgeons, marine mammals and migratory birds), fisheries, including an analysis of essential fish habitat (EFH), and special biological resource areas; (5) socioeconomic issues, environmental justice, and risks to children; (6) cultural resources—effects on sites on or near the Potomac River; (7) safety—cleanup, handling, storage, and transport of hazardous materials, unexploded ordnance, lasers, electromagnetic fields, and chemical and biological simulants.

The Notice of Intent for developing this EIS was published in the Federal Register on June 18, 2007 and public scoping occurred in July 2007. The Draft EIS Notice of Availability was published on 17 Aug 2012; three hearings were held in Sep 2012. The public comment period ended 01 Oct 2012. A Record of Decision was issued in Nov 2013.

**Chemical Simulant Testing.** Infrequent chemical simulations are conducted over the Potomac River Test Range to test sensor capabilities. Testing is conducted by producing a vapor cloud of chemical stimulant, such as SF<sub>6</sub> (an inert gas), triethyl phosphate, and glacial acetic acid. Chemical simulant testing occurs every

two to three years. An EA, conducted on this testing in 2003, resulted in a finding of no significant impact (FONSI) to natural resources or the human environment.

**Electromagnetic Railgun.** The electromagnetic railgun works by sending electric current along parallel rails to propel a non-explosive projectile at a very high rate of speed. An approximate 9.3-acre overland range is used to test and evaluate the components of this new weapons system. Future testing may bring the Navy closer to a new naval gun system capable of extended ranges against surface, air, and ground targets. Potential impacts from railgun testing include accidental fire ignition and noise, loss of adjacent forested habitat, and the potential for the incidental take of wildlife.

**Directed Energy Program.** Test activities conducted by the Directed Energy Program include RDT&E of High-Power Microwave (HPM) and High Energy Laser (HEL) systems. The effects of the environment on high energy laser effectiveness are evaluated. Tests consist of firing high energy lasers (up to 100 kilowatts) over land or water at targets within a laser-absorbing backstop. Road/water access to the area is restricted and remote cameras showing the test area are monitored to make sure the area is clear of any obstacles prior to and during testing.

An environmental assessment conducted on this action found potential impacts to birds in connection with the counter-explosives testing because birds can be disoriented by artificial light. However, the impacts are expected to be negligible and minor.

**Electromagnetic (EM) Sensor Testing.** Performance of detection and engagement systems such as radars and electro-optical tracking systems is evaluated on land and water ranges. Tracking and sensing tests with low, over-water targets allow for evaluation of background clutter, reflectivity, multi-path conditions and wave height effects.

**Mission Area.** The 1,593-acre Mission Area consists of property adjacent to but not designated as part of the PRTR complex. This area supports a myriad of outdoor RDT&E exclusive of ordnance testing. The Mission Area includes outdoor testing at such places as the Maginot Open Air Test Site (MOATS), ground planes, yardcraft, airfield hangers and runways.

**Ground Plane Testing. Mission Area** ground plane testing examines the effects of a ship's electromagnetic environment on nearby weapons systems. During testing an electromagnetic field with a

frequency range of 2 megahertz (MHz) to 300 gigahertz (GHz) and a power density level up to 18 milliwatts per square centimeter (mW/cm<sup>2</sup>) is generated and directed at the test object using a radio frequency antenna. Power levels generated by the electromagnetic field decline quickly in both the horizontal and vertical direction as distance from the source increases. For most tests, the power level decreases to less than 0.000005 mW/cm<sup>2</sup> at 50 meters from the source. This level is well below the level considered safe for human exposure by the Federal Communications Commission Regulations (1997) and is not likely to negatively affect wildlife or the environment.

**Pumpkin Neck/Explosive Experimental Area Range.** The Explosive Experimental Area (EEA) Range encompasses all of Pumpkin Neck. Data collection from testing Insensitive Munitions (IM) is the primary type of test conducted at the EEA Range. These evolutions assist in the verification that ordnance is safe to store, transport, handle and use for its intended purpose after being subjected to a series of kinetic and environmental influences indicative of typical military exposure. Furthermore, these data are utilized to determine final munitions classifications.

The EEA Range includes Churchill and Harris Ranges. Churchill and Harris Ranges are cleared areas, while the rest of Pumpkin Neck is comprised primarily of forests, wetlands, and streams. Both ranges are used for explosive testing. Churchill Range contains a RCRA-permitted site used for open burn (OB)/open detonation (OD). OD is used for the treatment of outdated, unsafe, or unusable ordnance. Ordnance may be covered with dirt during OD to reduce fragmentation and noise. OB is used for treatment of outdated, unsafe, or unusable ordnance or propellant.

Potential impacts to wildlife from these operations include disturbance from loud noise, fragmentation impacts, and loss of nesting, foraging, and roosting habitat from accidental fires started by the tests. All of these potential impacts are considered rare and minor.

## **(7) History and Pre-Military Land Use**

### **a. Historic Land Use**

At the time of European arrival in what is today northern Virginia, the land was occupied by groups of Algonkian-speaking Native Americans. Their villages were located along major drainages, including the Potomac River, while smaller settlements and hunting camps were found along tributaries. In 1608, Captain John Smith explored the Northern Neck area including the area known today as King George County. He reported lands rich in natural resources

which were occupied by Native Americans of the Powhatan Nation (USN 2020a).

By the early 1600s when the Virginia Colony was established, Native American villages dotted the riverbanks. Beginning in the seventeenth century, the earliest European settlers established large plantations along the larger rivers that flowed to the Chesapeake Bay. As the Colony began to grow, settlers built farms and towns along the rivers of the Northern Neck. Named for King George I of England, King George County was formed by an act of assembly passed in November 1720, by dividing Richmond County into two distinct counties. Rural growth of the area continued through the eighteenth century and the primary focus was the production of agricultural goods (USN 2020a).

The property was first used as a naval proving ground when operations were moved from the Naval Surface Warfare Center, Indian Head Division in Maryland to Dahlgren in 1919. The location was chosen because of its remote geography and ability to provide larger test range areas along the Potomac River. Prior to the naval activities, the property consisted of open farmland with few forested areas. No utilities or infrastructure were present until naval activities commenced at the property. During the initial military uses of the property at Dahlgren, the property contained residential areas known as "Boomtown Housing." This housing is believed to be the first true single-family home community in the unincorporated township of Dahlgren. Boomtown began because of Dahlgren's growing population during the onset of World War II.

Management of the Dahlgren base transferred from NSWCDD to NDW and the facility was redesignated as NDW West Area. In 2005 the NDW West Area became NSFD, a component of NSASP.

b. Current Land Use

Existing land uses at NSFDL include housing, RDT&E operations, support facilities, administration, community use and personnel support, and undeveloped open space (Figure 2-6). The majority of the developed land uses are located on Mainside, whereas Pumpkin Neck is largely undeveloped with scattered testing facilities and two large open test ranges.



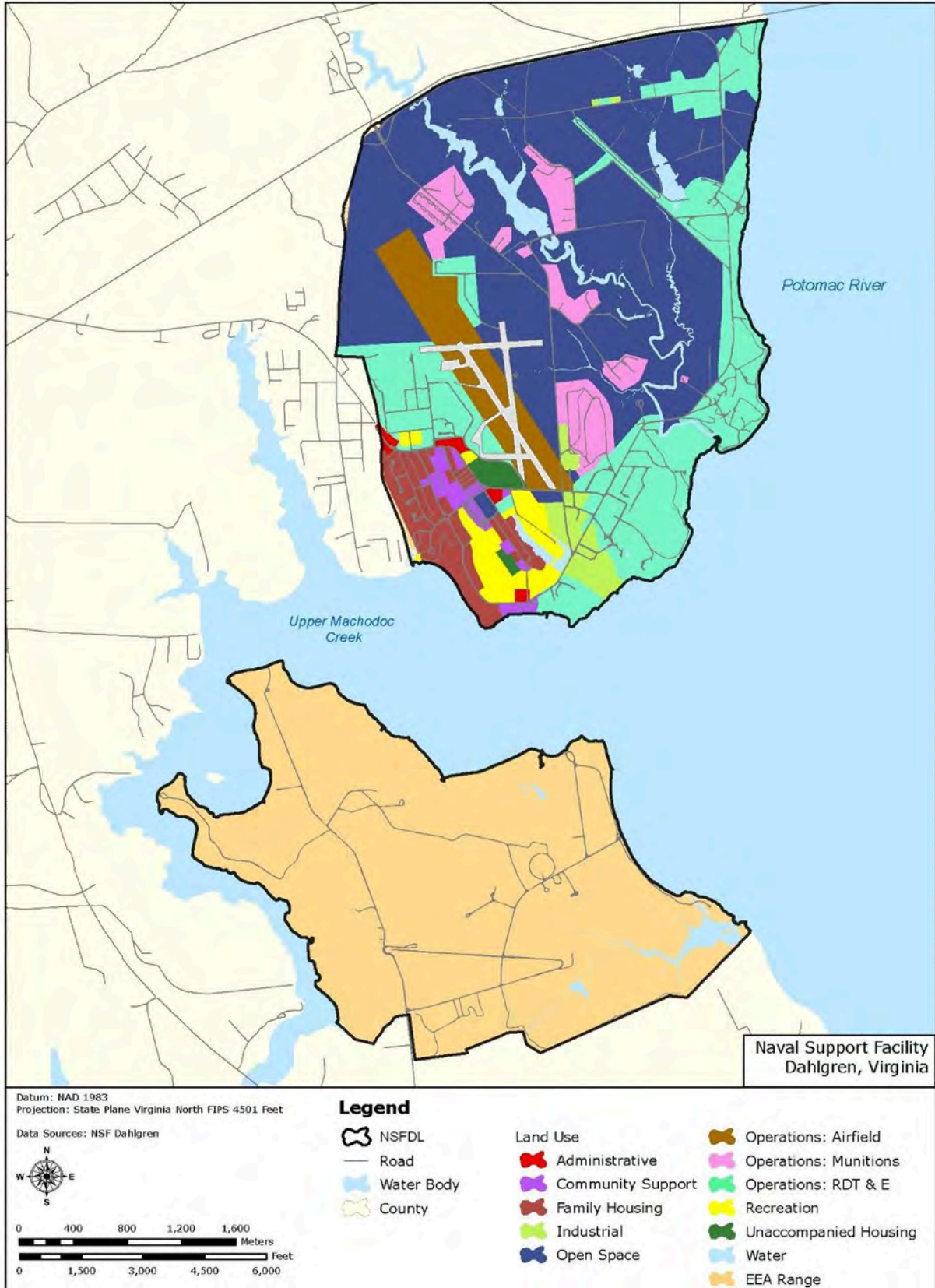


Figure 2-6. Land Use at Naval Support Facility Dahlgren

A total of 690 buildings covering over 89 acres are found on NSFDL. The buildings include administrative, operations, and miscellaneous purpose structures. Additional residential housing including 232 single family homes and townhomes are found on the property. Most of the buildings and housing is located on Mainside. An airfield with more than six acres of pavement is in the southern portion of Mainside. Approximately 53 miles of road cover 141 acres that includes 4 miles of residential roads.

A wastewater treatment plant exists at the southern end of Mainside. Underground and aboveground utilities provide electricity throughout NSFDL. Deep water wells that draw water from the underlying aquifer exist on the property to provide a potable water supply to support the military mission and personnel needs throughout the installation.

#### **(8) Regional Land Use**

NSFDL is in the northeastern-most portion of King George County, which is a rural area largely comprised of forest and agricultural land. King George County (KGC) developed a new comprehensive plan in 2019 which included some major revisions to the 2013 plan. The Dahlgren and Courthouse Settlement Areas have been shifted and recategorized to accommodate population and employment growth in a compact pattern focused along the major routes of 3 and 301. The town of Dahlgren is located southwest of the installation's main gate. The Courthouse community area contains most of the county's public facilities and is situated in the center of the county. Route 206 extends northward into the installation's main gate, attracting businesses and providing access to residential areas off the main highway. The majority of residences in the vicinity of the installation are also located in this area. The plan also promotes compatible land uses proximate to NSFDL through the establishment of a Military Overlay Zoning District (KGC 2019).

Population growth is a major issue facing King George County and other counties in the region. The King George County Comprehensive Plan estimates the county population will grow from the 2017 population estimate of 26,337 to a population of 37,365 by 2030. The Dahlgren settlement area immediately surrounding NSFDL is designated as a rural development area and has both residential and agricultural parcels. Commercial development along Route 301 immediately adjacent to the installation has accelerated in recent years. The project to replace the Nice-Middleton Bridge across the Potomac River began in 2020 and will likely result in a significant increase in development along this corridor on both sides of the river. Rapid residential growth and development along the Potomac River waterfront in Charles County, Maryland is also occurring (Charles County 2016).

**B. GENERAL PHYSICAL ENVIRONMENT**

**(1) Climate**

The climate of NSFDL is classified as modified continental. Continental air masses from the west are moderated by mixing with marine-type air masses present to the east over the Atlantic Ocean. Summers are warm and winters are relatively mild. Relative humidity is fairly high in the area because of the influence of the Atlantic Ocean.

The average annual precipitation for NSFDL is 41.1 inches and is distributed uniformly throughout the year except for a slight increase in July and August (Southeast Regional Climate Center 2018) (Table 2-2). Droughty periods lasting several weeks may occur, especially in the fall. In the summer and fall, extremely high precipitation events may occur as a result of hurricanes.

**Table 2-2. Weather Data, Fredericksburg, VA (1930-2018)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
<b>Ave. Max. Temp. (°F)</b>	45.9	49.2	58.0	69.0	78.0	85.7	89.3	87.4	81.5	70.8	60.0	48.9	68.6
<b>Ave. Min. Temp. (°F)</b>	32.4	33.6	39.8	48.3	57.5	66.0	70.9	69.9	64.6	53.3	43.6	35.5	51.3
<b>Total Precip. (inches)</b>	3.2	2.65	3.5	3.0	3.6	3.36	4.5	4.1	3.5	3.4	3.1	3.0	41.1
<b>Ave. Snow Fall (inches)</b>	5.2	4.1	2.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.3	14.6

Source: Southeast Regional Climate Center 2018

The average annual wind speed is 7.6 mph. Strongest winds occur in late winter and early spring. Mean wind direction is from the south. During February and October, the prevailing wind direction is slightly east of north. High winds are not uncommon and usually occur during hurricanes and other coastal storms. Hurricanes are most common in August and September and produce high winds and flooding on Upper Machodoc Creek and the Potomac River.

Climate change is referred to by the National Academy of Sciences as any significant change in measures of climate (i.e., temperature, precipitation, or wind) lasting for an extended

period (decades or longer). Global warming is one aspect of climate change. DoDI 4715.03 of 18 Mar 2011 requires assessing the potential impacts of climate change to natural resources on DoD installations and to take steps to implement adaptive management strategies to ensure the long-term sustainability of those resources. EO 13653 of 6 Nov 2013 directs federal agencies to plan for climate change related risks. This was followed by DoD Defense Manual 4715.03, Enclosure 8, of 25 Nov 2013 that provides DoD components with tools, resources, and guidance for updating an INRMP to include climate change considerations. Finally, Department of Defense Directive (DoDD) 4715.21 of 14 Jan 2016 directs DoD components to identify and assess effects of climate change on the mission, take climate change effects into consideration when developing plans and implementing procedures, and anticipate and manage climate change risks to build resilience. Potential impacts to installation natural resources over the long term may include:

- Loss of tidal wetlands due to inundation
- Changes in species composition and abundance due to warmer temperature
- Degraded aquatic ecosystems due to higher temperatures and flash-runoff
- Decline in forest biodiversity

Recommendations to address the impacts of climate change to forests and terrestrial ecosystems, aquatic ecosystems, and water resources may include:

- Accelerate protection of at-risk species and habitats
- Accelerate implementation of stream restoration practices
- Remove barriers to habitat connectivity
- Reduce impervious surface cover
- Prepare for new or expanding ranges of invasive species
- Accelerate shoreline stabilization projects
- Provide landscape recommendations that favor temperature and precipitation tolerant species
- Retain and expand existing forest cover

## **(2) Topography**

NSFDL is located in the Coastal Plain physiographic province, which extends from Cape Cod south to Florida along the Atlantic Ocean and west to Texas along the Gulf Coast. The topography of the Coastal Plain is a terraced landscape that stair-steps down to the coast and to the major rivers. In Virginia, the Coastal Plain is characterized by low relief, with elevations ranging from sea level to 400 feet above mean sea level (MSL). The Chesapeake Bay and Potomac River are prominent features of the Coastal Plain in the vicinity of NSFDL. Elevations at NSFDL range from 0 to 35 with generally gradual slopes (Figure 2-7). However, steep slopes are located along some shoreline sections of the installation. The broad, low-lying area surrounding and including NSFDL is interpreted as being a past shore of the Potomac River where alluvial deposition has produced the present flat topography.

## **(3) Geology**

The Atlantic Coastal Plain is underlain by a broad wedge of unconsolidated marine and fluvial sediments that begins at the fall zone and increases in thickness towards the Atlantic Ocean. Much of the sediments are comprised of late Jurassic and Cretaceous clay, sand, and gravel that were stripped from the Appalachian Mountains and carried eastward by rivers and deposited in the Atlantic Ocean basin. Overlaying these materials are layers of fossiliferous marine sediments that were deposited by repeated marine transgressions during the Tertiary period. Fluvial and estuarine sand, silt, and clay from the Quaternary period form a thin layer across most of the coastal plain (USGS 1992).

NSFDL is underlain by the Nanjemoy Formation. The Nanjemoy Formation is composed of alternating quartz and glauconite sands, clays, and calcitic units of shells and cavernous shell limestone. The basal unit of the formation, the Marlboro Clay, is a 20 to 30-foot alternating pinkish-orange and dark-gray clay. Gypsum crystals or rosettes common in caverns are formed at the intersection of joint planes, especially in the clay section.



Figure 2-7. Contour Map of Naval Support Facility Dahlgren

**(4) Soils**

The USDA SCS completed soil mappings for NSFDL in 1974, as part of the Stafford and King George Counties Virginia Soil Survey (USDA SCS 1974) and later updated this information as part of an independent soil study completed specifically for NSFDL (USDA SCS ND). Soil mappings were also updated by the US Natural Resources Conservation Service (NRCS). Physical, chemical, and biological soil-forming processes operating on the sediments of the Nanjemoy formation have produced numerous soil types at NSFDL. The 28 soil types found on NSFDL are shown in Figure 2-8 and Table 2-3 (USDA SCS ND). The Tetotum-Bladen-Bertie soil association is found at NSFDL and surrounding area. This association consists of deep, moderately well-drained or poorly drained soils having clay loam, sandy clay loam, or clay subsoil, and occurring in broad, low-lying areas.

Three of the soils series at NSFDL are classified as hydric by Natural Resources Conservation Service (NRCS 2021). Hydric soils typically support hydrophytic vegetation and occur in wetland areas. The hydric soils at NSFDL are Bladen loam, Fallingston very fine sandy loam, and Pooler loam. Bladen loam is located throughout large areas of Mainside and Pumpkin Neck. Fallingston very fine sandy loam is also located throughout Mainside and Pumpkin Neck. The texture of this soil ranges from very fine sandy loam to sandy clay loam and is common where the high-water table is at the surface or within a depth of 1.5 feet during wet periods. Pooler loam is located only within the western portion of Pumpkin Neck. Textures of this soil range from heavy clay loam to very fine sandy loam. The seasonal high-water table is usually at a depth of 1 to 1.5 feet in winter and spring.

**Table 2-3. Soils at Naval Support Facility Dahlgren**

Soil Type	Acreage	Percent of Total
Alluvial Land	61.87	1%
Bertie Very Fine Sandy Loam	692.83	17%
Bladen Loam	1211.06	29%
Bourne Fine Sandy Loam	67.82	2%
Cut and Fill Land	78.32	2%
Fallsington Very Fine Sandy Loam	294.09	7%
Fresh Water Swamp	43.21	1%
Galestown-Sassasfras Complex	209.43	5%
Pooler Loam	78.42	2%
Sand and Gravel Pits	33.42	1%
Sassasfras Fine Sandy Loam	300.56	7%
Tetotum Fine Sandy Loam	431.60	10%
Tidal Marsh	287.22	7%
Woodstown Fine Sandy Loam	387.61	9%
<b>TOTAL</b>	<b>4177.99</b>	<b>100%</b>

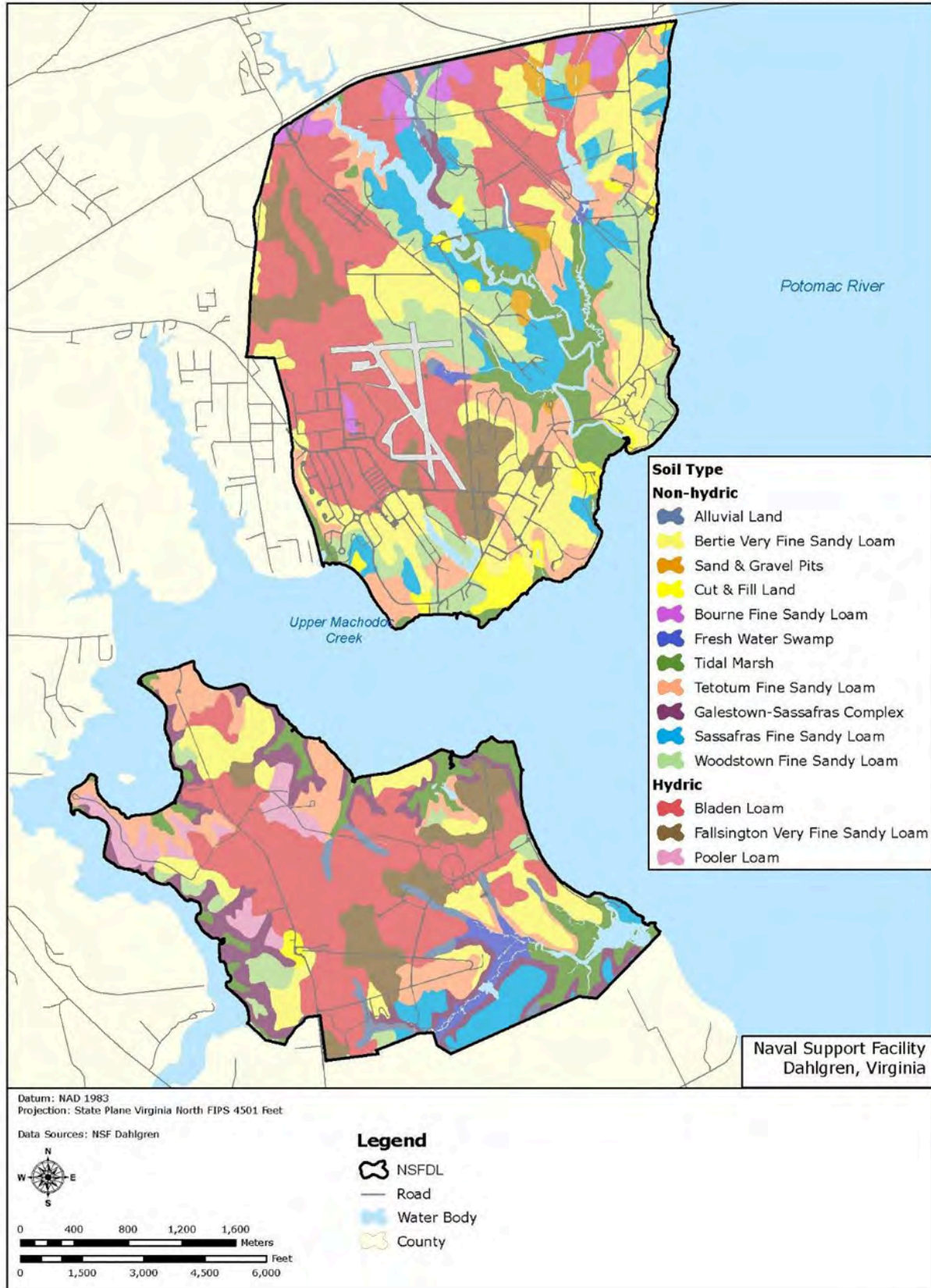


Figure 2-8. Soils at Naval Support Facility Dahlgren



## **(5) Watersheds**

NSFDL is located in the Lower Potomac subregion of the Mid-Atlantic hydrologic region (USGS 2021). The drainage basins are part of the Chesapeake Bay Watershed and include the Potomac River, Upper Machodoc Creek, and Gambo Creek. The USGS was contracted in 1992 to provide a watershed assessment study for the installation. As part of this study, GIS coverages and related datafiles were produced for contributing drainage basin areas. Twenty-nine individual basins were delineated within the contributing drainage areas. These coverages show that only a couple of drainage basins enter NSFDL, while none exit into surrounding lands. Drainage off NSFDL property occurs into the deep-water habitats of the Potomac River and Upper Machodoc Creek.

## **(6) Surface Water**

NSFDL has approximately 4 miles of Potomac River shoreline and approximately 6 miles of Upper Machodoc Creek shoreline. Gambo Creek flows from northwest to southeast through NSFDL, dividing Mainside into two approximately equal tracts. Small, unnamed tributaries to the Potomac River, Upper Machodoc Creek, and Gambo Creek flow through NSFDL as well. Two man-made freshwater impoundments, Hideaway Pond and Cooling Pond, are located within the installation.

The Potomac River flows approximately 400 miles from its headwaters in the Allegheny Mountains of West Virginia to the Atlantic coastal plain and its watershed encompasses approximately 14,670 square miles. The Potomac River adjacent to NSFDL is approximately 9,000 feet wide. The principal basin of the Chesapeake Bay is located approximately 50 miles southeast of NSFDL. The segment of the Potomac River adjacent to NSFDL is tidal and is classified as an estuary zone. The river's salinity regime in the vicinity of the installation is mesohaline (5 to 12 parts per thousand [ppt]) and varies depending on rainfall. The Potomac River is under the jurisdiction of the State of Maryland and is designated Use Class II (waters suitable for shellfish harvesting) by Maryland Water Pollution Control Regulations (MDE 2021). The designated uses of Use Class II waterways are:

- growth and propagation of fish (not trout), other aquatic life and wildlife;
- water contact sports;
- leisure activities involving direct contact with surface water;

- fishing;
- agricultural water supply;
- industrial water supply;
- propagation and harvesting of shellfish;
- seasonal migratory fish spawning and nursery use;
- seasonal shallow-water SAV use;
- open-water fish and shellfish use;
- seasonal deepwater fish and shellfish use; and
- seasonal deep-channel refuge use.

Upper Machodoc Creek is approximately 3,000 feet wide at the mouth and six feet deep. Its total length is approximately 17.4 miles, and its watershed encompasses approximately 47.2 square miles. Upper Machodoc Creek and its tidal tributaries are designated as Class IIa (estuarine waters capable of propagating shellfish), while the remaining tidal tributaries to the Potomac River within the installation are designated Class IIb water (estuarine water with Potomac embayment standards) by Virginia Water Quality Standards (VR 680-21-00).

Gambo Creek is tidally influenced as far inland as the northern boundary of the installation. Extensive tidal wetlands dominated by saltmarsh cordgrass (*Spartina alterniflora*), and big cordgrass (*Spartina cynosuroides*) border the creek and support a wide variety of wildlife.

#### **(7) Floodplains**

Approximately 700 acres of NSFDL along the shores of the Potomac River, Upper Machodoc Creek, and Gambo Creek lie within the 100-year floodplain (Figure 2-9). Shore and wetland areas associated with the Potomac River, Upper Machodoc Creek, Gambo Creek, and unnamed tributaries to these waterways are classified as a Chesapeake Bay Resources Protection Area (RPA) by the Commonwealth of Virginia. All areas outside of the RPAs in King George County are designated as Resource Management Areas (RMAs) (KGC 2019).

#### **(8) Groundwater**

The only productive aquifer in the vicinity of NSFDL is the Potomac Group Artesian aquifer. This aquifer is composed of three aquifers and three confining units that are collectively labeled the Potomac Formation. The unconsolidated sediments consist of a massive,

eastward-thickening wedge of interlacing gravels, sands, silts, and clays. The deep wells of NSFDL draw from the upper Potomac Group Artesian aquifer.

The Potomac Group Artesian aquifer is mostly confined and yields between 100 and 1,500 gallons per minute. Analyses of NSFDL wells in 1992 determined the static water level ranges from approximately 116 feet to 123 feet below ground surface with a yield of approximately 350 gallons per minute.

**(9) Nearshore Area**

DoDI 4715.03 and OPNAV 5090.1E define nearshore areas as the submerged lands titled to the military and all other submerged lands that are adjacent to installations that extend from the mean high-water level, offshore to the boundary of any security areas controlled by the Military Services (DoD 2011). Navy installations abut significant bodies of water and the status of natural resources in nearshore areas can become an encumbrance to waterfront mission activities if stewardship of these areas is ignored. Navy INRMPs must, therefore, address installation watersheds, shorelines, and nearshore areas such that conservation benefits are provided to aquatic species and habitats in waters adjacent to Navy installations (Appendix 1C, M4; USN 2019a). NSFDL does not own, lease, or control submerged lands below the mean high-water level which surround the installation. These areas are owned by the State of Maryland. However, NSFDL does manage and monitor aquatic species and habitats in adjacent water bodies to meet OPNAVINST 5090.1E requirements.



Figure 2-9. Naval Support Facility Dahlgren 100-Year Floodplain

## C. GENERAL BIOTIC ENVIRONMENT

### (1) Rare Species

Rare species include both state and federally listed threatened and endangered species and species proposed for such listing, as well as other species that may be considered species of concern, rare or sensitive species of conservation concern. The only listed federal species that are known to inhabit the water bodies adjacent to NSFDL are the shortnose (*Acipenser brevirostrum*) and Atlantic sturgeons (*A. oxyrinchus*). The rusty patched bumble bee (*Bombus affinis*), northern long-eared bat (*Myotis septentrionalis*), and sensitive joint-vetch (*Aeschynomene virginica*) have the potential to occur on NSFDL. The monarch butterfly (*Danaus plexippus plexippus*), now a federal candidate species, and the following species of concern have been identified at NSFDL: alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), little brown (*Myotis lucifugus*) and tri-colored bats (*Perimyotis subflavus*), northern red-bellied cooter (*Pseudemys rubriventris*) and spotted turtle (*Clemmys guttata*). The FWS recently identified the following species in their National Domestic Listing Workplan for FY21-25: the monarch butterfly, little brown and tricolored bats, Northern red-bellied cooter and spotted turtle. Although no longer listed, the bald eagle continues to receive protection under the Bald and Golden Eagle Protection Act (BGEPA).

### (2) Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory 1987). Under the Cowardin system (Cowardin et al. 1979), wetlands are divided into five major systems: marine, estuarine, riverine, lacustrine, and palustrine.

The total acreage of wetlands at NSFDL is approximately 608 acres. As part of the USFWS National Wetland Inventory (NWI) effort, wetlands were remotely 'delineated' through photo-interpretation and assigned a cover type classification based on the Cowardin system. Field verification was only conducted on a portion of the wetlands; consequently, there are additional wetlands not identified. The NWI delineation represents a planning-level survey that is adequate for general planning purposes. Site specific wetland delineations are required for Military Construction Projects (MILCON) or other actions that require permitting under the CWA. As project-specific jurisdictional delineations are

completed, the existing wetlands coverage is updated to reflect the most current status of wetlands on the installation.

a. Estuarine Systems

Estuarine systems consist of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land and have fluctuating freshwater inputs from adjacent rivers and watercourses. At NSFDL the estuarine system, comprised of approximately 368 ac, is associated with the Potomac River and the Upper Machodoc Creek and Gambo Creek. This system includes estuarine subtidal and estuarine intertidal subsystems.

**Estuarine Subtidal Subsystem**

This subsystem includes those areas located along rivers and tidal creeks that are permanently flooded by tidal water or continuously submerged. At NSFDL, only one estuarine subtidal community is present: unconsolidated bottom wetlands.

**Estuarine Intertidal Subsystem**

This subsystem includes those areas located between the highest and lowest tide levels of rivers or tidal creeks. As such, their substrates are periodically exposed and flooded by semidiurnal tides. Fluctuating submergence, warm water, copious deposits of mud, and varying salinity make intertidal estuarine communities an extremely specialized habitat (Fassett 1928). At NSFDL, three estuarine intertidal communities are present: emergent, scrub-shrub and unconsolidated shore wetlands.

b. Palustrine Systems

Palustrine systems are defined as non-tidal wetlands that are typically inundated with water for some part of the year and are capable of supporting hydrophytic vegetation (i.e., vegetation that is capable of living in anaerobic or saturated soils for part of the growing season). At NSFDL the palustrine system totals approximately 240 ac and is categorized into four classes: emergent, forested, scrub-shrub, and unconsolidated bottom wetlands.

**Emergent Wetlands**

During the growing season of most years, the area covered by vegetation is 30 percent or greater. The dominant vegetation of these wetlands is characterized by erect, rooted, perennial herbaceous plants, excluding mosses and lichens. This vegetation is present for most of the growing season in most years.

**Forested Wetlands**

This subsystem includes seasonally flooded, broad-leaved deciduous forests, and permanently flooded or saturated swamps. These forests and swamps generally have at least 50 percent tree cover.

**Scrub-shrub**

The class scrub-shrub wetland includes areas dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.

**Unconsolidated Bottom**

Palustrine unconsolidated bottom or open water class consists of open wetland communities in which vegetative cover is less than 30 percent during the growing season of most years. The underlying substrate ranges from mineral soils to well-decomposed organic soils, or muck.

Most wetlands at NSFDL are classified as estuarine intertidal (278 acres), although a significant amount is also classified as palustrine forested (183 acres). Wetland cover is presented in Table 2-4, Figure 2-10, and Figure 2-11.

**Table 2-4. Wetlands at Naval Support Facility Dahlgren**

Cowardin Classification	Area (acres) or Length (feet)	Percent of Installation
Estuarine Subtidal	90 ac	2.1%
Estuarine Intertidal	278 ac	6.4%
Palustrine Emergent	18 ac	0.4%
Palustrine Forested	183 ac	4.2%
Palustrine Scrub-Shrub	9 ac	0.2%
Palustrine Unconsolidated Bottom	30 ac	0.7%
<b>Total Wetlands</b>	<b>608 ac</b>	<b>14%</b>
Riverine Upper Perennial	8,891 ft	-
Riverine Intermittent	213 ft	-
<b>Total Riverine</b>	<b>9,104 ft</b>	<b>-</b>

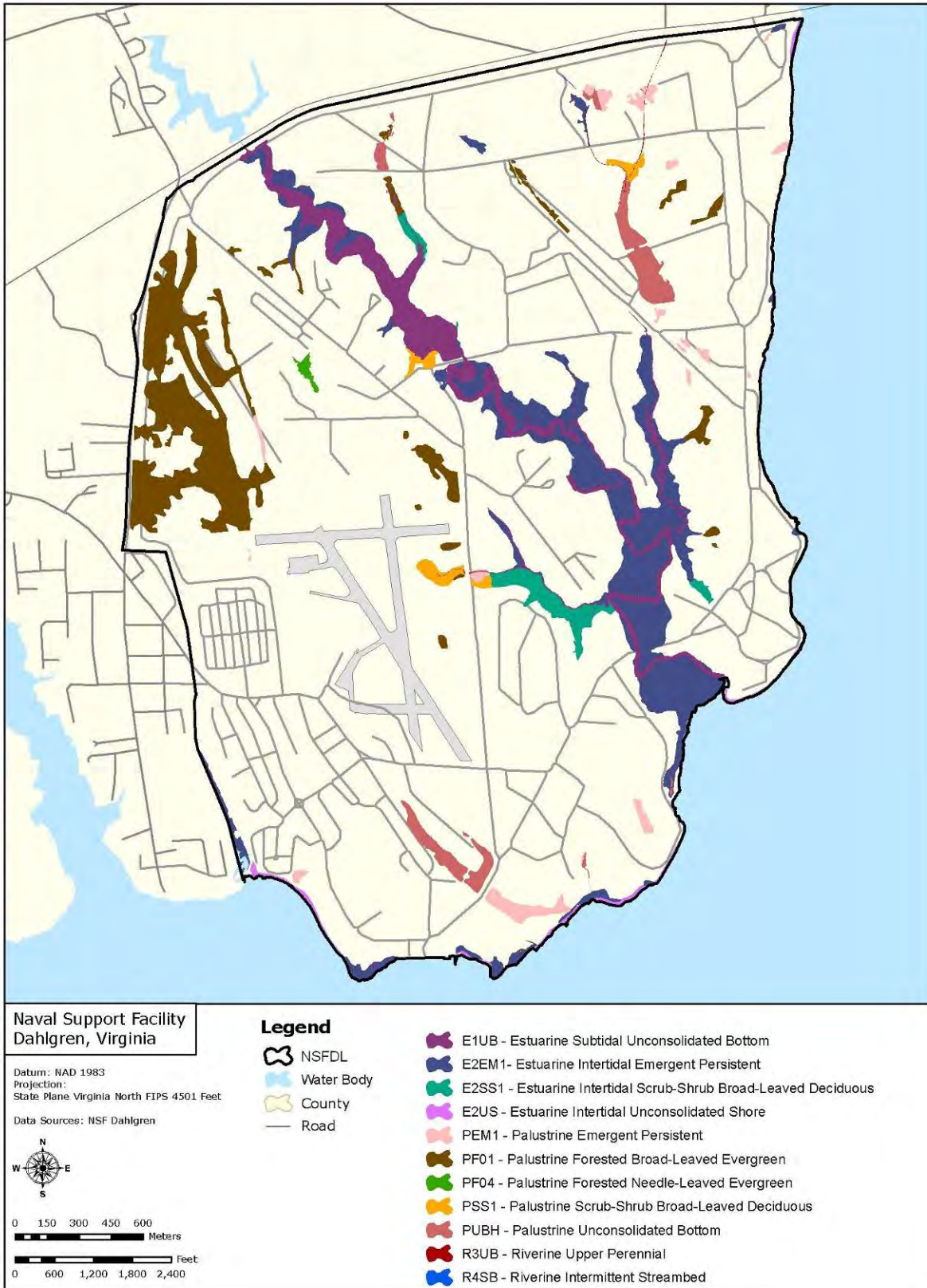


Figure 2-10. Wetlands at Mainside



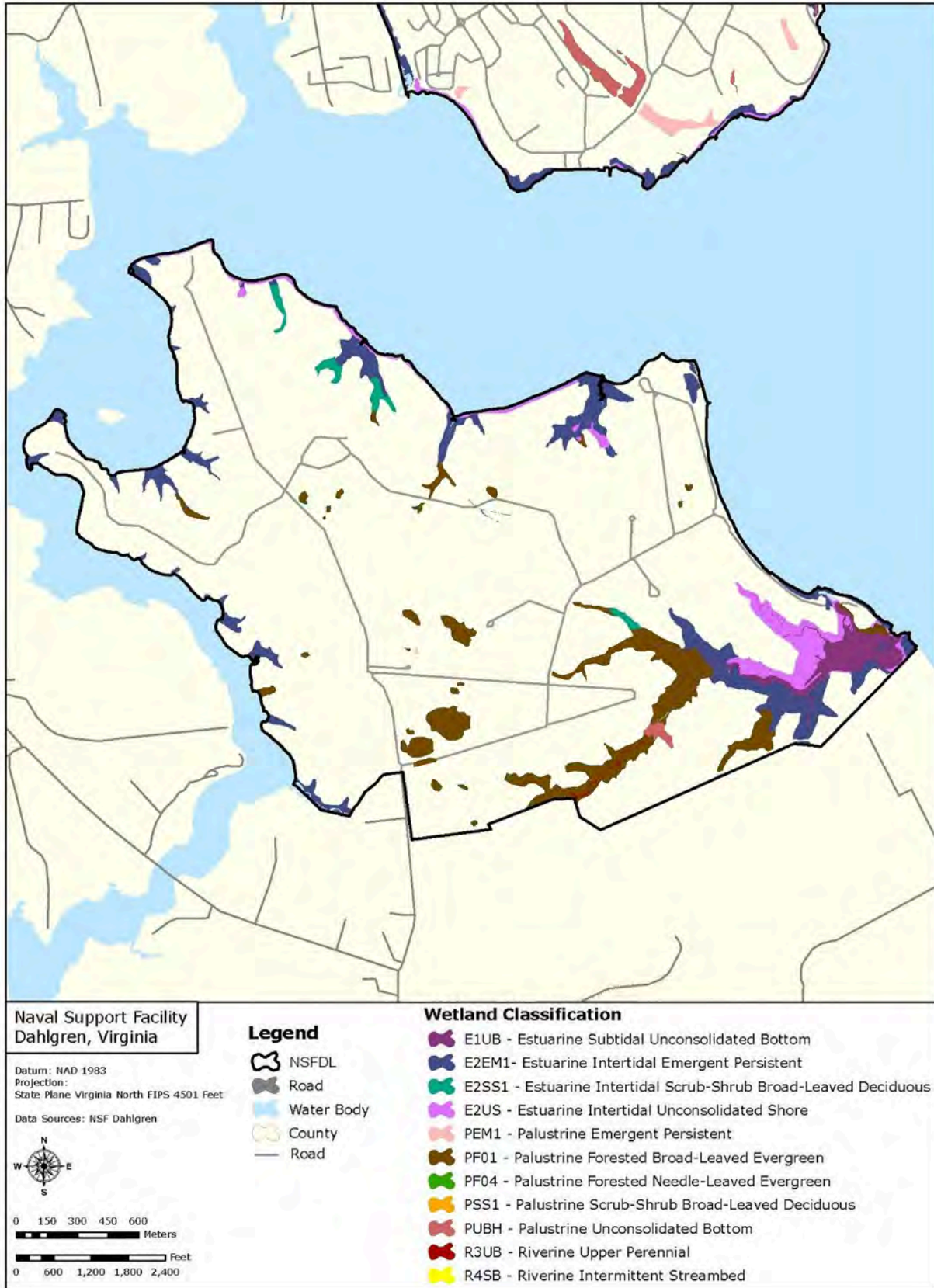


Figure 2-11. Wetlands at Pumpkin Neck

### (3) Fauna

The diverse plant life and habitat at NSFDL supports a rich faunal community. The first formal faunal surveys conducted at the Installation in 1977-78 (USN 1979) documented 157 avian, 20 mammalian, 16 amphibian, and 16 reptilian species. The Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDCR-DNH) accomplished a Natural Heritage Inventory during 1991 and 1992 to refine the survey from the late 70s (USN 1992). Additionally, game and nongame species at NSFDL have been well documented by the NRM through periodic and annual wildlife surveys. Subsequent surveys include:

- neotropical migratory breeding birds conducted annually
- waterfowl conducted annually
- herpetofauna conducted annually
- white-tailed deer spotlight surveys conducted annually
- osprey nest sites conducted annually
- bald eagle nest and roost sites conducted annually since the late-1980s
- wood duck nest and productivity data has been recorded annually since 2015
- eastern bluebird (*Sialis sialis*) nest box utilization and fledgling success has been recorded annually since 1988
- and passive acoustical monitoring of bats conducted annually from 2014-2020. Mist netting conducted in 2017 and 2019.

The avian community is particularly diverse and includes many migratory waterfowl that overwinter at NSFDL, as well as a large number of neotropical migrants that breed on-site. Large mammal species that have been documented at NSFDL include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), and red (*Vulpes vulpes*) and gray fox (*Urocyon cinereoargenteus*). Medium and small mammals include eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), groundhog (*Marmota monax*), beaver (*Castor canadensis*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), long-tailed weasel (*Mustela frenata*), and a number of small rodents and insectivores.

The installation's wetlands, ponds, and wooded areas provide habitat for a number of reptiles and amphibians that are common in the region. Common snakes include the northern water snake (*Nerodia s. sipedon*), black rat snake (*Elaphe o. obsoleta*), and northern black racer (*Coluber c. constrictor*). Common turtles include the common snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), eastern mud turtle (*Kinosternon subrubrum*), and eastern box turtle (*Terrapene carolina*). Lizards found on the installation include ground skinks (*Scincella lateralis*) and five-lined skinks (*Eumeces fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the installations include the American toad (*Bufo americanus*), green frog (*Rana clamitans*), southern leopard frog (*Rana sphenoccephala*), spring peeper (*Pseudacris crucifer*), green tree frog (*Hyla cinerea*), and upland chorus frog (*Pseudacris triseriata*).

Lists of birds, fish, reptiles and amphibians and mammals either observed or expected to occur on or adjacent to NSFDL may be found in Appendix 2A through Appendix 2G.

a. Aquatic Life

The installation is located at the upper limit of the estuarine portion of the Potomac River, an ecologically important area that provides adult, migratory, spawning, and nursery habitat for local and regional fish populations. Salinity near the installation varies from 5 to 12 ppt. Anadromous species such as striped bass (*Morone saxatilis*), hickory shad (*Alosa mediocris*), American shad (*A. sapidissima*), alewife (*A. pseudoharengus*), and white perch (*Morone americana*) use the Potomac. Wetlands associated with Upper Machodoc Creek and Gambo Creek provide nursery habitat for these species. The catadromous American eel (*Anguilla rostrata*), once common throughout the area, has exhibited declines in harvest levels along the Atlantic Coast. As a result, monitoring programs have been established.

The Alliance for the Chesapeake Bay and NSFDL have conducted fish sampling at two stations on the Potomac River and four stations on Upper Machodoc Creek in conjunction with a SAV study conducted between 1999 and 2002. A total of 24 fish species were collected during these efforts. The most abundant species included Atlantic menhaden (*Brevoortia tyrannus*), Atlantic silverside (*Menidia menidia*), banded killifish (*Fundulus diaphanus*), bay anchovy (*Anchoa mitchilli*), mummichog (*Fundulus heteroclitus*), and white perch. Additional species of recreational and commercial importance that were collected included striped bass, bluefish (*Pomatomus saltatrix*), and spot (*Lieostomus xanthurus*). The

bluecrab (*Callinectes sapidus*) and American oyster (*Crassostrea virginica*) are other commercially important species found in the waters around Dahlgren (Alliance for the Chesapeake Bay N.D.).

The 1977-78 floral and faunal survey identified 32 species of fish in Gambo Creek, Black Marsh, Hideaway Pond, and Cooling Pond (USN 1979). Common freshwater fish found in Hideaway Pond and Cooling Pond include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), and channel catfish (*Ictalurus punctatus*). Recently, the exotic northern snakehead (*Channa argus*), has been caught in the upper reaches of Gambo Creek by Route 301, Cooling Pond, and the Willow Oaks Wetland Complex. Although not reported to date, the likelihood of snakeheads in Hideaway Pond is high.

#### **(4) Flora**

Although a comprehensive ecological community survey has not been performed at NSFDL, various natural resources mapping and surveying efforts, including forest inventories, wetland surveys, and rare species surveys have yielded an overall understanding of existing communities. A basewide floral survey conducted in 1977-78 and again in 1992 as well as the targeted rare plant surveys conducted in 2004 and 2017 provided a good understanding of the flora present on base. These communities function as part of the entire ecological system. The management of each community must take the surrounding communities into consideration in order to provide for the most effective management practices.

Ecological communities occurring at NSFSDL include terrestrial (upland) and wetland (palustrine and estuarine) ecosystems (Table 2-5 and Figure 2-12). The terrestrial system comprises nearly 86 percent of the installation, whereas the wetlands system accounts for 14 percent of the installation. Approximately 2,223 acres (52 percent of the installation) are forested. Mixed pine-hardwood forests are the predominant forest cover type (31 percent of the installation), followed by hardwood forests (15 percent), then pine forests (6 percent). Maintained open uplands comprise 1,431 acres (34 percent of the installation) and include grasslands (6 percent) and developed/maintained areas (28 percent). Approximately 368 acres (8.5 percent of the installation) are tidal wetlands (estuarine system) and 240 acres (5 percent) are non-tidal, freshwater wetlands (palustrine system). A master list of vegetation for the installation was developed during floral surveys conducted in 1977-78 (USN 1979). This list includes over 300 species representing 86 families and includes the community type in which the species occur. The vegetation list is provided

in Appendix 2G. A general description of each community type is provided in the following sections.

**Table 2-5. Ecological Communities at Naval Support Facility Dahlgren**

Ecological Community	Estimated Area (acres)	Percent of Installation
Pine Forest	244	6%
Hardwood Forest	631	15%
Pine-Hardwood Forest	1,349	31%
<b>Total Forested Uplands</b>	<b>2,224</b>	<b>52%</b>
Grasslands	250	6%
Developed/Maintained Area	1,237	28%
<b>Total Open Uplands</b>	<b>1,487</b>	<b>34%</b>
<b>Total Terrestrial System</b>	<b>3,711</b>	<b>86%</b>
Estuarine Subtidal	90	2.1%
Estuarine Intertidal	278	6.4%
<b>Total Estuarine</b>	<b>368</b>	<b>8.5%</b>
Palustrine Emergent	18	0.4%
Palustrine Forested	183	4.2%
Palustrine Shrub	9	0.2%
Palustrine Unconsolidated Bottom	30	0.7%
<b>Total Palustrine</b>	<b>240</b>	<b>5.5%</b>
<b>Total Wetlands</b>	<b>608</b>	<b>14%</b>

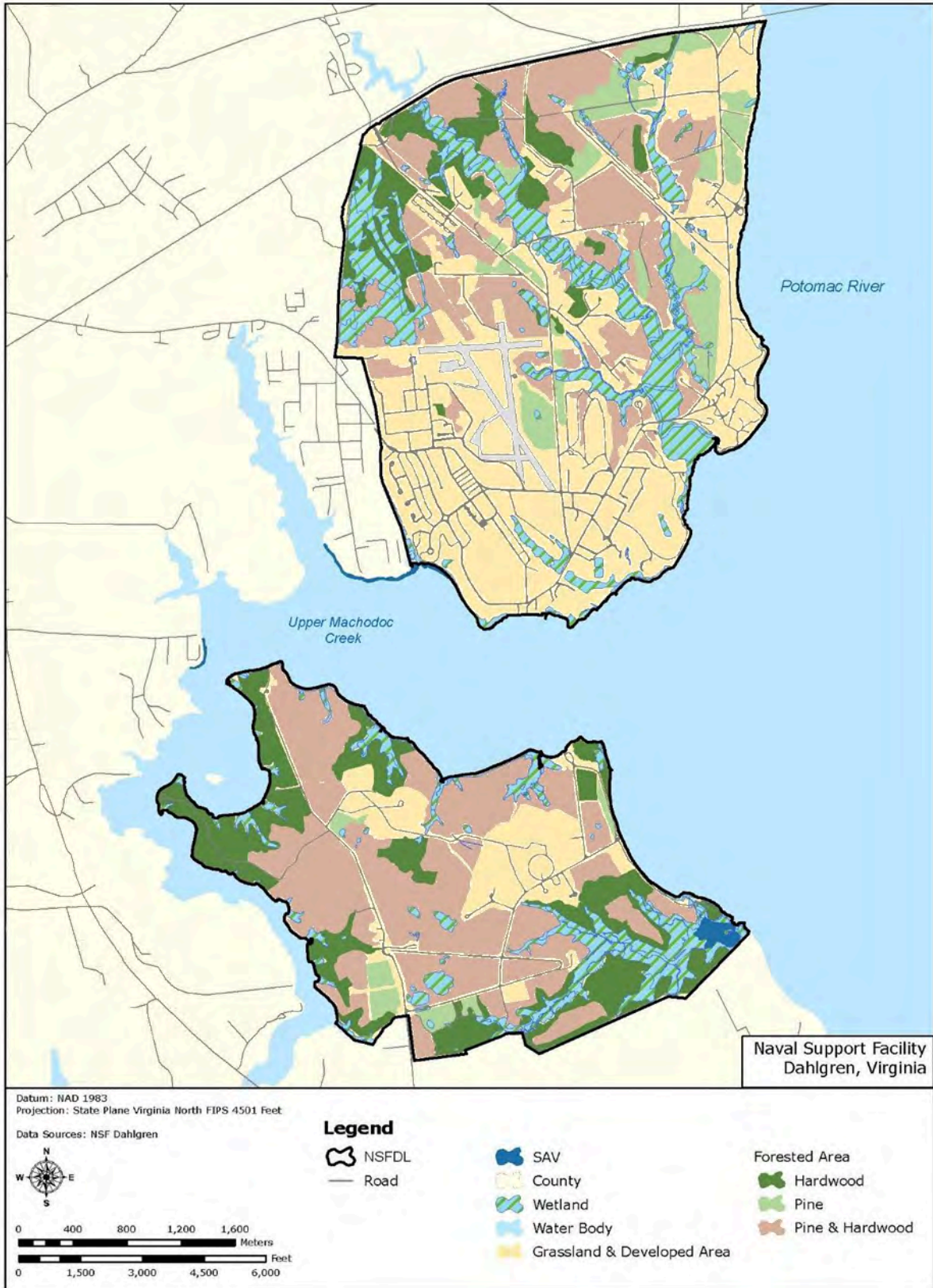


Figure 2-12. Ecological Communities on Naval Support Facility Dahlgren

a. Terrestrial Systems

Ecological communities are defined as terrestrial when they possess all of the following characteristics: (1) vegetative cover is never predominantly hydrophytic, (2) soils are not predominantly hydric, and (3) surfaces are not flooded or saturated at any time during the year. Terrestrial ecosystems on NSFDL classified by NatureServe and identified in the INRMP metrics are the Northern Atlantic Coastal Plain Hardwood Forest, Northern Atlantic Coastal Plain Maritime Forest and Herbaceous. The first system is comprised of generally dry hardwood forests typically dominated by oaks (*Quercus* spp.), while the maritime system includes a mixture of evergreen and deciduous species. The herbaceous community includes early successional fields, grasslands and landscaped areas. A more general description of terrestrial habitat types follows.

**Pine Forests.** Pine forests in the Atlantic Coastal Plain are mid-successional in nature and are indicative of disturbance or intensive maintenance of areas. The dominant overstory species of these forests include loblolly pine (*Pinus taeda*) and Virginia pine (*Pinus virginiana*) with lesser amounts of yellow poplar (*Liriodendron tulipifera*) and sweetgum (*Liquidambar styraciflua*). Older pine stands may support an understory with oak (*Quercus* spp.) and other hardwood seedlings. The shrub and herbaceous components of pine forests are often sparse, but may include Japanese honeysuckle (*Lonicera japonica*), trumpet creeper (*Campsis radicans*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and blueberry (*Vaccinium* spp.).

**Hardwood Forests.** Many hardwood forests in the Atlantic Coastal Plain are late successional communities. Common overstory species that occur on poorly drained sites include blackgum (*Nyssa sylvatica*), red maple (*Acer rubrum*), willow oak (*Quercus phellos*), and water oak (*Quercus nigra*). On drier sites, oaks such as black oak (*Quercus velutina*), southern red oak (*Quercus falcata*), and chestnut oak (*Quercus prinus*) and hickories (*Carya alba* and *Carya ovata*) dominate the overstory. Understories often include American holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), Virginia creeper, partridge berry (*Mitchella repens*), blueberry, and ground pine (*Lycopodium* spp.).

**Pine-Hardwood Forests.** Mixed forests are considered transitional between pine and various hardwood types and, in the absence of disturbance, succession will strongly be towards the hardwoods. Site index and hydrologic regime strongly influence the hardwood component of a stand. On moist sites, sweetgum, red maple, and

tulip poplar colonize the site along with loblolly pine. In these stands, hardwoods grow quickly and form a single stratum canopy with the pines. On drier sites, several oak species, including southern red oak and white oak, may invade areas that were first colonized by pines and, over time, become their canopy codominants. The understories of these forests are varied and depend on site conditions.

**Early Successional Fields, Grasslands, and Roadsides.** These areas are occupied by shrubs, grasses, and herbaceous vegetation that are mowed less than twice annually. The vegetative composition of these communities is highly variable and is influenced by previous land use and adjacent ecological communities. Various native warm season grasses such as broomsedge (*Andropogon virginicus*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), goldenrods (*Solidago* spp.), bonesets (*Eupatorium* spp.), partridge pea (*Cassia fasciculata*) and bushclovers (*Lespedeza* spp.) are common in these areas.

b. Wetland Systems

Wetland ecosystems classified by NatureServe and identified for NSFDL in the INRMP metrics include the Northern Atlantic Coastal Plain Brackish Tidal Marsh, the Northern Atlantic Coastal Plain Tidal Swamp, the Northern Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest and Freshwater Ponds and Lakes. This first system includes tidal vegetation occurring on the lower reaches of rivers and creeks influenced by tidal flooding from brackish water. The second system includes freshwater tidal vegetation occurring on the upper reaches of rivers and creeks influenced by tidal flooding but above the salt wedge. The third system is comprised of non-riverine hardwood swamps that are seasonally flooded. The final system includes the freshwater ponds at NSFDL. A more general description of wetland systems follows.

**Estuarine.** Estuarine wetlands are those that are periodically flooded with tidally influenced waters with salinity greater than 0.5 parts per thousand (ppt). Estuarine wetlands may be subtidal if the substrate is continuously submerged or intertidal if the substrate is exposed and flooded by tides. Tidal flooding occurs daily in the lower portions of the system and intermittently in the upper portions. These marshes are dominated by saltmarsh cordgrass, big cordgrass, marsh elder (*Iva frutescens*), and sea myrtle (*Baccharis halimifolia*). Much of Black Marsh is dominated by narrow-leaved cattail (*Typha angustifolia*).

**Palustrine.** Palustrine wetlands are nontidal vegetated wetlands or open water habitats less than 20 acres or 6.6 feet deep that have



salinity less than 0.5 ppt. Palustrine wetlands at NSFDL include emergent, shrub, and forested. Vegetation in the palustrine emergent wetlands (freshwater marshes) included pickerelweed (*Pontederia cordata*), swamp rosemallow (*Hibiscus moscheutos*), swamp loosestrife (*Decodon verticillatus*), and a spike rush (*Eleocharis ambigens*) were common. The palustrine forested wetlands generally consisted of bottomland hardwood species such as red maple, black gum, sweetgum, and mixed oaks.

**Submerged Aquatic Vegetation (SAV).** SAV beds are another important component of the wetland systems at NSFDL. SAV is a diverse assembly of marine and bay grasses found in shoal areas of Chesapeake Bay, from its mouth to the headwaters of its tributaries (VIMS 2021). SAV is an important resource that provides protection and nursery habitat for a broad range of aquatic organisms, contributes to the oxygenation of the water, and prevents erosion and sedimentation. Large-scale declines in SAV populations have occurred since the 1960s in response to increasing amounts of non-point inputs of nutrients and sediments in the bay system (Moore et al. 2004).

VIMS has mapped SAV in the Chesapeake Bay and its tributaries regularly since 1971 using aerial photo-interpretation and ground verification. Specific surveys of SAV in the Virginia portion of the Potomac River have been conducted historically (Moore et al. 2004). These studies indicated SAV occurs in the Potomac River and Upper Machodoc Creek adjacent to NSFDL as shown in Figure 2-12. The targeted areas within the Chesapeake Bay were most recently mapped in 2019 (VIMS 2020) but SAV was not identified in the vicinity of NSFDL.

### c. Invasive Species

Invasive species are any species that are not native to a given ecosystem, and whose introduction causes or is likely to cause economic or environmental harm and/or harm to human health. Because of their ability to alter natural ecosystems and diminish the abundance or survival of native species, invasive species are recognized as a leading threat to natural ecosystems and biodiversity, as well as a leading cause of species becoming threatened and endangered. It is estimated that more than 400 of the over 1,300 species currently protected under the ESA and more than 180 candidate species for listing are at risk due to invasive species (USFWS 2012). Invasive species also impose enormous costs to agriculture, forestry, fisheries, and the economy. In fiscal year (FY) 17, the U.S. government spent an estimated \$3.0 billion across a range of federal agencies and activities in an effort to

prevent, control and eradicate invasive species domestically (Congressional Research Service [CRS] 2018).

Federal efforts to control invasive species have included both administrative and legislative actions (CRS 2018). For example, several EOs have provided an overarching federal framework to address invasive species (CRS 2018). In 1977, President Carter signed EO 11987, which required federal agencies to restrict the introduction of "exotic organisms" (CRS 2018). In 1999, President Clinton signed EO 13112, which revoked EO 11987, extended federal requirements to address invasive species, and established the interagency National Invasive Species Council (NISC; CRS 2018). NISC provides national leadership in addressing invasive species. It is cochaired by the Secretaries of the Interior, Agriculture, and Commerce. In 2016, President Obama signed EO 13751, which expanded the membership of NISC and increased the responsibilities of federal agencies to prevent and respond to invasive species (CRS 2018).

The control of invasive species is a primary natural resources management issue on military installations because of their potential impacts on military training and readiness and the degradation they can cause to the natural environment. Common threats to the military mission that have been identified at military installations include degradation of realistic training conditions, reduction of available training land, increase in training and operational costs, and causing security and health risks (Westbrook et al. 2005).

A comprehensive invasive plant species inventory was conducted on Mainside in 2011 (USN 2011a) to supplement an earlier less intensive effort in 2001 (USN 2001c). Fourteen selected plant species were surveyed utilizing two methods; a whole forest stand survey and a visual edge (forest edge) survey. These two methods allowed documentation of population size, habitat occurrence, and abundance. A management plan was prepared that documented inventory results, addressed the individual plant species and their control methods, identified hotspots, and recommended priorities. This effort provided the focus to enhance the control program.

Fourteen invasive plant species were identified during the inventory. Additional non-native species that occur at NSFDL are identified on the plant species list in Appendix 2G. The following

are considered the most problematic nuisance plant species at NSFDL.

- tree of heaven (*Ailanthus altissima*)
- mimosa (*Albizia julibrissin*)
- porcelain-berry (*Ampelopsis brevipedunculata*)
- Oriental bittersweet (*Celastrus orbiculatus*)
- autumn olive (*Elaeagnus umbellata*)
- Chinese bush clover (*Lespedeza serica*)
- Chinese privet (*Ligustrum sinense*)
- Japanese honeysuckle (*Lonicera japonica*)
- Japanese stiltgrass (*Microstegium vimineum*)
- princess tree (*Paulownia tomentosa*)
- common reed (*Phragmites australis*)
- Japanese knotweed (*Polygonum cuspidatum*)
- multiflora rose (*Rosa multiflora*)
- wineberry (*Rubus phoenicolasius*)

Invasive animal species that are known to occur on NSFDL include, but are not limited to,

- blue catfish (*Ictalurus furcatus*)
- English house sparrow (*Passer domesticus*)
- European starling (*Sturnus vulgaris*)
- mute swan (*Cygnus olor*)
- northern snakehead (*Channa argus*)

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### **3. PROGRAM ELEMENTS**

#### **A. RARE, THREATENED AND ENDANGERED SPECIES MANAGEMENT AND SPECIES BENEFIT, CRITICAL HABITAT AND SPECIES OF CONCERN MANAGEMENT**

##### **(1) Program Description**

Several rare species (i.e., federally listed, candidate, and species of concern) surveys have been conducted at NSFDL over the past couple decades. The Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDCR-DNH) accomplished a Natural Heritage Inventory during 1991 and 1992 with only the bald eagle (*Haliaeetus leucocephalus*) and a funnel web spider (*Agelenopsis kastoni*) being documented (USN 1992). In 2004, ESA, Inc. completed a rare plant survey for several target species that were known to occur in the vicinity of NSFDL. Included were swamp pink (*Helonias bullata*), narrow-leaved spatterdock (*Nuphar sagittifolia*), small-whorled pogonia (*Isotria medeoloides*), harperella (*Ptilimnium nodosum*), New Jersey rush (*Juncus caesariensis*), sensitive joint-vetch (*Aeschynomene virginica*), and mat-forming water hyssop (*Bacopa innominata*). Although potential habitat exists for these rare plants, none of the target species nor other rare plants were found in the areas surveyed on the installation (USN 2004). A 2014 herpetological survey was conducted in an effort to update the status of those species listed as potential on the installation. The status of 3 species was upgraded to confirmed (USN 2014b) and ongoing inhouse surveys are conducted annually. A 2017 sensitive joint-vetch survey resulted in no specimens being found (USN 2018a). Finally, bat acoustical surveys were conducted in 2014 (USN 2016b), 2015 (USN 2017c), 2017 (USN 2018b), 2018 (USN 2019b), 2019 (USN 2019c) and 2020 (USN 2021). Mist netting was conducted in 2017 and 2019. The Northern long eared bat was not detected; however, other bat species of concern (i.e., little brown and tricolored) were.

##### **(2) Management Practices**

The overall goal of the Rare Species Management Program is to ensure compliance with applicable state and federal regulations and to protect and enhance rare species populations and their habitats (Appendix 1A, G6). Management criteria for the program includes:

- Ensure surveys are conducted and/or updated to determine presence/absence of rare, threatened and endangered species (Appendix 1C, M5).

- Update the GIS database to ensure rare, threatened and endangered species locations and habitats are accurately identified (Appendix 1B, P20, DL8; Appendix 1C, M6).
- Avoid/minimize impacts to rare species and their habitat through environmental review (Appendix 1C, M7).
- Maintain existing population levels and habitat, and where feasible, increase populations and enhance habitat for rare, threatened and endangered species (Appendix 1C, M8).
- Identify and control invasive plant and animal species that have the potential to negatively impact known rare, threatened, and endangered species at NSFDL (Appendix 1C, M9).

The NRM is responsible for rare, threatened and endangered species management and coordinates the planning, budget controls, and general administrative functions of the program. The NRM is also responsible for conducting all rare, threatened, and endangered species related consultations with regulatory agencies. The USFWS, VDWR/VDCR-DNH, and NOAA/NMFS provide guidance on rare species management and requirements.

The following federally-listed species (i.e., shortnose sturgeon, Atlantic sturgeon, rusty patched bumble bee, northern long-eared bat, and sensitive joint-vetch), federal candidate species (i.e., monarch butterfly), and federal species of concern (i.e., alewife, blueback herring, little brown bat, tricolored bat, northern red-bellied cooter, and spotted turtle) are addressed below with regard to, habitat requirements, limiting factors, sensitivity to disturbance, installation activities with potential to affect, and current management practices. Lastly, the bald eagle is addressed as it continues to be protected by the BGEPA and remains a species on everyone's watch list.

Critical habitat is defined as a specific geographic area(s) that is/are essential for the conservation of a threatened or endangered species and that may require special management and protection (USFWS 2002). These areas are assessed and identified during the initial proposal for listing of each species. Critical habitat was designated for the Atlantic sturgeon, including the Chesapeake Bay distinct population segment (DPS), in August 2017. NMFS reviewed the NSFDL INRMP, stated it provides a benefit to Atlantic sturgeon and its habitat, and has ruled that the portion of NSFDL that overlaps the proposed critical habitat is excluded from the

designated critical habitat. No other critical habitat has been designated at NSFDL.

### **(3) Federally Listed Endangered Species**

#### **a. Shortnose (*Acipenser brevirostrum*) and Atlantic Sturgeon (*A. oxyrinchus oxyrinchus*)**

The USFWS listed the shortnose sturgeon as endangered throughout its range on March 11, 1967 under the Endangered Species Preservation Act of 1966. The NMFS took over jurisdiction of the listed species in 1974, following the enactment of the Endangered Species Act (ESA) of 1973. There are 19 Distinct Population Segments (DPSs) of shortnose sturgeon in 25 river systems. The Chesapeake Bay DPS includes shortnose sturgeon found in the Potomac River in Maryland and Virginia. The Atlantic sturgeon was federally listed as endangered on April 6, 2012. NMFS currently recognizes 5 DPSs (Chesapeake Bay, New York Bight, Gulf of Maine, Carolina, and South Atlantic). All are listed as federally endangered apart from the federally threatened Gulf of Maine DPS (NMFS 2012).

The USFWS has been conducting a Sturgeon Reward Program since 1996 to accrue information on sturgeon population and characteristics in the Potomac River. In the years 1996 to 2010, 15 shortnose sturgeon were documented in the river as a result of the Reward Program. In contrast, the Atlantic sturgeon was a well-documented, important commercial species in the Chesapeake Bay area from colonial times until the population crashed as a result of overfishing at the beginning of the 20th century. During the same time period, a total of 226 Atlantic sturgeon have been reported in the Potomac River, primarily through the Reward Program.

#### **Habitat Requirements**

The shortnose and the Atlantic sturgeon share many characteristics - long-lived, late maturing, estuarine-dependent, anadromous (ascending rivers from the sea to spawn) species. Atlantic sturgeon grow larger, spend more time in marine environments, and have a more northerly range than the shortnose sturgeon. Shortnose sturgeon habitat varies depending on life stage, but they spend part of their time in freshwater reaches of tidal rivers throughout all life-history phases.

Both sturgeons are demersal (living on or near the bottom) omnivores that use their flattened snouts to search through bottom sediments with their sensitive barbels (whisker-like tactile organs) to find crustacea, insects, worms, and small mollusks, which they suck into their mouths. Feeding activity of the two species generally does not overlap except for brief periods,

probably because the two species occur in different river stretches/salinity zones, at different water depths, and seek different prey.

The Potomac River offers suitable habitat for the two anadromous sturgeon species. While the probability of sturgeon activity along the river adjacent to NSFDL and within the PRTR remains low, efforts to improve habitat quality and reduce limiting factors is paramount to the future of these species.

### **Critical Habitat**

NOAA NMFS designated critical habitat for the Atlantic sturgeon on 17 August 2017 (82 FR 39160) with the final rule becoming effective on 18 September 2017. This included critical habitat designation for the Chesapeake Bay DPS within the Potomac River from the Little Falls Dam downstream for 189 RKMs to where the main stem river discharges at its mouth into the Chesapeake Bay (NOAA 2017). The critical habitat designation does not include any new restrictions or management measures for recreational or commercial fishing operations and does not create any preserves or refuges (NOAA 2017). Federal agencies will be responsible for working with NOAA NMFS to avoid or minimize potential impacts to the critical habitat when activities are funded, authorized, or carried out. This may require federal agencies to modify proposed activities to avoid adversely impacting the critical habitat.

During the review process, NOAA NMFS requested information from the DoD related to installations located within the proposed critical habitat area. The information requested focused on installation INRMPs, which were reviewed to determine if management objectives provided a conservation benefit to the species and their habitat. NOAA NMFS concluded that all INRMPs within the proposed critical habitat area for the Chesapeake Bay DPS provided a benefit. Therefore, in accordance with Section 4(a)(3)(B) of the ESA, the particular areas of the proposed critical habitat units (in water habitat) that overlap with DoD-controlled lands are not part of the critical habitat units (NOAA 2017). These installations will continue to conduct ESA Section 7 consultations for the species but will not be restricted by other requirements established during critical habitat designation.

NMFS reviewed the NSFDL INRMP, stated it provides a benefit to Atlantic sturgeon and its habitat, and has ruled that the portion of NSFDL that overlaps the proposed critical habitat is excluded from the designated critical habitat.



### **Limiting Factors and Sensitivity to Disturbance**

The USFWS identified pollution and overharvesting by commercial fisheries as reasons for initially listing shortnose sturgeon as endangered under listing criteria set forth in the ESA. Many aspects of shortnose sturgeon biology and environmental tolerances are poorly understood. Activities including commercial and recreational fishing, bridge construction and demolition, contaminants, dams, dredging, and cooling water intakes/power plants may contribute to the further decline and impede recovery of shortnose sturgeon. Natural history features (e.g., delayed maturation, non-annual spawning, and long lifespan) may also affect the rate at which recovery can proceed for this species. Habitat alterations can also be problematic for Atlantic sturgeon due to their long-life span, late age at maturing, and reliance on multiple habitats. Numerous factors have the potential to negatively impact the Atlantic sturgeon Chesapeake Bay DPS, including habitat degradation, vessel strikes, and being accidentally caught and potentially injured or killed by fishermen.

Very few studies have been conducted on the sensitivity of shortnose sturgeon to specific disturbance levels. It has been documented that shortnose sturgeons inhabit turbid waters which would provide justification that suspended solids have the least impact on them. However, shortnose sturgeons have been noted to react negatively to elevated noise levels in the water, high intake velocities near power plants and pump houses, and dredging activities. The Atlantic sturgeon is also highly sensitive to disturbances within the Chesapeake Bay and its tributaries. The highly depressed population is greatly impacted by habitat destruction/alteration and life cycle disturbances. Dredging, water quality impacts, vessel strikes, bycatch related issues, and in-stream water blockages are activities with the greatest potential to disturb this species.

### **Installation Activities with Potential to Affect Shortnose and Atlantic Sturgeon**

Activities at NSFDL that have the potential to impact the sturgeons and/or their habitat include over-water testing, pier repair, dredging, and shoreline stabilization. Apart from over-water testing, the frequency of these activities is very minimal. Over-water testing within the PRTR was addressed in a Biological Assessment prepared by NSWCCD (USN 2011b). The NMFS responded that the effects of over-water testing would be insignificant or discountable and not likely to adversely affect any listed species under their jurisdiction (NMFS 2012 letter in response to BA).

## Management Practices

Current management practices implemented at NSFDL to minimize potential impacts to the shortnose and Atlantic sturgeon include:

- Partner with local sturgeon research experts to provide Navy assistance for sampling efforts to improve understanding of shortnose and Atlantic sturgeon densities, movement, and spawning locations within the Potomac River and PRTR. (Appendix 1B, P2; Appendix 1C, M10).
- Shortnose and Atlantic sturgeon habitat are delineated in the GIS database. This provides the NRM with the ability to consider these species and their habitat while reviewing CWAPs and PRTR testing plans to avoid or minimize impacts. (Appendix 1C, M11).
- Consult with NMFS, as required, and ensure special restrictions are adhered to for the duration of the project or testing program (Appendix 1C, M12).

Currently, no other management practices are implemented onsite because the sturgeon habitat exists adjacent to NSFDL property. Other management practices that could indirectly improve sturgeon habitat when implemented include stormwater retrofits, restoration of CERCLA sites, stream restoration (Appendix 1B, P11), and the implementation of low impact design into Navy projects.

### b. Rusty Patched Bumble Bee (*Bombus affinis*)

The species was proposed for listing in 2016 and was listed as endangered on March 21, 2017. A rather large historical range throughout the eastern and mid-western United States included 28 states, the District of Columbia, and two Canadian provinces. Since 2000, however, surveys have documented the presence of this species in only 13 states and one province. To date, this species has only been reported in one Virginia County (Fauquier).

## Habitat Requirements

The rusty patched bumble bee has been observed and collected in a variety of habitats including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens. Suitable habitat provides food (a constant supply and diversity of flower pollen and nectar throughout a colony's life from April to September), nesting sites (underground and abandoned rodent cavities or clumps of above ground grasses), and overwintering sites (undisturbed soil) for hibernating queens (USFWS 2016a).

### **Limiting Factors and Sensitivity to Disturbance**

While the exact cause for this species' significant decline is uncertain, those that top the list include habitat loss and degradation, pathogens, pesticides, and small population dynamics.

A number of manmade disturbances believed to be responsible for the decline in this species' range include the loss of suitable grasslands via land use conversion, the higher incidence of intensive farming techniques that characteristically increase the use of pesticides, lower crop diversity, and reduce edge habitat due to the increased size of farm fields, and climate change impacts on the environment.

### **Installation Activities with Potential to Affect Rusty Patched Bumble Bee**

Activities at NSFDL having the potential to directly impact the rusty patched bumble bee and/or their habitat are associated with the grounds maintenance program. They include the scheduled mowing of areas currently used as testing ranges and the use of pesticides. Less certain are the affects that changing climate conditions are having on this species and the means for addressing.

### **Management Practices**

Management practices, if implemented, at NSFDL that would minimize potential impacts to the rusty patched bumble bee and their habitat include:

- Conduct native bee and pollinator surveys to determine if the rusty patched bumble bee is present at NSFDL and if identified, delineate habitat in the GIS. (Appendix 1B, P5, P20, DL8; Appendix 1C, M13)
- Modify the current mowing schedules on testing ranges to protect pollinators and pollinator-friendly plants (Appendix 1C, M14).
- Reduce the use of pesticides (Appendix 1C, M15).
- Expand and protect existing bee-friendly landscapes (Appendix 1C, M16).
- Educate the general populace about the importance of bee conservation (Appendix 1C, M17).

- Consult with USFWS, as required, when landscape changes have the potential to impact this species or its habitat (Appendix 1C, M18).

#### **(4) Federally Listed Threatened Species**

##### **a. Sensitive Joint-Vetch (*Aeschynomene virginica*)**

The sensitive joint-vetch, a bristly-stemmed annual legume native to the eastern United States, was listed as threatened on June 19, 1992. Historically, it was found in six states: New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Currently, it is no longer being reported in Pennsylvania and Delaware. It has been documented growing along the Potomac River.

A survey conducted in 2004 found suitable habitat but no specimens. A more extensive effort was accomplished in 2017 that also resulted in no observations (USN 2018a). Future surveys may be required if identified suitable habitat is present.

##### **Habitat Requirements**

The sensitive joint-vetch occurs in fresh to slightly brackish tidal river systems, within the intertidal zone where populations are flooded twice daily. It typically occurs at the outer fringe of marshes or shores. Its presence in marsh interiors may be a result of nutrient deficiencies, ice scouring, or muskrat herbivory. This vetch species is found in localities where plant diversity is high and annual species are prevalent. Bare to sparsely vegetated substrates appear to be a habitat feature of critical importance for establishment and growth of this species (USFWS 2010).

##### **Limiting Factors and Sensitivity to Disturbance**

This species has specific growing conditions that are intensified by growing in a dynamic environment. Threats to this species include sedimentation, competition from non-native plants, dams, dredging, filling, recreational activities, shoreline stabilization, shoreline structures, road and bridge construction, commercial and residential development, water withdrawal projects, water quality degradation, agricultural practices, introduced pest species, mining, over-visitation, declines in muskrat populations, rise in sea level (this may also be a result of natural cycles), and collection. Natural threats are often identified with disturbances, such as wave and ice action associated with severe storm events, competition, herbivory, channel migration, sea level rise and natural sedimentation processes (USFWS 2010).

### **Installation Activities with Potential to Affect Sensitive Joint-Vetch**

Activities at NSFDL that have the potential to impact the sensitive joint-vetch include shoreline stabilization projects, inaction in addressing eroding shorelines, and neglecting establishing invasive plant species communities in potential vetch habitat.

### **Management Practices**

Current management practices implemented at NSFDL to minimize potential impacts to sensitive joint-vetch include:

- Conduct periodic surveys to document presence and suitable habitat (Appendix 1C, M19).
- If identified, delineate in the GIS and protect marshes where it grows including adjacent upland buffer zones buffering the identified marshes (Appendix 1B, P20, DL8; Appendix 1C, M20).
- Consult with USFWS, as required, when landscape changes have the potential to impact this species or its habitat (Appendix 1C, M18).

#### **b. Northern Long-Eared Bat (*Myotis septentrionalis*)**

The northern long-eared bat was federally listed as threatened on April 2, 2015. A final 4(d) rule was published in the Federal Register on January 14, 2016 which specifically defines the "take" prohibitions. The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. Within the United States, this area includes 37 states and the District of Columbia (USFWS 2015). Although its distribution is widespread, the population is now at risk mainly due to a fungal disease, white-nose syndrome (WNS), which has decimated populations throughout the northeast. Passive acoustical monitoring of bats was conducted at NSFDL in 2014-2015 and 2017-2020 without a definitive identification for this species. In an ongoing effort to fully document our bat community, monitoring surveys are being conducted annually.

### **Habitat Requirements**

Northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees during the summer months. They seem opportunistic in selecting roosts, using tree species based on suitability to retain bark or

provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. They emerge at dusk to fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch using echolocation or gleaning motionless insects from vegetation and water surfaces (USFWS 2015). During winter months, this species hibernates in caves and mines. Absence of their specific hibernating habitat at NSFDL results in an unlikely over wintering population; however, suitable habitat is available to support them during the summer.

### **Limiting Factors and Sensitivity to Disturbance**

A number of threats to northern long-eared bats have contributed to their range-wide population decline. The pervasive impact of WNS and loss and/or degradation of roosting, hibernating, and foraging habitat due to human activity, development, forestry operations, and energy development (surface mining and oil, gas, and wind energy development) are contributing factors (. WNS is clearly the number one cause with an estimated 99% decrease in the northeastern population (USFWS 2015). While wind energy project related mortalities occur at a relatively low rate, the potential for them to increase is of concern with this expanding industry.

### **Installation Activities with Potential to Affect Northern Long-Eared Bats**

Building renovations/demolitions only occur occasionally at NSFDL. The NRM inspects these buildings prior to start up to check for northern long-eared bat and other bat maternal colonies. Forest harvest activities at NSFDL have slowed to a halt over the past decade for a number of reasons. All future forest management projects will incorporate appropriate management practices to sustain bat populations to include consultation with the USFWS. The NRM reviews all projects associated with the development of lands to ensure project sites are chosen to avoid or minimize habitat loss and/or degradation.

### **Management Practices**

Management practices currently implemented at NSFDL to minimize impacts to the northern long-eared bat include:

- Conduct passive acoustical monitoring annually to assess presence/absence of this species throughout the installation (Appendix 1B, P1; Appendix 1C, M21).
- Update the 2010 Integrated Forest Management Plan to include management guidelines related to forest

harvest/silvicultural practices that promote forest bat species. This includes retaining large snags that provide suitable roosting habitat (Appendix 1B, P17; Appendix 1C, M22).

- Follow guidelines for the removal of bats from buildings during summer roosting periods (Appendix 1C, M23).
- Provide comments to avoid/minimize impacts to forests and wetlands during project reviews to ensure habitat quality is maintained for this species ((Appendix 1C, M24).
- Identify mature/late successional forested areas to preserve their ecological significance as they provide potential high-quality summer habitat (Appendix 1C, M25).
- Consult with USFWS, as required, when landscape changes have the potential to impact this species or its habitat (Appendix 1C, M18).

Additionally, the following actions could indirectly improve northern long-eared roosting and foraging habitat when implemented: stormwater retrofits, restoration of CERCLA sites, stream restoration (Appendix 1B, P11), and silvicultural activities to promote wildlife habitat.

#### **(5) Federal Candidate Species**

Candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to their population to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. The NMFS also maintains a list of species of concern for which more information is needed before they can be proposed for listing. Candidate species receive no statutory protection under the ESA. USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA (USFWS 2011). The monarch butterfly is the only federal candidate species that is known to occur on NSFDL.

##### a. Monarch Butterfly (*Danaus plexippus plexippus*)

On August 26, 2014, the monarch butterfly was petitioned for listing as threatened under the Endangered Species Act (76 FR 67652) and the designation of critical habitat was requested. USFWS determined that the petition presented substantial scientific or

commercial information indicating that listing may be warranted. As a result, USFWS issued a 90-day petition finding on December 31, 2014. On December 15, 2020, the USFWS announced that listing the monarch as endangered or threatened under the ESA is warranted, but precluded by higher priority listing actions (USFWS 2020).

### **Habitat Requirements**

The monarch butterfly has a multi-generational migration that can cover thousands of miles from Canada and northern states to the mountains of central Mexico or the coast of California (CBD 2014). During the spring and summer, the majority of monarchs live east of the Rocky Mountains ranging from Texas to Canada. A smaller population lives west of the Rocky Mountains that range from California to Canada but only migrate as far south as San Diego. Small, non-migratory populations also exist in Florida, along the Gulf of Mexico and Hawaii.

Monarchs lay their eggs only on plants in the Family Apocynaceae (dogbane) in the milkweed subfamily Asclepiadoideae, genus *Asclepias* (L.) and related genera (CBD 2014). The caterpillars feed exclusively on milkweed plants. Milkweed butterflies are specialized to accumulate toxins from milkweed plants into their larval and adult bodies for predator defense (CBD 2014). Adults feed on nectar from a wide range of flowers, including milkweeds.

Most monarch butterflies do not live more than a few weeks. There are about 3 to 5 generations born each spring and summer and most of the offspring do not live beyond 5 weeks. The lone exception is the last generation born at the end of the summer. The last generation of each year is the over-wintering generation that must make the journey back to Mexico. Rather than breeding immediately, the over-wintering monarchs fly back to Mexico and stay there until the following spring. In the early spring, they fly north to the southern United States and breed. Over-wintering monarch butterflies can live upwards of 8 months.

### **Limiting Factors and Sensitivity to Disturbance**

Numerous threats to the monarch butterfly that are attributed to their range-wide population decline include modification or loss of habitat or range, impact on milkweed species populations, disease and predation, overutilization for commercial, recreational, scientific or educational purposes, inadequacy of existing regulatory mechanisms, widespread pesticide use, invasive species, and impacts associated with climate change (CBD 2014). Significant habitat reduction and degradation have occurred throughout their summer and winter ranges and it is ongoing. Monarch habitat is threatened by, among other things, pesticide



use from genetically engineered, pesticide-resistant crop systems that kill milkweeds and nectar sources, as well as by development, logging, and climate change (CBD 2014).

### **Installation Activities with Potential to Affect Monarch Butterflies**

At NSFDL, activities with the most potential to impact monarchs include invasive plant species outcompeting native milkweed species, construction projects that impact milkweed and other native forb species, mowing regimes on testing ranges, and the use of herbicides. The NRM reviews all projects associated with the development of lands to ensure project sites are chosen to eliminate or minimize habitat loss and/or degradation. Herbicides are used through the grounds maintenance contract along fence lines, around transformers and airfield lights, on two large testing arenas, and to control weeds in sidewalks and parking lots. The NRM provides guidance to the Installation Pest Management Coordinator (IPMC) and service calls related to herbicide use to ensure sensitive areas and milkweed plants are not impacted.

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to the monarch butterfly include:

- Review proposed vegetation clearing related to construction and testing through the CWAP process to ensure impacts to milkweed plants and other native forbs are avoided or minimized (Appendix 1C, M26).
- Ensure herbicide usage adheres to contract to protect sensitive areas (wetlands, streams, native vegetation) and milkweed plants (Appendix 1C, M27).
- Carry out monarch butterfly/pollinator habitat enhancement projects and protect existing landscapes (Appendix 1B, P3; Appendix 1C, M28).
- Conduct invasive species plant control throughout the installation to promote native plant establishment and growth. Targeted species include lespedeza, tree-of-heaven, and Japanese stilt grass (Appendix 1b, P9; Appendix 1C, M29).

Additionally, projects at NSFDL that have indirectly improved monarch butterfly when implemented include stormwater retrofits including bioretention areas and constructed wetlands vegetated

with pollinator-friendly species, modified mowing schedules, restoration of CERCLA sites, and stream restoration (Appendix 1B, P11).

#### **(6) Federal Proposed Species**

A proposed species is any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under Section 4 of the ESA (USFWS 2015). Species are proposed only after the USFWS or NMFS determine that listing is warranted based on review of information related to the species. Currently, there are no federal proposed species at NSFDL.

#### **(7) Federal Species of Concern**

Species of concern is an informal term that refers to those species that are believed to be in need of conservation actions. These actions vary depending on the health of the populations and types of threats and may include periodic monitoring of species population levels and threats to their habitat. Future actions may require listing the species as federally threatened or endangered but, until listed, species of concern receive no legal protection and the use of the term does not necessarily mean it will receive federal protection at a future time.

##### a. *Alewife (Alosa pseudoharengus) and Blueback Herring (A. aestivalis)*

Alewife and blueback herring are collectively referred to as "river herring". Due to difficulties in distinguishing between the two species, they are often harvested and managed together (NMFS 2009). On November 2, 2011, both species were petitioned for listing as threatened under the Endangered Species Act (76 FR 67652). On August 12, 2013, NMFS determined that listing alewife and blueback herring was not warranted at this time as either threatened or endangered based on a collective review of both species. Alewife and blueback herring are still considered federal species of concern throughout their current range.

Historically, alewife were distributed from Newfoundland to South Carolina. In recent years, accounts of this species in South Carolina have not been reported. Blueback herring have a more southerly distribution than alewife and are found from Cape Breton, Nova Scotia to the St. John's River in Florida.

#### **Habitat Requirements**

River herring are anadromous fish that leave the marine environment in the spring to enter coastal rivers to spawn. Alewife spawning migrations begin in the southern portion of the range and move progressively northward as water temperatures reach approximately

41 to 50 degrees F (NMFS 2009). Alewife spawn over a wide range of substrates such as gravel, sand, detritus and submerged aquatic vegetation in large rivers, small streams, ponds and large lakes (NMFS 2009). Predominantly filter feeders, alewife generally prefer zooplankton. However, while at sea they are known to prey on small fishes and the eggs and larvae of other fish (NMFS 2009).

Blueback herring spawning migrations begin about a month later than alewife as they enter coastal rivers to spawn in late March and continue through mid-May. In areas where they co-habitat with alewife, blueback herring will utilize a wider range of habitat for spawning, which includes submerged aquatic vegetation, rice fields, swampy areas and small tributaries upstream from the tidal zone (NMFS 2009). Young-of-the-year are found in fresh and brackish rivers and juveniles will remain in these nursery areas until they reach approximately 2 inches (NMFS 2009). Blueback herring are also predominantly filter feeders preferring zooplankton but prey on other pelagic shrimp and fish while at sea.

After spawning, river herring adults migrate quickly downstream and little is known about their life history while in the marine environment (NMFS 2009). However, both are pelagic, schooling species that undertake seasonal migrations due to changing water temperatures and prey movement and availability (NMFS 2009). River herring are known to migrate very long distances based on these changes in environmental conditions. Suitable habitat for river herring to spawn and forage is found in waterways on and adjacent to NSFDL.

#### **Limiting Factors and Sensitivity to Disturbance**

There are numerous threats to river herring that continue to contribute to their range-wide population decline. These threats include spawning and migration habitat loss and/or degradation due to dam construction and other impediments, overharvesting by the commercial fishing industry, bycatch impacts, and greater predation rates resulting from recovering striped bass populations (NMFS 2009). However, no single factor has been identified as being primarily responsible for their sharp decline. As a result, several states have issued moratoriums on their take and possession including Virginia in their tidal waters.

In the past decade, river herring numbers have dropped sharply in areas where historical numbers had been abundant and consistent, with some states reporting as much as a 95% decline. Much of this can be attributed to an increase in the commercial harvesting of river herring from the 1950s through the 1980s. Also, the bycatch impact from the commercial harvest of other fish has been

significant for both species. Declining populations also make river herring more susceptible to changing environmental conditions associated with disturbances.

### **Installation Activities with Potential to Affect River Herring**

Activities at NSFDL that have the potential to directly impact river herring include over-water testing, pier repair, dredging, and shoreline stabilization projects. These activities would require consultation with NMFS prior to start up for the shortnose and Atlantic sturgeon at which time river herring issues could be discussed. With the exception of over-water testing, the frequency of these activities is minimal. The BA prepared in 2011 for expanding research, development, testing, and evaluation activities within the PRTR did not address river herring.

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to river herring include:

- Delineate river herring habitat in the GIS database. This provides the NRM with the ability to consider these species and their habitat while reviewing CWAPs and PRTR testing plans in an effort to avoid or minimize impacts (Appendix 1C, M30).
- Conduct annual tidal and non-tidal stream surveys to determine presence/absence of fish species and assess stream quality. Surveys will provide data on river herring and better enable management of the species and habitat at NSFDL (Appendix 1C, M31).

Other management practices that could indirectly improve river herring habitat include stormwater retrofits, restoration of CERCLA sites, stream restoration (Appendix 1B, P11), and the implementation of low impact design into Navy projects.

#### **b. Little Brown Bat (*Myotis lucifugus*)**

The little brown bat is found from Labrador west to central Alaska and south to the Appalachians in Georgia and Arkansas, except Florida, Texas and southern California (NHFG 2013). Historically, little brown bats were one of the most common, if not the most common, bat species throughout its geographical range. However, this species is now at risk due to WNS, which has decimated populations throughout the east. Passive acoustical monitoring results from efforts conducted in 2014 and 2015 at NSFDL could only report the possible presence of this species at 3 locations

given the difficulties associated with identifying the genus *Myotis* to the species level. The survey in 2018 verified its presence through acoustics at one location. The little brown bat was verified in 2019 as well, but not in 2020. Virginia has listed this species as endangered.

### **Habitat Requirements**

Little brown bats seek out summer roosts in buildings (barns, attics, outbuildings) with the males and females roosting apart. The females gather into maternity colonies. They prefer hot spaces, such as right under the roof. The increased heat from the roof and multiple bat bodies helps the pups to grow faster. Males roost in smaller colonies and may use tree cavities as well as buildings (NHFG 2013). These summer roosts are usually located within proximity to water where foraging mostly occurs. NSFDL provides suitable habitat for roosting and maternity colonies with buildings and old structures as well as an abundance of forested acres and wetlands. Wintering habitat is absent as this species utilizes mines and caves to establish their hibernacula.

Little brown bats feed primarily over wetlands and other still water where insects are abundant. Their sought-after prey includes moths, wasps, beetles, gnats, mosquitoes, midges, and mayflies. They use rivers, streams, and trails as travel corridors to navigate across the landscape (NHFG 2013). NSFDL offers abundant foraging habitat for this species with approximately 10 miles of Potomac River and Upper Machodoc Creek shoreline, the 198-acre and 71-acre tidal marshes of Gambo Creek and Black Marsh, respectively, and a landscape dotted with ponds, forested wetlands, and rights-of-way.

### **Limiting Factors and Sensitivity to Disturbance**

There are numerous threats to little brown bats that have contributed to their range-wide decline. They include WNS, loss or degradation of roosting and foraging habitat due to development, extermination practices related to removal/exclusion from homes and buildings, forestry operations, and wind energy development projects. WNS has decimated many local populations of little brown bats in the east with some experiencing declines of 85% to 98%. Wind energy projects represent a growing concern with the expansion of this alternative renewable energy industry.

### **Installation Activities with Potential to Affect Little Brown Bats**

Building demolitions/renovations occur infrequently at NSFDL. The NRM inspects buildings prior to start up to ensure little brown bat and other bat maternity colonies are not present. Impacts to

maternity colonies could result in abandonment of young and roosts. Forest harvesting activities at NSFDL have slowed to a halt over the past decade for several reasons. All future forest management projects will incorporate appropriate management practices to sustain bat populations. The NRM reviews all projects associated with the development of lands to ensure project sites are chosen to avoid or minimize habitat loss and/or degradation.

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to the little brown bat include:

- Conduct passive acoustical monitoring annually to assess presence/absence of this species throughout the installation (Appendix 1B, P1; Appendix 1C, M21).
- Update the 2010 Integrated Forest Management Plan to include management guidelines related to forest harvest/silvicultural practices that promote forest bat species. This includes retaining large snags that provide suitable roosting habitat (Appendix 1B, P17; Appendix 1C, M22).
- Follow guidelines for the removal of bats from buildings during summer roosting periods (Appendix 1C, M23).
- Provide comments to avoid/minimize impacts to forests and wetlands during project reviews to ensure habitat quality is maintained for this species (Appendix 1C, M24).
- Identify mature/late successional forested areas to preserve their ecological significance as they provide potential high-quality summer habitat (Appendix 1C, M25).
- Follow the VDWR guidelines on best management practices (BMPs) and processes for conserving little brown bats and tri-colored bats (VDGIF 2016) (Appendix 1C, M32).

Additionally, the following actions could indirectly improve little brown bat roosting and foraging habitat when implemented: stormwater retrofits, restoration of CERCLA sites, stream restoration (Appendix 1B, P11), and silvicultural activities to promote wildlife habitat.

c. Tri-Colored Bat (*Perimyotis subflavus*)

On June 14, 2016, the Center for Biological Diversity and Defenders of Wildlife formally petitioned USFWS to list the tri-colored bat as a threatened or endangered species and to designate critical habitat concurrent with listing. USFWS announced a 90-day finding status review for the tri-colored bat on December 20, 2017.

Formerly known as the eastern pipistrelle (*Pipistrellus subflavus*), this species was once a common small forest-dwelling bat across its range. It was found from southeastern Canada to Honduras and as far west as Oklahoma (Silvis et.al. 2016). Evidence suggests that its range is expanding westward (Silvis et al. 2016). It was detected at most sites during passive acoustical monitoring survey efforts at NSFDL during 2014, 2015, 2017, and 2018. The tri-colored bat was identified in 2019 and 2020, including a sighting on the Public Works building 182 in September 2020.

**Habitat Requirements**

Tri-colored bats preferred summer roost type appears to be tree foliage, including dead leaf clusters (Silvis et al. 2016) although they have been observed roosting during the summer in buildings (including houses and abandoned military bunkers). Preferred trees include spruce, oak, and pines based on geographical regions. The sexes choose to roost at separate sites. NSFDL provides suitable habitat for roosting and maternity colonies with buildings and old structures as well as an abundance of forested acres and wetlands.

In the eastern United States, this species begins to migrate to hibernacula sites by mid-August. Where they exist, caves are the preferred hibernacula site, but they have been observed utilizing culverts, old bunkers, and other man-made structures where caves do not exist. Tri-colored bats that spend summer months at NSFDL likely migrate to the Piedmont Region to utilize caves as hibernacula for the winter.

Tri-colored bats feed over a range of habitats including canopy gaps, closed canopy forests, along forest edges, wetlands and open water. NSFDL offers abundant foraging habitat for this species with approximately 10 miles of Potomac River and Upper Machodoc Creek shoreline, the 198-acre and 71-acre tidal marshes of Gambo Creek and Black Marsh, respectively, and a landscape dotted with ponds, forested wetlands, and rights-of-way.

**Limiting Factors and Sensitivity to Disturbance**

A range-wide decline in tri-colored bats can be attributed to WNS, loss or degradation of roosting and foraging habitat due to land use conversion and forestry operations, loss of genetic diversity

due to WNS impacts, and wind energy development projects. WNS is the leading cause of population decline and has pushed many local populations of tri-colored bats to the brink of local extirpation (Silvis et al., 2016). Wind energy projects represent a growing concern with the expansion of this alternative renewable energy industry. Declining populations has resulted in several states listing the tri-colored bat as threatened or endangered or designated them as a species of concern. Virginia has listed this species as endangered.

### **Installation Activities with Potential to Affect Tri-Colored Bats**

Building demolitions/renovations occur infrequently at NSFDL. The NRM inspects buildings prior to start up to ensure tri-colored bats and other bat maternity colonies are not present. Impacts to maternity colonies could result in abandonment of young and roosts. Forest harvesting activities at NSFDL have slowed to a halt over the past decade for several reasons. All future forest management projects will incorporate appropriate management practices to sustain bat populations. The NRM reviews all projects associated with the development of lands to ensure project sites are chosen to avoid or minimize habitat loss and/or degradation.

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to the tri-colored bat include:

- Conduct passive acoustical monitoring annually to assess presence/absence of this species throughout the installation (Appendix 1B, P1; Appendix 1C, M21).
- Update the 2010 Integrated Forest Management Plan to include management guidelines related to forest harvest/silvicultural practices that promote forest bat species. This includes retaining large snags that provide suitable roosting habitat (Appendix 1B, P17; Appendix 1C, M22).
- Follow guidelines for the removal of bats from buildings during summer roosting periods (Appendix 1C, M23).
- Provide comments to avoid/minimize impacts to forests and wetlands during project reviews to ensure habitat quality is maintained for this species (Appendix 1C, M24).



- Identify mature/late successional forested areas to preserve their ecological significance as they provide potential high-quality summer habitat (Appendix 1C, M25).
- Follow the VDWR guidelines on best management practices (BMPs) and processes for conserving little brown bats and tri-colored bats (VDGIF 2016) (Appendix 1C, M32).

Additionally, the following actions could indirectly improve tri-colored bat roosting and foraging habitat when implemented: stormwater retrofits, restoration of CERCLA sites, stream restoration, and silvicultural activities to promote wildlife habitat.

d. Northern Red-bellied Cooter (*Pseudemys rubriventris*)

On April 20, 2010, the northern red-bellied cooter was petitioned by the Center for Biological Diversity (CBD) for listing as endangered or threatened under the ESA and the designation of critical habitat was requested. USFWS determined that the petition presented substantial scientific or commercial information indicating that listing may be warranted. As a result, USFWS issued a partial 90-day petition finding on September 27, 2015 (76 FR 59836 59862). USFWS is currently conducting a status review. To date, no decision has been made on the listing of the species.

**Habitat Requirements**

The northern red-bellied cooter is a diurnal, freshwater turtle that is endemic to the eastern United States. The species is relatively common in its core range (Maryland, Virginia, Delaware and New Jersey) but populations are small and in decline elsewhere (CBD 2010). It is a large turtle, averaging 10 to 12.5 inches in length, with an olive to brown colored carapace.

The northern red-bellied cooter is associated with relatively deepwater bodies such as moderate gradient rivers and impoundments, but oxbows, floodplain marshes, blackwater swamps, ponds and canals are also occupied. This species often frequents tidal waters near the mouths of rivers. Habitat requirements include a soft bottom and numerous basking sites. Aquatic plants form the staple of the turtle's diet and must also be present (Ernst and Lovich 2009).

Northern red-bellied cooters are active from March to November and typically enter hibernation from December to February. The species hibernates at the bottom of waterways by resting on the top of or burying itself in the mud bottom to a depth of 3 meters (Ernst and Lovich 2009).

Foraging occurs in the morning in either shallow or deep water and much of the day is spent basking on the bank, logs, rocks, pier pilings or duck blinds. Juveniles are essentially omnivores, consuming insects, snails, crayfish, tadpoles, plant material and fish. Adults are almost exclusively herbivorous feeding on aquatic vegetation (Ernst and Lovich 2009).

NSFDL provides excellent non-tidal and tidal wetland, pond, creek and river habitat that is suitable for the northern red-bellied cooter. The species is relatively common on the installation and was documented during a 2014 herpetofaunal survey.

#### **Limiting Factors and Sensitivity to Disturbance**

There are numerous threats to northern red-bellied cooters that continue to contribute to a rangewide decline in populations. They include but are not limited to: (1) habitat and travel corridor fragmentation; (2) loss or degradation of wetlands due to development; (3) road mortality; (4) harvesting for commercial purposes; and (5) nest site destruction/degradation due to development. Increased predation by species such as dogs, foxes, raccoons, and skunks is also having an impact.

#### **Installation Activities with Potential to Affect Northern Red-Bellied Cooters**

At NSFDL, activities with the most potential to impact northern red-bellied cooters include construction projects that have the potential to negatively impact wetlands, creeks/rivers, and ponds that provide suitable habitat for the species, and roadkills.

#### **Management Practices**

The current management practices implemented at NSFDL to minimize impacts to the northern red-bellied cooter are:

- Conduct periodic herpetofaunal surveys to identify species and update the INRMP and species lists (Appendix 1B, DL1; Appendix 1C, M33).
- Review proposed wetland disturbance and in-water work projects related to construction, demolition, and operations/training through the CWAP process to ensure impacts to these habitats are eliminated or minimized (Appendix 1C, M34).
- Restrict proposed dredging activities during northern red-bellied cooter hibernation (November-March) (Appendix 1C, M35).

- Conduct wetland habitat enhancement and construction projects as funding is provided. Areas are identified based on suitable site conditions and are approximately 0.5 acres in size (Appendix 1C, M36).
- Strive to deter/prevent collection of turtles and other wildlife species for the illegal pet trade and consumption (Appendix 1C, M37).

Additionally, the following projects are currently ongoing at NSFDL and could indirectly improve northern red-bellied cooter habitat: stormwater retrofits including bioretention areas vegetated with native forbs, invasive species control, restoration of CERCLA sites and stream restoration (Appendix 1B, P11).

e. Spotted Turtle (*Clemmys guttata*)

Spotted turtle's range along the Atlantic coast from Maine to Florida and in the Great Lakes region. Virginia has declared this species as Tier III (High Conservation Need). The species was first identified on NSFDL during the 1977-28 survey (USN 1979). However, a herpetological survey conducted in 2014 did not find any specimens. Since then, there have been several verified observations of this species and annual surveys are conducted as warranted.

**Habitat Requirements**

Spotted turtles are semi-aquatic and can be found in a variety of shallow waterbodies including streams, swamps, marshes, bogs, and permanent and seasonal pools and ponds. The muddy bottoms of these aquatic habitats are used to spend the winter hibernating. During the spring, they are commonly seen basking on logs, stumps, and grass mats. Nesting occurs in open sites such as a meadow, field, or along the edge of a road. They seek out a variety of plant and animal foods. They primarily forage in the water for worms, slugs, snails, adult and larval insects, tadpoles, frogs, and fish carrion. They supplement their animal diet with algae, leaves, soft aquatic plants and seeds.

**Limiting Factors and Sensitivity to Disturbance**

A decline in the spotted turtle population has been documented throughout its range. Much of it can be attributed to human-induced causes such as collection for the pet trade, pollution, and road mortality. Landscape changes, habitat fragmentation, and a decrease in the quantity and quality of wetland habitats are also important contributing factors. They are also sensitive to pollution and toxic substances, and quickly disappear from

habitats with declining water quality. The above impacts coupled with a lengthy maturation period and a relatively low reproductive rate greatly limits their ability to maintain viable population levels.

### **Installation Activities with Potential to Affect Spotted Turtle**

Activities at NSFDL that have the potential to directly impact the spotted turtle and their habitat include land development, degradation of wetlands, certain silvicultural practices, the loss of open areas due to plant succession, and road mortality.

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to the spotted turtle include:

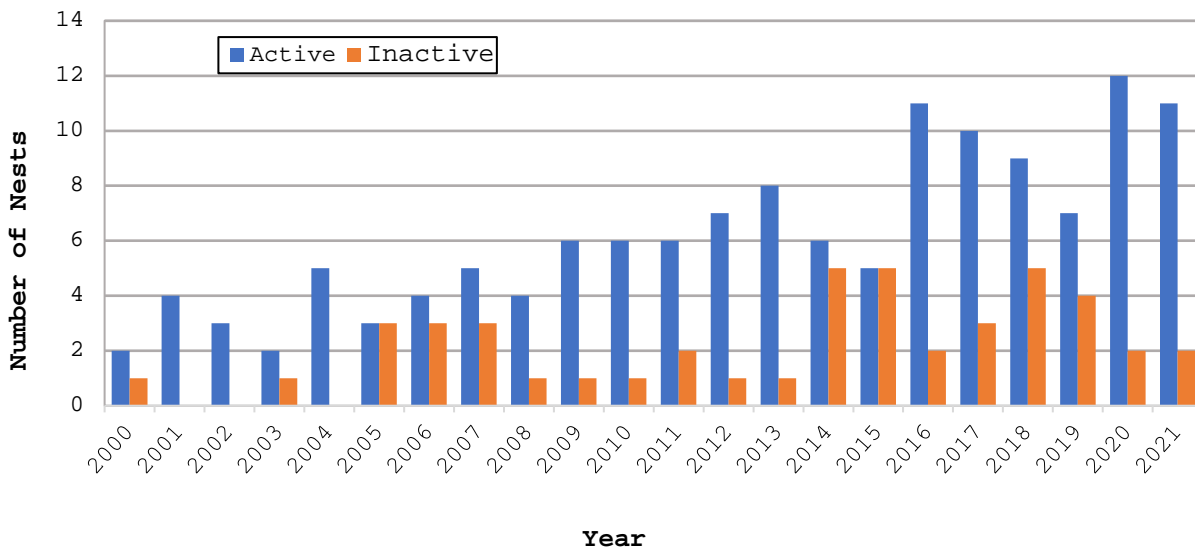
- Conduct periodic herpetofaunal surveys to identify species and update the INRMP and species lists (Appendix 1B, DL1; Appendix 1C, M33).
- Review proposed wetland disturbance and in-water work projects related to construction, demolition, and operations/training through the CWAP process to ensure impacts to these habitats are eliminated or minimized (Appendix 1C, M34).
- Conduct wetland habitat enhancement and construction projects as funding is provided. Areas are identified based on suitable site conditions and are approximately 0.5 acres in size (Appendix 1C, M36).
- Strive to deter/prevent collection of turtles and other wildlife species for the illegal pet trade and consumption (Appendix 1C, M37).
- Implement practices detailed in the Legacy funded *Recommended BMPs for Spotted Turtles on DoD Installations* guidance document (DoD 2019) (Appendix 1C, M38).

A management practice that could directly benefit this species if implemented would be to educate the general populace about the impact road mortality has on this species and the importance of careful driving to all species found in proximity to roadways.

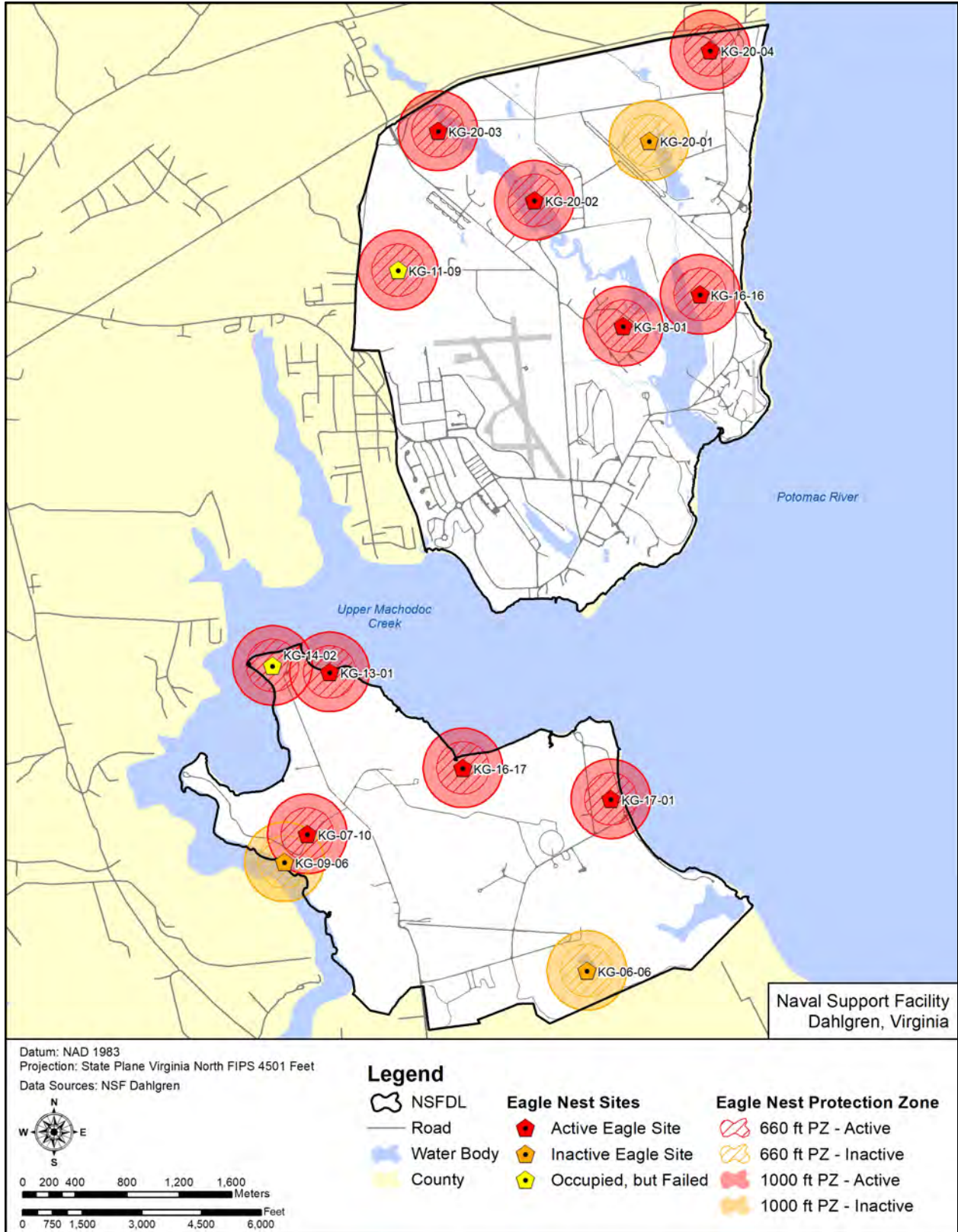
f. Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles have been known to nest on NSFDL since 1983. From 2000 to 2021, the number of active and inactive nests have fluctuated between two and eleven and zero and seven, respectively (Figure 3-1, Figure 3-2, and Appendix 6). During that same period of time, the number of eagle nests considered historic rose from three to 13. Three consecutive years of inactivity followed by a fourth results in a nest being defined as historic. The once rare sighting of an eagle has become an almost daily event. Our ability to track the status of bald eagles onsite is accomplished by conducting aerial surveys in Mar (nesting) and Apr (productivity). The resulting data is used by the NRM to better manage nesting bald eagle pairs and their young at NSFDL.

Bald eagle management practices on NSFDL are outlined in the Bald Eagle Management Plan (USN 2007b) and are implemented in cooperation with VDWR and USFWS to ensure protection of this species and compliance with the Bald and Golden Eagle Protection Act. Management includes protection of documented nesting and foraging habitat, monitoring nesting activity and success, and enforcement of the Bald Eagle Protection Guidelines for Virginia developed by the USFWS and VDGIF. With the delisting of the bald eagle in 2007, the USFWS developed National Bald Eagle Guidelines that include general non-binding recommendations for land management practices that will benefit bald eagles (USFWS 2007a). The USFWS ecological field services in Virginia then released their revised guidelines to which NSFDL adheres (USFWS 2014).



**Figure 3-1. Bald Eagle Nesting Activity at Naval Support Facility Dahlgren**



**Figure 3-2. Bald Eagle Nests at Naval Support Facility Dahlgren during the 2020-2021 Nesting Season**

### **Limiting Factors and Sensitivity to Disturbance**

Individual bald eagle pairs exhibit considerable variation in response to human activities. The variability in eagles' responses to disturbance may be related to a number of factors including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and the tolerance of the individual nesting pair. Human disturbance has been shown to reduce productivity, nest success, and territory use (USN 2007b).

### **Management Practices**

Current management practices implemented at NSFDL to minimize impacts to the bald eagle include:

- Conduct annual bald eagle aerial surveys to assess productivity (Appendix 1B, P4; Appendix 1C, M39).
- Ensure GIS database is updated as needed to reflect current bald eagle nest sites and nest protection zones (Appendix 1B, P20, DL8; Appendix 1C, M40)
- Erect barriers and signs identifying nest protection zones on base during the time of year restriction period (December 15 through June 15) and conduct environmental review of projects to ensure compliance (Appendix 1C, M41).

### **(8) Special Interest Areas (SIA)**

Several SIAs have been established at the installation to represent areas with unique ecological characteristics and/or high-quality habitat for rare species (Figure 3-3). The SIAs were originally delineated in the 1992 Natural Heritage Resources Inventory (USN 1992) and later expanded by the Natural Resources manager, Dr. Thomas Wray. Two wetland areas on Mainside possess unique ecological characteristics and high-quality rare species habitat and three areas on Pumpkin Neck provide nesting habitat for bald eagles.

#### **a. Forested Wetland Swale**

The 167-acre Forested Wetland Swale SIA is located in the northwestern portion of Mainside. This area consists of several seasonally flooded, parallel low troughs in flat topography. An extensive forested wetland is present and herbaceous wetlands occur along firebreaks. Tree species in the forested wetland include red maple, black gum, willow oak, and pin oak (*Quercus palustris*). The shrub layer is sparse to non-existent. The herbaceous layer includes sedges and Sphagnum species. Three invertebrates including the blue-faced meadowfly (*Sympetrum*

*ambiguum*, a dragonfly), Coyle's purse-web spider, a funnel-web spider, and a beetle (*Amerinum* spp.) were documented in this area during the VDCR-DNH 1991-92 surveys.

b. Gambo Creek

This SIA is approximately 643 acres and consists of a brackish-intertidal emergent marsh community along Gambo Creek. The extensive marshes along Gambo Creek are dominated by saltmarsh cordgrass, marsh elder, and pigweed (*Amaranthus cannabinus*). The area is well buffered by mixed hardwood and pine forests. Three of the seven Mainside bald eagle nests are in this area, all of which were active during the 2020 nesting season. The area also provides important roosting and foraging habitat for eagles, ospreys, and other birds; nursery habitat for fish; and habitat for uncommon invertebrates. Blue-faced meadowfly and unicorn clubtail (*Arigomphus villosipes*, a dragonfly) were documented in this area by VDCR-DNH biologists during the 1991-92 surveys.

c. Tetotum Flats North

This SIA includes approximately 124 forest acres adjacent to Upper Machodoc Creek. Bald eagles have nested in this area intermittently since 1983 and have utilized at least two separate nest sites.

d. Tetotum Flats South

The Pumpkin Neck South SIA is in the southwestern corner of Pumpkin Neck, adjacent to Upper Machodoc Creek. It consists of approximately 44 forested acres and has also historically supported an active bald eagle nest site.

e. Tetotum Flats East

This SIA is in the interior portion of Pumpkin Neck and includes approximately 55 forested acres. Bald eagles have consistently nested at this site since 1997.



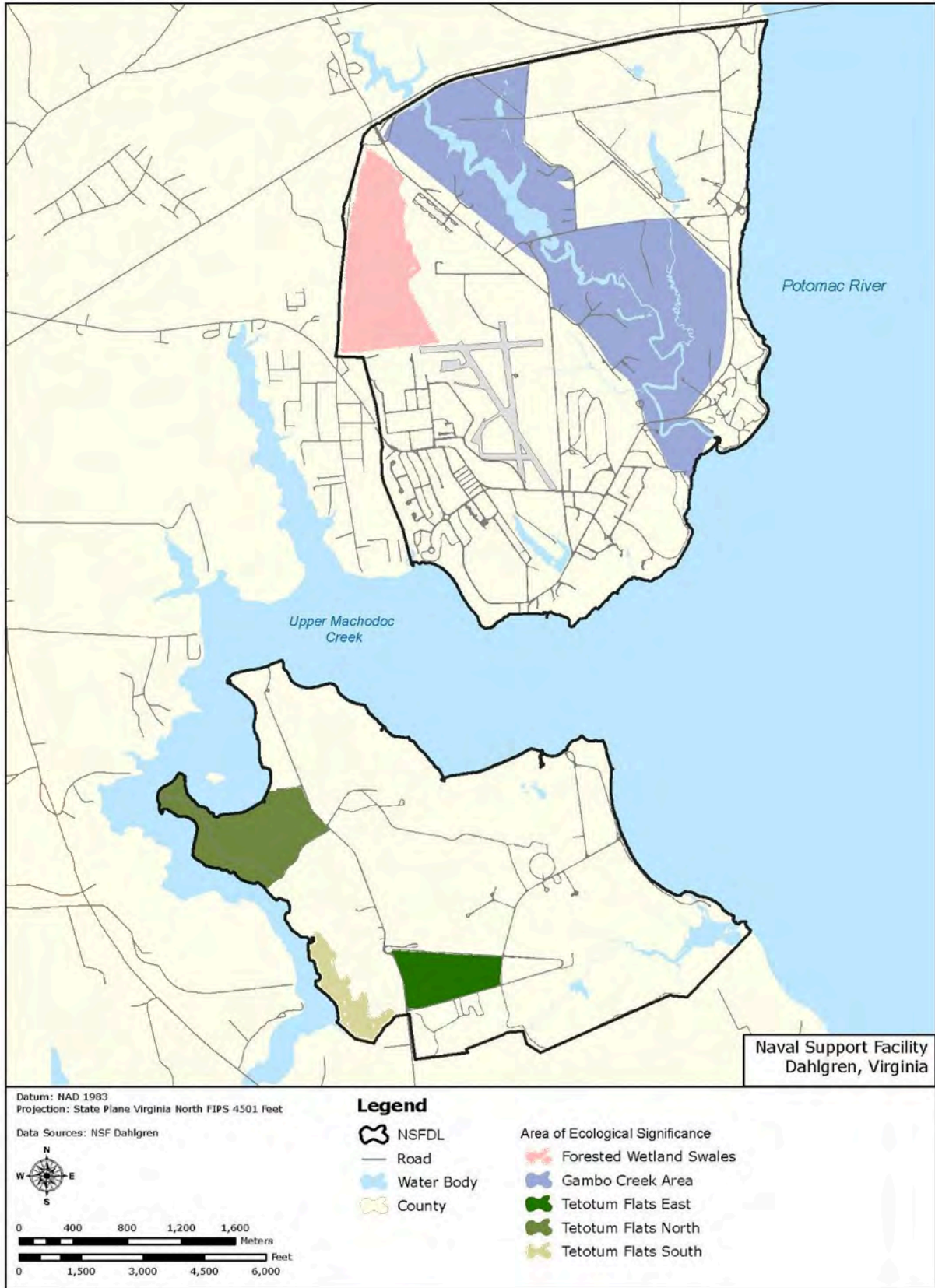


Figure 3-3. Special Interest Areas

## **(9) Potential Threats to Rare Species**

Rare species at NSFDL are potentially threatened by competition from other plants and animals, as well as ecological imbalances that alter their preferred habitats. Competition from invasive plant species such as common reed, lespedeza, Japanese stilt grass, and Japanese honeysuckle poses the greatest threat to rare plant populations. Invasive species reproduce aggressively, limiting the amount of light, water, nutrients, or space available for rare species growth and survival. Over population by white-tailed deer also results in over browsing of understory plants, such as red-berried greenbrier. General land use management guidelines have been established for the protection areas. Hunting, fishing, hiking, and minimal forestry activities are allowed in the protection areas; recreational off-road vehicle use is not permitted. Development in the protection areas is avoided to the extent possible, but potential impacts are rigorously evaluated if an action is proposed in a protection area. The protection areas have been incorporated into the GIS and will be evaluated based on the findings of updated rare species surveys.

## **B. WETLANDS MANAGEMENT**

### **(1) Program Description**

Wetland communities encompass over 14 percent of the installation (see Table 2-4, Figure 2-10, and Figure 2-11). Wetlands are protected and regulated by the CWA, EO 11990 - Protection of Wetlands, and VDEQ regulations. The Navy considers wetland protection a top priority as reflected by their "No Net Loss" wetland policy. The wetland protection policy of NSFDL is in strict compliance with federal and state requirements and the Navy's wetland policy.

The wetland data contained in the NSFDL GIS are available to a variety of users to ensure that wetland issues are integrated into the mission and land use planning processes. All proposed development activities are coordinated with the NRM early in the planning process via CWAP to ensure that wetland issues are addressed. The NRM provides assistance in identifying potential alternatives to ensure compliance with regulations and to ensure that impacts to wetlands are avoided or minimized to the extent possible. In addition, the NRM coordinates with VMRC, USACE, VDEQ, and KGCWB early in the planning process to ensure that all potential wetland issues are identified, and the appropriate permits are obtained.

Over the past few years the NRM has conducted additional wetland surveys to ground truth and update existing GIS coverages. In

addition, project-specific wetland delineations are conducted in accordance with the Corps of Engineers Wetlands Delineation Manual on an as needed basis for all proposed activities that could potentially require a Section 404 permit.

## **(2) Program Goals**

The overall goal of the Wetlands Management Program is to ensure compliance with the CWA, EO 11990, EO 11988, and applicable state regulations, as well as to protect and enhance wetland communities at NSFDL (Appendix 1A, G7). Management practices for the program include the following:

The goals of wetlands management at NSFDL are to avoid or minimize impacts to wetlands to the greatest extent practicable, to mitigate any unavoidable impacts in accordance with state and federal regulations, and to enhance wetland habitats where feasible. The primary statutes that regulate activities in wetlands are EO 12088 Federal Compliance with Pollution Control Standards, EO 11990 Protection of Wetlands, and the CWA, which require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In addition, the VMRC regulates activities in submerged lands, tidal wetlands, and coastal sand dunes/beaches (Code of Virginia Title 28.2).

- Implement ecosystem management practices to achieve Wetland Management Program goals (Appendix 1C, M42).
- Protect and enhance the biodiversity, functions, values, and habitat availability of wetland communities (Appendix 1C, M43).
- Maintain no net loss of size, function and value of installation wetlands and preserve the natural and beneficial values of wetlands (Appendix 1C, M44).
- Enhance and/or create wetlands at NSFDL to provide wildlife habitat, improve water quality, and return hydrology to identified areas. This will only be conducted in areas that have no impact on mission operations (Appendix 1C, M45).
- Comply with existing federal, state, and Navy wetland regulations and policies and ensure all permits/consultations are completed to remain compliant with applicable regulations (Appendix 1F, M46).

- Ensure wetland delineations are conducted, per the USACE Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), for all military construction (MILCON) projects and activities that may have impacts to wetlands (Appendix 1F, M47).
- Participation in off-site mitigation banks or in-lieu fee instruments is encouraged when impact avoidance to wetlands and waterways is not practicable (Appendix 1F, M48).
- Adverse impacts to floodplains shall be avoided when possible (Appendix 1F, M49).

### **(3) Wetland Management**

Under Section 404 of the CWA, discharge of dredge and fill material into waters of the United States, including wetlands, is prohibited unless a permit is issued by the USACE. Exemptions for discharges of dredged or fill material are provided for normal forestry activities such as timber harvesting and construction and maintenance of forest roads in accordance with BMPs if the activity is part of an established operation. Activities that bring an area into farming, silviculture, or ranching use, however, are not considered part of an established operation and do require permits.

In accordance with Section 401 of the CWA, federal agencies must also obtain a water quality certificate from the state for any action requiring a federal license or permit. In Virginia, the Virginia Water Protection Permit Program (9 VAC 25-210) requires state permits for any impacts to state waters and wetlands, including isolated wetlands. VMRC and the KGCWB, an arm of the VMRC, issue permits when the action occurs within their jurisdictional boundaries. The Joint Permit Application process formalizes the regulatory agencies jurisdictional determination for permitting purposes wetland resource impacts. The application is submitted to VMRC who then forwards it to the other regulatory agencies for their action.

As part of the permit evaluation process used to authorize a particular project proposing to impact state waters (including wetlands), applicants must (1) establish that avoidance of impacts to state waters, including wetlands is not practicable; (2) demonstrate that all practicable efforts to minimize unavoidable impacts to state waters, including wetlands, have been taken in project design and construction plan; and (3) provide a plan for compensation for all unavoidable impacts.

A number of USACE Nationwide Permits (NWP) and Regional Permits (RPs) may be used to streamline the permitting process for small or routine actions that are similar in nature and typically have only minor environmental impacts. They protect all jurisdictional waters, including small wetlands and other waterbodies, through their terms and conditions, such as acreage and linear foot limits. They also support the "no overall net loss goal" through mitigation requirements. Individual Permits and letters of permission may be required for larger or more complex actions that include a public notice and comment period.

Compensatory mitigation requirements are determined by district engineers on a case-by-case basis, after considering relevant and available information, such as the ecological conditions of the project site, the type of activity, the impacts of the activity on the aquatic environment, and other public interest factors. General conditions for NWPs require compensatory mitigation at a minimum one-for-one for all wetland losses that exceed 1/10 acre and require preconstruction notification. The mitigation ratio, however, can be adjusted upward as necessary to provide for more appropriate mitigation for a specific activity (VDEQ 2007b). In Virginia, recommended mitigation ratios (VDEQ) for various wetland types are generally as follows:

- 2:1 ratio for forested wetlands
- 1.5:1 for scrub-shrub wetlands
- 1:1 for emergent wetlands
- 1:1 for streams
- Project-specific ratios for other surface water impacts

#### **(4) Mitigation Sites**

Several remedial activities under the Environmental Restoration (ER) Program have resulted in unavoidable disturbances to wetlands. Implementation of the ER Program places avoidance and minimization of wetland impacts as a priority. However, some minor impacts to wetlands within and surrounding various ER sites were unavoidable and necessary to meet ER objectives for protection of human health and the environment.

Eight ER sites have associated wetland impacts. During remediation, some of the impacted wetlands were restored and additional wetland acreage was constructed where feasible. Potential wetland mitigation sites at NSFDL were identified and

evaluated (USN 1998a). Any final mitigation requirement has not been determined.

Wetland impacts associated with the ER Program under CERCLA do not require a CWA permit. However, the equivalent of a Joint Permit Application must be submitted to obtain agency input and concurrence with proposed mitigation plans, including a mitigation monitoring plan for all existing and proposed mitigation sites. Any wetland mitigation design and construction projects will be implemented under the ER Program, in coordination with the NRM.

#### **(5) Submerged Aquatic Vegetation (SAV)**

SAV beds are considered Special Aquatic Sites, as defined in 40 CFR Part 230 (Section 404 (b)(1) Guidelines), Subpart E (230.4 through 240.45). SAV beds grow in the littoral zone of the Potomac River and Upper Machodoc Creek. These beds provide habitat for fish and other aquatic organisms, replenish oxygen supplies in the water, and improve water quality. The decline of SAV is a major ongoing ecological concern in the Chesapeake Bay and its tributaries.

In a multi-year study that was initiated in 1999, the Navy teamed with the Alliance for the Chesapeake Bay to monitor SAV beds and to study the effects of SAV restoration on fish populations in the Potomac River (Alliance for the Chesapeake Bay N.D.). The NRM conducted water quality and SAV monitoring as part of this effort. The results of the study indicated that fish abundance and species diversity were consistently greater in vegetated sites than in non-vegetated sites. A total of 24 species of fish and one crab species were observed at the six sites at NSFDL.

### **C. FISH AND WILDLIFE MANAGEMENT**

#### **(1) Program Description**

The NRM and SCA interns (when available) implement a majority of the management activities under this program. The Pest Management Coordinator within the PWD is responsible for implementing nuisance wildlife management activities in conjunction with the NRM. A GIS specialist when available to the environmental office provides information management support. Other environmental office staff and volunteers provide assistance with various management activities, such as monitoring bird nesting boxes, conducting habitat management activities, and running the hunting program. The USFWS, NMFS, and VDWR are cooperating agencies for the Fish and Wildlife Management Program and provide guidance on management issues and projects.

The Fish and Wildlife Management Program at NSFDL is applicable to the entire installation and addresses a wide variety of topics including the following:

- Habitat management
- Game management
- Non-game management
- Nuisance wildlife management
- Fisheries management

In accordance with the overall natural resources management approach at NSFDL, fish and wildlife management focuses on protecting and enhancing biodiversity through ecosystem management. Biodiversity consists of all elements of the natural environment and ecosystem management is a tool that encourages management decisions to focus on natural resources at a community or ecosystem level rather than at a single species level. By maintaining or improving the quality, integrity, and connectivity of the ecosystem, individual species should prosper. While species-specific management actions are implemented under the Fish and Wildlife Management Program, they are done so within the broader context of ecosystem management.

## **(2) Program Goals**

The overall goal of the Fish and Wildlife Management Program is to manage fish and wildlife resources to maintain and enhance ecosystem functions and values in a manner that is consistent with the military mission (Appendix 1A, G8). Specific management practices are discussed below.

## **(3) Habitat Management**

Quality habitat provides the foundation for healthy fish and wildlife resources. Accordingly, fish and wildlife management at NSFDL focuses on habitat management, which consists of two primary components: habitat protection and habitat enhancement. The overall goal of habitat management is to maintain a diversity of natural community types to ensure that the ecological requirements for the greatest number of species are met.

### **a. Habitat Protection**

Habitat protection is the most important and highest management priority for the Fish and Wildlife Management Program. Habitat protection measures have been integrated into all the resource-specific management programs, as well as the NSFDL mission and

land use planning processes. Implementation of habitat protection measures helps to ensure compliance with natural resources-related regulations, as well as providing benefits to fish and wildlife resources. Specific habitat protection measures at NSFDL include the following:

- SIAs with unique ecological characteristics and/or high-quality habitat for rare species are recognized. Such areas may require special natural resources management practices and may be given special consideration during land use planning (Appendix 1C, M50)
- Wetlands protection and adherence to the Navy's "no net loss" of wetlands policy (Appendix 1C, M51)
- Maintenance of vegetated riparian buffers (Appendix 1C, M52)
- Enforcement of Virginia's erosion and sediment control and stormwater regulations ((Appendix 1C, M53)
- Enforcement of Best Management Practices for timber harvests (Appendix 1C, M54)

b. Habitat Enhancement

Active management practices to enhance fish and wildlife habitat are implemented under the Land Management Program, the Forest Management Program, and the Fish and Wildlife Management Program. Habitat enhancements are generally designed to improve the overall health of the system and to provide a diversity of habitat elements to support all species. However, species-specific habitat enhancements are also implemented to improve conditions when a population is declining or when significant habitat gaps have been left due to human disturbances.

The following general management practices/guidelines have been identified and implemented, when feasible, at NSFDL to sustain and improve overall fish and wildlife habitat quality:

- Manage forest resources to minimize fragmentation and preserve large blocks of forested communities, when possible (Appendix 1C, M55)
- Improve connectivity between forested communities and maintain wildlife corridors by allowing forest edge habitat to develop (Appendix 1C, M56)



- Maintain a balance of forest stand types and do not convert hardwood or pine-hardwood forest stands to pine stands (Appendix 1C, M57)
- Reduce residual forest stand basal area to 70 to 80 square feet per acre by thinning (Appendix 1C, M58)
- Retain or encourage snags 10 inches in diameter at breast height (DBH) or greater and preserve potential nest/den trees. Cluster snags where possible. Larger snags are especially valuable in proximity to wetlands or a water source (Appendix 1C, M59)
- Encourage hard and soft mast-producing species during forest management activities (Appendix 1C, M60)
- Conduct prescribed burning on a rotation of 3 to 5 years to improve wildlife habitat in designated early successional habitats (Appendix 1C, M61)
- Maintain open grasslands and early successional habitats through prescribed burning and/or mowing to promote overall biodiversity (Appendix 1C, M62)
- Conduct mowing, disking, and replanting of wildlife food plots on an annual or biannual basis (Appendix 1C, M63)
- Maintain vegetated buffers, preferably forested buffers, along streams, wetlands, shorelines and roadsides (Appendix 1C, M64)
- Use native species that benefit wildlife in landscape plantings (Appendix 1C, M65)
- Create brush piles using slash generated by forest management activities to create wildlife cover (Appendix 1C, M66)
- Schedule and conduct active habitat management activities (e.g., timber harvests, prescribed burning, mowing, etc.) outside the breeding season for birds and other species whenever possible (Appendix 1C, M67)
- Identify land management practices that may be modified to benefit pollinators and their habitat (Appendix 1C, M68)

Species-specific habitat enhancements have primarily focused on improving avian nesting habitat, including installation, monitoring, and maintenance of nesting boxes for eastern bluebirds and wood ducks, and nesting platforms for ospreys (Appendix 1B, DL 2).

Approximately 10 acres have been established as wildlife food plots at the installation. These areas provide food and cover for a variety of wildlife, alleviating over-browsing of trees and shrubs by deer and improving opportunities for wildlife viewing. The fields are routinely maintained by mowing, disking, and replanting with a variety of desirable vegetation (Appendix 1B, DL4).

#### **(4) Species Management**

##### **a. White-tailed Deer Management**

White-tailed deer are very common throughout Virginia and at NSFDL. They are very adaptable and thrive in a variety of habitats, including those with high levels of human activity. Over the past 25 years, white-tailed deer population numbers have increased to unprecedented levels in many parts of their range. They have a high reproductive capacity that likely evolved to offset losses to predators such as wolves, cougars, and humans. When predation and other losses are low and food is plentiful, deer populations can double every 2 to 3 years. High deer populations cause concerns about impacts to native plant communities, wildlife habitat, deer-human interactions, and deer herd health. These concerns have been well studied and documented, and the need to manage them is well recognized.

A regulated deer hunting program was first initiated at the installation during the 1980/81 hunting season to control the population level. The hunting program has continued at the installation as the primary means of managing the deer herds. However, no hunting occurred on Pumpkin Neck during the 1987/88 through 1990/91 seasons because of safety issues due to the potential for unexploded ordnance. Deer harvests were once again established on Pumpkin Neck during the 1991/92 season, although only 25 percent of the property is currently accessible to hunters because of safety issues. Expanded limited hunting in the "OFF LIMITS" area has increased the prospects of reducing the large deer herd on Pumpkin Neck.

Overall management goals for white-tailed deer at NSFDL are to:

- Ensure the present and future well-being of white-tailed deer and their habitat (Appendix 1C, M69)

- Maintain deer populations at or below the cultural carrying capacity of their habitat and at levels necessary to ensure compatibility with mission land uses and natural ecological communities (Appendix 1C, M70)
- Reduce military mission and human-related conflicts (Appendix 1C, M71)
- Provide and promote high quality recreational hunting experiences that do not interfere with the military mission (Appendix 1C, M72)

Several methods are used to evaluate the status of the deer herd at NSFDL. Surveys are conducted annually during January and February to collect post-hunting season and pre-fawning data and during August and September to collect pre-hunting season data (Appendix 1B, DL6). These data are evaluated over the years to identify any trends. Estimates are made on what percentage of the herd is being observed during these surveys to obtain general population estimates.

Deer harvest data are collected at the game checking stations established on Mainside and Pumpkin Neck. Hunters are required to bring harvested deer to the checking station for biological examination and analysis. Data collected include sex, dressed weight, antler points, antler spread, antler diameter, and physical abnormalities. The survey and harvest data are summarized in the annual Hunting and Fishing Program Summary and are used to evaluate the status of the herd. The summaries are circulated to NSFDL sportsmen along with a questionnaire soliciting input on future management needs. In addition, deer-vehicle incidents are carefully monitored to detect changes. These data help determine bag limits and harvest regulations for the next season.

The NSASP Hunting Instruction (Appendix 7) VDWR Deer Management Assistance Program (DMAP), and more recently the Deer Population Reduction Permit Program (DPOP), have been the primary means available for managing the deer population. Participation in these state deer reduction programs have been curtailed with the recent decline in deer numbers and harvest. The most recent NSASP Hunting Instruction was updated and signed in April 2018. The Annual Hunting Notice identifies hunting seasons and times, deer harvest restrictions, hunting permit fees, and bow proficiency requirements for NSFDL.

Starting with the 1989/90 season, a quality deer management (QDM) was initiated. QDM discourages the take of young antlered bucks

and increases harvests of antlerless deer. The goal of the QDM is to build an older age class of male deer and to improve overall herd quality through reduced populations. On Mainside, QDM involves restricting harvest of younger bucks through point and spread limits and establishing an accelerated doe harvest. Deer management on Pumpkin Neck is similar to Mainside, but somewhat less restrictive. These efforts encourage the harvest of females to reduce the herd size and improve herd health.

Available deer habitat on Mainside and Pumpkin Neck is about 1,600 and 1,530 acres, respectively. Assigning a density of one deer per 20 acres as an optimal cultural carrying capacity, the desired post-hunting season population for Mainside and Pumpkin Neck should not exceed 100 animals. Past post-hunting season population estimates are 100 to 125 for Mainside and 175 to 200 for Pumpkin Neck. These estimates suggest that the population was above the desired level especially at Pumpkin Neck.

Since the hunting program began, the total deer harvested has ranged from 2 to 60 with an average of 33 deer per year on Mainside, and from 6 to 90 with an average of 39 deer per year on Pumpkin Neck (Figure 3-4 and Figure 3-5). Efforts to reduce the deer population to carrying capacity has been a primary goal since the start of the 1987/1988 hunting season. Improving herd health and reducing vehicle-deer collisions were paramount. This undertaking has been largely successful as evidenced by annual deer spotlight surveys. The decline in the number of harvested deer over the past several hunting seasons can be attributed to a number of factors including mortality associated with eastern hemorrhagic disease, past harvest regulations directed at increasing the doe harvest, deer-vehicle incidents, and to some degree, coyote predation. In addition, stricter harvest regulations and fewer deer across the landscape has led to a decline in hunter participation resulting in fewer deer being harvested. The current deer herd is clearly in "better shape" than the one that roamed the base a couple decades ago.

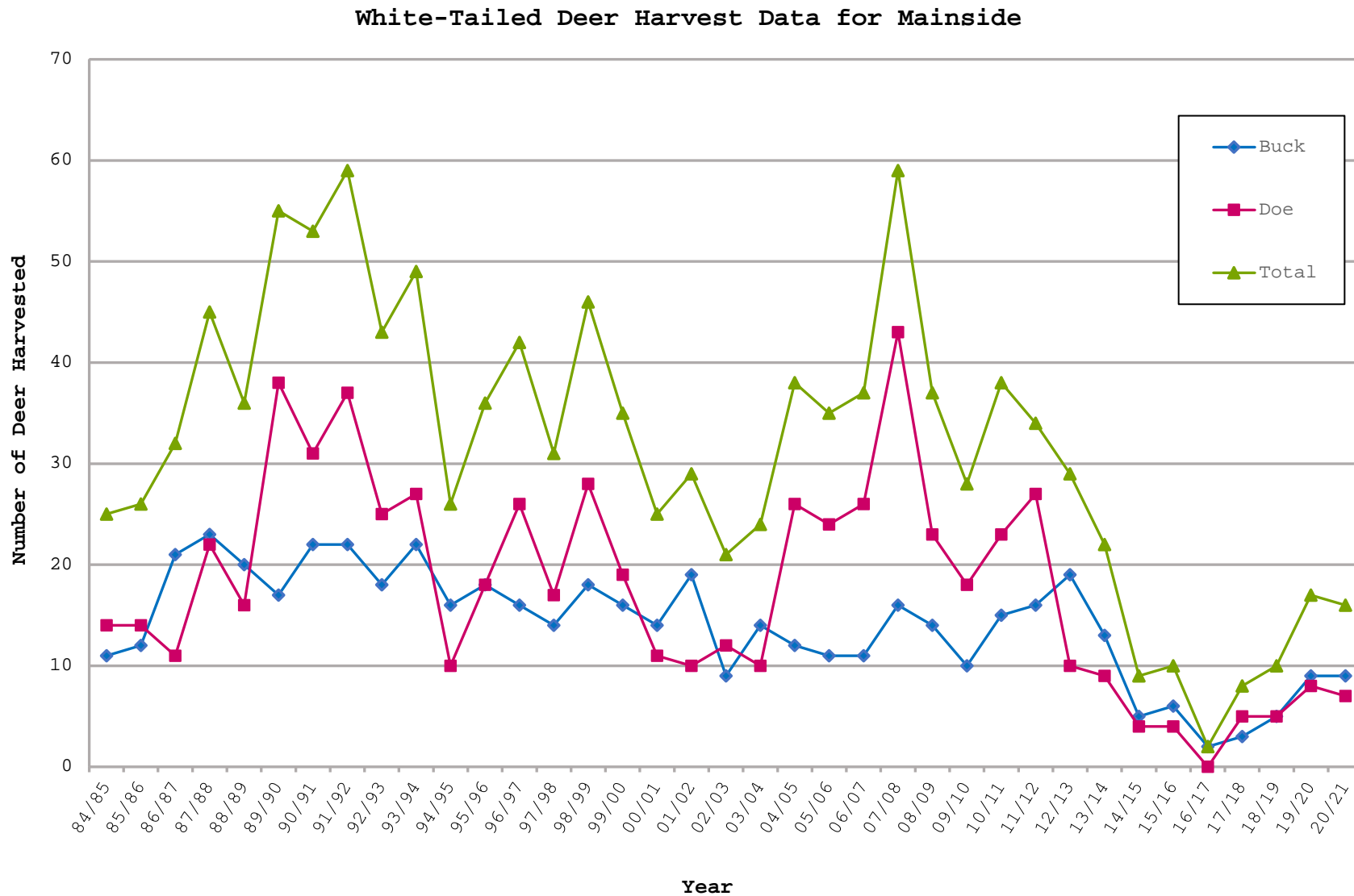


Figure 3-4. White-tailed Deer Harvest Data for Mainside

White-Tailed Deer Harvest Data for Pumpkin Neck

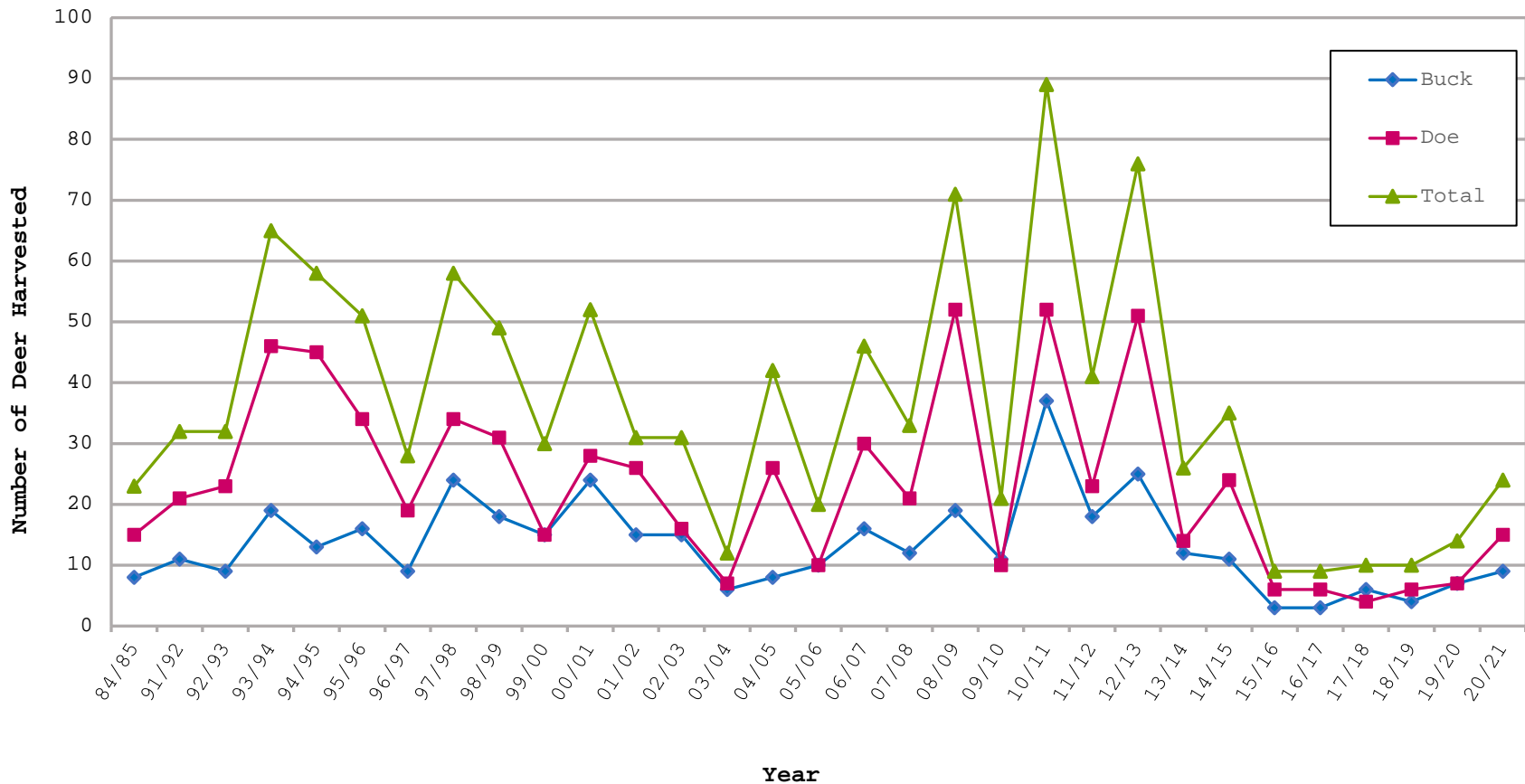


Figure 3-5. White-tailed Deer Harvest Data for Pumpkin Neck

b. Wild Turkey Management

Although population estimates have not been calculated at NSFDL, incidental observations suggest wild turkeys are abundant on Mainside and Pumpkin Neck. Management activities for this species include habitat enhancement practices described above and collecting hunter harvest data. Turkey hunting is permitted during the fall season and spring gobbler season established by the state. Approximately four or five birds are harvested annually on Mainside and one or two birds on Pumpkin Neck.

A trapping and transplanting operation on Mainside resulted in the relocation of 18 birds to the NSFIDH in Maryland. These efforts were instrumental in reestablishing the wild turkey population there and the population is now self-sustaining and expanding.

c. Small Game Management

The installation supports a variety of small game animals. All legal game species may be harvested in accordance with state seasons and bag limits. However, the species that are primarily hunted include: bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), eastern cottontail, and eastern gray squirrel. A few sportsmen also hunt American woodcock (*Philohela minor*). Management activities for these species include habitat enhancement practices described above and collecting hunter harvest data.

d. Waterfowl Management

Although detailed seasonal waterfowl surveys have not been conducted at NSFDL, incidental observations by the NRM and sportsmen harvest reports provide a general understanding of waterfowl activity on and near the installation. The most common species are mallard (*Anas platyrhynchos*), black duck (*Anas rubripes*), canvasback (*Aythya valisineria*), lesser scaup (*Aythya affinia*), ruddy duck (*Oxyura jamaicensis*), and Canada goose (*Branta canadensis*). Less common species include blue-winged teal (*Anas discors*), wood duck (*Aix sponsa*), red-breasted merganser (*Mergus serrator*), ring-necked duck (*Aythya collaris*), common goldeneye (*Bucephala clangula*), and bufflehead (*Bucephala albeola*).

Breeding waterfowl population density is low at NSFDL. However, a non-migratory, resident Canada goose population has established itself at the Cooling Pond and frequents various developed areas at the installation, including the closed golf course. Mallards, wood ducks, and occasional black ducks also nest on the installation.

In contrast to the breeding population, fall migrants and over wintering waterfowl are very common at NSFSDL. The puddle ducks are common winter inhabitants in the tidal creeks and Hideaway Pond whereas diving ducks are common along the Potomac River/Upper Machodoc Creek shoreline. Large groups of 30 to 50 black ducks are often seen in Gambo Creek Marsh and the total wintering population is estimated at 100 to 150 individuals. Large rafts (i.e., several hundred to several thousand) of diving ducks are observed annually on the Potomac River stretching from the Route 301 Bridge into the mouth of Upper Machodoc Creek. Canvasback, scaup, and ruddy ducks are the major species comprising these rafts. Tundra swans are a common sighting just offshore in the Potomac River and Upper Machodoc Creek and the flock numbers 10 to 15. Resident and migratory Canada geese exceed 200 during the winter. The wintering mallard population is estimated to be less than 100. The other species of waterfowl listed above are occasional to uncommon sightings.

Waterfowl hunting is permitted in designated areas and licensed blinds identified in the NSASP Hunting Instruction. Waterfowl management activities at NSFSDL primarily focus on protection of wetland habitat and water quality. Gambo Creek Marsh has been designated as a SIA based in part on its value as wintering waterfowl habitat. Shoreline management, wetland protection and enhancement, and habitat protection will all contribute to the overall health of the waterfowl populations at NSFSDL. Nest boxes have also been installed to enhance nesting habitat for wood ducks. In spring 1989, ten nest boxes were erected on Hideaway Pond and eight were erected in Black Marsh. The wood duck nesting box program was resurrected in 2007 with the replacement of the original 18 boxes with 18 new boxes on Mainside. Recently, 20 nesting boxes were purchased from the Maryland Wood Duck Initiative to replace those in disrepair. There are currently 24 boxes on Mainside and Pumpkin Neck with about half of them producing young. These efforts help to support regional goals under the North American Waterfowl Management Plan (NAWMP) and the Joint Agreement of Cooperation to Perpetuate North American Waterfowl Populations, which was signed by the USFWS and the DoD in 1988.

e. Furbearer Management

Furbearers at NSFSDL include beaver, river otter, muskrat, mink, red fox, gray fox, raccoon, striped skunk, long-tailed weasel, and opossum. Trapping is permitted at the installation; however, demand is low and very little trapping actually occurs. Recently, only trapping of nuisance species is permitted and must be authorized by the NRM. River otter trapping is discouraged due to low abundance. Furbearer management activities include habitat



enhancement practices described above and collecting trapper harvest data, if and when trapping is conducted. Beaver, muskrat, striped skunk, groundhogs, and raccoon occasionally cause nuisance problems that require attention.

f. Non-Game Management

Non-game wildlife management is a general term used to categorize specific management activities that address a variety of species, not hunted, and their habitats. Habitat protection and enhancement activities that are performed to benefit non-game species and other species at NSFDL are described above. Rare species, which are covered separately, are an important component of the non-game management program.

A group of species critical to ecosystem functioning and our well-being are pollinators. This group includes over 200,000 species of beneficial insects such as flies, beetles, wasps, ants, butterflies, moths, and bees. In addition, there are over 1,000 species of vertebrates including birds, bats, and small mammals that provide this important function.

Beneficial habitat management practices conducted at NSFDL include planting for pollinators, mowing restrictions, protecting wetlands, and reducing pesticide use. A recent project conducted in support of pollinator conservation enhanced a 1-acre buffer zone around a constructed stormwater wetland by drilling a beneficial seed mix and planting shrubs. Currently, a project is underway to prepare a pollinator habitat management plan that will include measures for benefiting pollinators across the landscape.

**(5) Nuisance Wildlife Management**

As part of the Fish and Wildlife Management Program, the NRM and the Pest Management Coordinator within the PWD receive and respond to various nuisance wildlife calls from the NSFDL community. The NRM is consulted on management actions for nuisance wildlife. The NRM and PWD respond to wildlife outside structures, while the PWD handles nuisance wildlife inside structures. The Public Private Venture (PPV) housing contractor handles all nuisance wildlife calls in the housing area.

A number of species in Virginia, including the house mouse, Norway rat, black rat, coyote, groundhog, nutria, European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), mute swan (*Cygnus olor*), and pigeon/rock dove (*Columba livia*) are designated as nuisance species and may be taken at any time (except on Sunday) by use of a firearm or other weapon. While considered a nuisance species in Virginia, coyote's are not viewed as such by the Natural

Resources Program on NSFDL and are a welcome factor in maintaining a healthy deer population.

Wildlife species that have caused problems at NSFDL and may be considered nuisance species include beaver, muskrat, gray squirrel, groundhog, skunk, raccoon, fox, Canada goose, mute swan, feral cats, and some nesting/perching birds. The management approach for each species varies depending on the frequency of occurrences and the severity of the situation. Other NSFDL personnel may also provide assistance during the trapping season in identified problem areas. Appropriate action is taken on a case by case basis and all calls and actions are recorded for tracking purposes. General management approaches for individual nuisance species are listed below (Appendix 1B, DL5).

a. Beaver

The primary nuisance activity of beaver is the damming of culverts and stormwater management systems, which can cause flooding, real property damage, loss of natural tidal action, and impediment to anadromous fish movement. Beneficial aspects of beaver damming are also recognized, and management actions are only taken when necessary. Lethal means are utilized to remove problem beaver on an as-needed basis.

b. Muskrat

Musk rats have caused damage to constructed wetlands (i.e., damage to vegetation) at the installation including the wetland near C Gate. Lethal trapping is used to remove muskrat from constructed wetlands on an as-needed basis.

c. Gray Squirrel

Gray squirrels are a problem within the residential housing areas. Nuisance activities include stripping trees, destroying gardens, destroying bird nests, and damaging electrical wiring in vehicles and homes. NSFDL has an ongoing educational campaign effort to inform residents on the nuisance activities of squirrels and actions that can be implemented to limit further population proliferation. The nuisance squirrel population is controlled in the housing areas through the PPV contractor.

d. Groundhog

Groundhog burrowing in the earthen layer covering storage magazines can cause explosive safety issues. Strict military guidelines dictate the physical requirements for these structures to ensure public safety. Groundhogs are removed from magazine areas by shooting with a .22 caliber firearm or through trapping

activities. Groundhog control inside magazine areas is typically an annual requirement.

e. Skunks and Raccoons

Skunks and raccoons are occasional nuisance species in the residential housing areas. Residents are educated on good housekeeping procedures to avoid attracting these animals. When necessary, problem animals are live trapped and relocated to another portion of the installation.

f. Fox

Recently, red foxes have become a common sighting in the housing and administrative areas. Their increased comfort level has resulted in denning activities. Their presence has caused concern among residents and employees as evidenced by the number of trouble calls. Some limited trapping has been conducted.

g. Resident Canada Geese

The resident Canada goose population has grown significantly throughout the United States during the past several decades and they are now considered a nuisance in many places. Resident Canada geese are those that nest within the lower 48 states in the months of March, April, May, or June, or that reside within the lower 48 states in the months of April, May, June, July, and August (USFWS 2007b). The primary locations of concern are within the Cooling Pond area and the closed golf course. Monitoring of the resident goose population is conducted and management recommendations are given to NSFDL command on an as needed basis. Active management has been conducted, as required, by the U.S. Department of Agriculture Wildlife Services in accordance with established guidelines, which includes capturing, processing, and donating the meat to a charitable organization for human consumption (Appendix 1). The September resident goose season offers potential for some control, but few sportsmen participate.

Additional nuisance goose control is also possible through the Nest and Egg Depredation Order (71 FR 45964) passed by the USFWS in 2006 (Appendix 1B, P7). The regulation allows landowners to remove Canada geese at airports, in agricultural area, and in other areas where they are causing conflicts with human populations. No permit is required under this order, but the landowner must register with the USFWS each year prior to taking nests and eggs. The landowner or land manager (including employees that may conduct the work) may register via the VDWR website: <https://epermits.fws.gov/eRCGR/geSI.aspx>. Nests and eggs may be taken only between March 1 and June 30. Each registered landowner must then return to the website by October 31 to report the number

of nests with eggs destroyed, and the date and location (VDGIF 2007).

h. Mute Swans

The mute swan is an exotic species, native to Europe and Asia that has been nesting in Virginia for over 20 years (VDGIF 2012). They primarily reside in estuarine river habitats with smaller numbers on inland lakes and ponds. Mute swans are larger than the native tundra swan (*Cygnus columbianus*) and has an orange bill as opposed to the black bill of the tundra swan. These swans compete for food and habitats with our native waterfowl and can displace other native bird species such as shorebirds, terns, and skimmers (VDGIF 2012). The mute swan is non-migratory and is not protected by the MBTA. This occasional nuisance species at NSFDL is controlled on an as-needed basis.

i. Feral Cats

Feral cats are a nuisance throughout the installation. Feral cats are a prolific species that can take up residence under homes and other buildings. Problems associated with feral cats include damage to real property, rabies and disease, and reduction of wild bird populations through predation. In accordance with the CNO Policy letter of January 2002, 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. Nuisance feral cats are captured and relocated to King George County Animal Shelter on an as-needed basis. Feral cat management focuses on avoidance through education of residents. A pet registration program, which includes cats, is administered by the PPV housing contractor. Residents must register their pets with the Lincoln Military Housing Office at the time of lease signing. New pets must also be registered via a pet addendum. This program should reduce the likelihood of transient residents abandoning cats when transferred from NSFDL to other duty stations.

j. Nesting and Perching Birds

Certain nesting and perching birds may become a nuisance in the residential, administrative, and operational areas. Nuisance birds frequently include English sparrows, European starlings, and pigeons, which are species that have adapted to take advantage of urban environments and are not regulated by the MBTA. Bird-proofing measures are employed in these areas to discourage nesting and perching. Trapping, shooting, mechanical repellents, and nest removal may be used in conjunction with bird-proofing for pigeon, European starling, and house sparrow control, but may not be used for birds regulated by migratory bird laws without a permit.

## (6) Fisheries Management

Fisheries resources at and in the immediate vicinity of the installation include brackish/saltwater fisheries (i.e., Potomac River, Upper Machodoc Creek, Gambo Creek, and Black Marsh) and freshwater fisheries (i.e., Hideaway Pond, and Cooling Pond). Recreational fishing is permitted at Hideaway Pond, Cooling Pond, Gambo Creek, and portions of the Potomac River and Upper Machodoc Creek shorelines of Mainside. Pumpkin Neck is closed to fishing. The open fishing areas receive low to moderate fishing pressure. Specific areas open to fishing and other program information is contained in the NSASP Fishing Instruction (Appendix 7). Administrative aspects of the fishing program (i.e., issuing NSFDL fishing permits) are addressed under the Outdoor Recreation Program.

Management of Potomac River fisheries is primarily the responsibility of the Potomac River Fisheries Commission. However, many of the management practices implemented under the Land Management Program support Potomac River fisheries management through habitat and water quality protection. Other management activities include program administration and law enforcement.

Hideaway Pond is approximately 13 acres and supports a recreational fishery for warm water species including channel catfish, bluegill, redear sunfish, and largemouth bass. This pond is located in a relatively isolated area on Mainside and is buffered by forests, which adds to the recreational experience. Overall water quality and habitat conditions in Hideaway Pond are good for fish production. However, elevated mercury levels have been documented in larger predatory fish over the last two decades. Consequently, the pond has been managed as a catch and release fishery since 1992. The ER Program has addressed the contamination issues at the pond and determined that fish tissue sampling and analysis will continue. Periodic fish tissue monitoring indicates that mercury concentrations appear to be decreasing over time. The pond has a regulating device to permit water level management. In 1990, the level was dropped in order to correct an imbalance between predator fish and prey fish densities. After the draining, the pond was restocked with largemouth bass, redear sunfish (*Lepomis microlophus*), and channel catfish. Since that time, the only active management of the fishery has been the catch and release program and water level manipulation.

A fisheries survey and habitat assessment of the pond was conducted in Nov 2011 and May 2012 that produced a management plan (USN 2013b). The following management recommendations were provided to

meet mercury sampling requirements, to obtain a more sustainable fishery, and to improve angler satisfaction.

- Increase food source for predator fish by stocking forage fish such as fathead minnows (*Pimephales promelas*) or common shiner (*Luxilus cornutus*). A stock rate of 20 lbs. of minnows/surface acre may be stocked during the fall. The results of future fisheries surveys should be used to determine if stocking should be continued.
- Conduct a one-time removal of stock sized bass, black crappie, and sunfish species via electrofishing. Remove up to 120 pounds of 8" - 12" largemouth bass, 480 pounds of 3" - 6" bluegill, 480 pounds of 4" - 7" redear sunfish, and 120 pounds of 5" - 8" black crappie.
- For long-term management, introduce selective harvesting with an annual harvest of up to 10 pounds of bass per acre and up to 40 pounds of sunfish species per acre. Consider introducing a slot limit prohibiting the harvest of largemouth bass in the quality size class (12" - 15").
- Postpone further mercury sampling for two years after implementation of target removals and supplemental feeding.
- Monitor the extent and density of the hydrilla population. If it exceeds 25 - 30 percent cover of the pond, implement control using an approved aquatic herbicide strictly following label instructions and/or manual control. Repeat the treatment, if necessary, the following year.
- Monitor snakehead populations through ongoing surveys and angler reporting.

In support of the identified survey recommendations, a removal and stocking effort was conducted in May 2014. Over two days, 144 pounds of redear sunfish, 97 pounds of largemouth bass, 48 pounds of bluegill, and 10 pounds of black crappie were removed. A forage fish, golden shiner, was stocked soon after to stimulate growth of the remaining fish populations.

The Natural Resources Manager intends to enhance fishing opportunities at Hideaway Pond with the addition of a prefabricated fishing pier. This initiative would offer easy access to disabled anglers including those that served in the military.

The Navy and EPA signed the Remedial Action Completion Report (RACR) in September 2019 based on the site's achievement of the Remedial Action Objectives (RAO). These RAOs were demonstrated through ongoing mercury sampling in fish tissue which fell below the ecological and human health risk based levels. This RACR removes the institutional controls associated with the site and thereby eliminates the catch and release requirement (USN 2019d).

Cooling Pond is approximately 10 acres, is relatively shallow and is located in a developed open area on Mainside. This pond contains channel catfish, bluegill, largemouth bass and more recently snakehead. Cooling Pond offers a low-quality fishing experience and has not been actively managed as a recreational fishery due to contamination problems and marginal physical habitat (i.e., shallow water and poor substrate for establishment of emergent vegetation). In recent years, the pond has been overtaken by yellow water lily (*Nuphar lutea*) presumably due to a reduction in water depth. Fish tissue analyses conducted in 1992 indicated detectable concentrations of mercury, arsenic, copper, lead, and degradation products of DDT. Long term monitoring to evaluate the contamination issues was being conducted under the ER Program. Historic catch and release regulations have been relaxed.

#### **D. FOREST MANAGEMENT**

##### **(1) Program Description**

The Forest Management Program addresses issues related to the management of all forested areas on the installation, including urban forests. Activities conducted under this program include forest inventories, development and implementation of management prescriptions, administration of timber sale contracts, forest pest management, implementation of BMPs, and urban forest maintenance. Within the tenants of this program, issues related to biodiversity conservation, fish and wildlife habitat management, watershed protection, and human health and safety are also addressed. The program is applicable to the entire installation and is integrated with other natural resources management programs.

The NRM conducts and oversees forest inventories, develops management practices, and administers timber sales, with support from SCA interns, when available (Appendix 1B, P21). NAVFAC Washington provides contracting support for timber sales. The Virginia Polytechnic Institute and State University (Virginia Tech), Department of Forestry has conducted forest stand inventories and prepared management plans. Additional guidance and assistance are also available through the VDOF.

## **(2) Program Goals**

The overall goal of the Forest Management Program is to employ ecosystem management techniques to promote healthy and diverse forest communities at NSFDL (Appendix 1A, G9). Forests at NSFDL have been managed under written plans since at least 1965. The forest stands show the benefits of over 40 years of stewardship, with good stocking, wide age distribution, and diverse species composition of trees while supporting the protection of wildlife, scenic, soil, and water resources. The initial forest management plans for the installation focused on timber production and achieving a self-supporting program based on revenues generated from timber sales. The management philosophy has evolved from one of commodity production, to one of sustainable, multiple use of natural resources, natural resources stewardship, biodiversity protection, and ecosystem management. Management practices for the program include the following:

- Maintain the health and integrity of a diversity of healthy and productive natural forested ecosystems that support a full complement of native wildlife species (Appendix 1B, P16 and P17; Appendix 1C, M73)
- Provide for sustained multipurpose uses to the extent consistent with the mission and ecosystem management (Appendix 1C, M74)
- Protect unique and sensitive natural areas and habitats (Appendix 1C, M75)
- Protect real property investments for the installation (Appendix 1C, M76)
- Protect soil and water resources through the use of BMPs (Appendix 1C, M77)
- Provide recreational opportunities for installation personnel and their dependents and community members (Appendix 1C, M78)

## **(3) Forest Inventory and Classification**

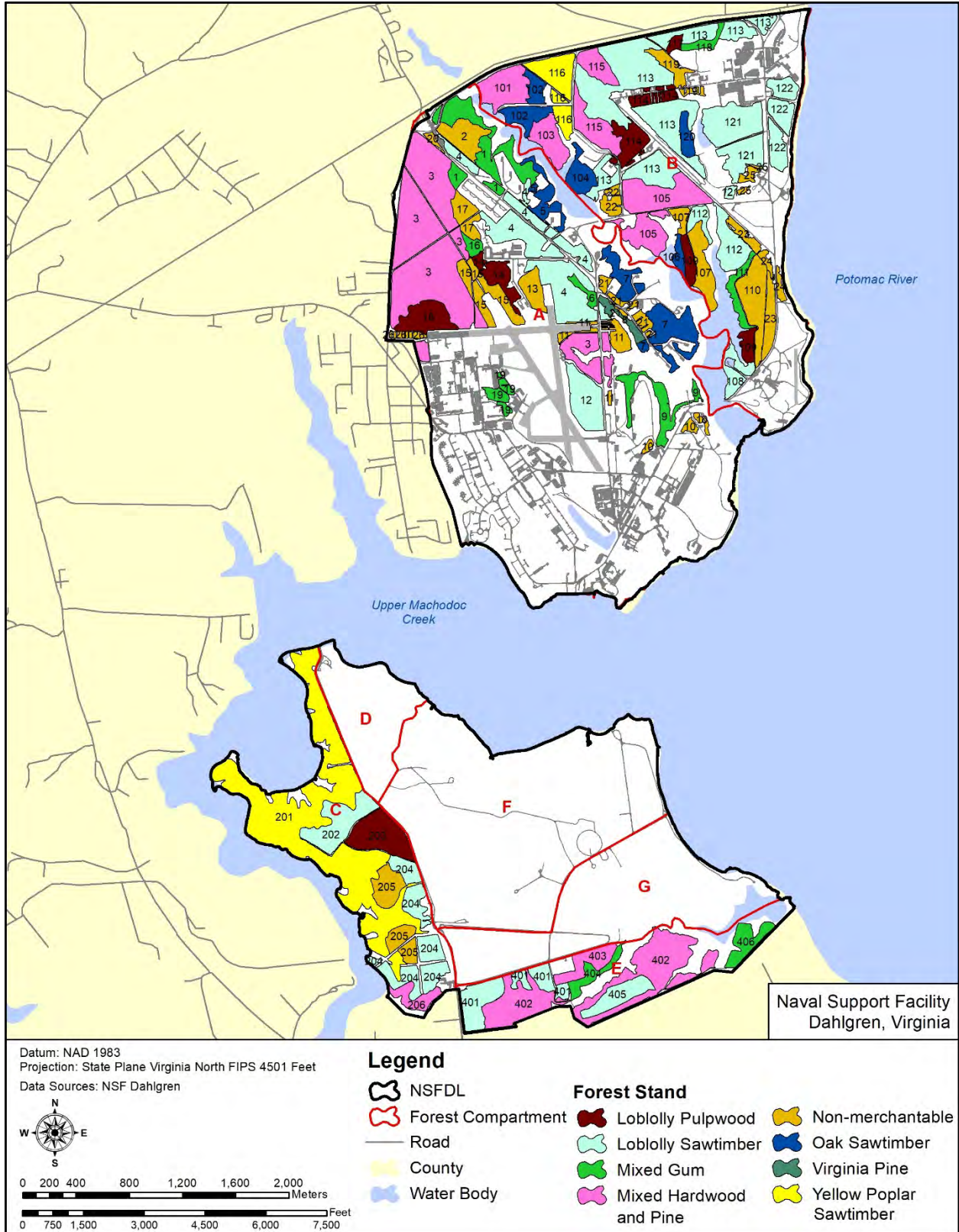
Forest health and productivity are assessed through information gathered during periodic forest inventories. A thorough forest inventory typically records physical characteristics such as forest type, age, height, site index for the dominant species, and size class. Size classes are determined by a tree's DBH and may be classified as seedling/sapling (<6 inches), pulpwood (6 to 12



inches, and sawtimber (>12 inches). These data are used to determine stand density, basal area, and timber volume. Detailed forest inventories at NSFDL were conducted in 1979, 1993, 2000, and 2009. The 2000 forest inventory data was removed from the most recent INRMP, but the standalone document continues to offer valuable information (USN 2000a). The 2009 inventory is discussed below and is found in Appendix 5.

To facilitate forest management, the forested areas at NSFDL were grouped into seven forest compartments (A-G) based on geographic location. Forest Compartments A and B are located on Mainside and Compartments C, D, E, F, and G are located on Pumpkin Neck (Figure 3-6). Gambo Creek forms the boundary between compartments A and B, with A to the south and B to the north. Compartment A is the most accessible being constrained less by mission related activities. Compartment B contains testing areas and munitions ranges (electromagnetic railgun, and terminal and missile test ranges) which cause road closures and restricted access due to explosive safety quantity distance (ESQD) arcs on testing days. Out of the Compartments on Pumpkin Neck, C and E are the only accessible areas for inventory and management due to potential for UXO in Compartments D, F, and G. This represents approximately 47 percent of Pumpkin Neck's 1,182 forested acres. Areas within ESQD arcs in Compartments C and E are also constrained on certain days due to testing activities.

Forest stands were delineated by aerial photo interpretation. The 1993 inventory identified a total of 118 stands, 87 on Mainside and 31 on Pumpkin Neck. The stands on Mainside are highly fragmented by both man-made and natural features. Stands on the installation are relatively small, averaging 12 acres per stand on Mainside and 16 acres on Pumpkin Neck. Earlier wildlife management philosophy encouraged a patchwork forest of many small stands for its increased edge effect. This philosophy has shifted towards encouraging larger continuous habitat areas rather than conglomerations of many small patches of habitat types. Managing a fragmented forest also poses challenges to the economics of forest management. Smaller timber harvests can be less economical for logging operators, making contracting for management activities more challenging. While timber production is not the primary objective for the NSFDL forest, larger stand sizes facilitate management activities prescribed for ecosystem benefit.



**Figure 3-6. Forest Cover Types at Naval Support Facility Dahlgren**

The 2010 inventory (Appendix 5; USN 2010) consolidated stands to increase manageability. The original forest stands layer was edited, performing "unions" to consolidate old stand polygons into the new stand polygon. Stand polygon boundaries were also edited to more accurately depict the stand boundaries and to reflect recent losses to development and gains in new forest establishment.

Stand consolidation aided by cluster analysis of the inventory data resulted in a reduction from 118 stands to 60, including the addition of seven previously un-delineated non-merchantable stands. Using the most newly edited stand polygons, the total accessible forested acreage is 1604.8. The mean stand size for the entire forest is 26.8 acres, ranging from 1.7 to 189.0. Forty-eight of the 60 stands are located on Mainside, averaging 23.0 acres, while the remaining 12 stands on Pumpkin Neck averaged 41.9 acres.

Previous forest inventories used cover types (pine, hardwood, and pine-hardwood) in combination with a size classification (1 - seedling/sapling, 2 - poletimber, 3 - sawtimber) to describe the forest resource. The 2009 inventory utilized k-means cluster analysis to classify forest condition classes.

The percentage of the total basal area made up by important species or species groups classified as pulpwood or sawtimber was calculated for each stand. This combined variable represents the relative dominance of each important species/product class. The distribution of species/product classes provides a good descriptor of the species composition and size structure for the stand. N=7 was found to most adequately cluster the stands, based on key differences in species composition and size structure.

These seven condition classes are more specific in terms of species and product composition which facilitates prescription making and management for larger blocks of fragmented forest.

The forest condition classes are as follows C-1 - Oak Sawtimber, C-2 - Mixed Gum, C-3 - Virginia Pine, C-4 - Loblolly Pulpwood, C-5 - Loblolly Sawtimber, C-6 - Yellow Poplar Sawtimber, and C-7 - Mixed Hardwood and Pine (Figure 3-6). An eighth *Non-Merchantable* condition class was added to include the young stands previously referred to as Class 1 stands, and which were not measured or included in the cluster analysis. Within each condition class, a detailed description and management recommendation are provided for each stand.

a. Timber Volumes

Volume estimates for the 2009 inventory amounted to 17,172 thousand board feet (MBF) of sawtimber and 1,308,587 cubic feet of pulpwood. These values are not the total for the installation as 1,182 acres on Pumpkin Neck were not inventoried due to UXO concerns. For comparative purposes, the 2000 inventory estimated a standing growing stock of 10,393 MBF of sawtimber and over 230,000 cubic feet of pulpwood. These data indicate an increase in sawtimber volume by about 7,000 MBF and over 1 million cubic feet of pulpwood. The highly significant increase in pulpwood volume can be attributed to the addition of the topwood volume not calculated in the earlier inventory. Table 3-1 provides condition class acreage and volume for the 2009 inventory. A recommended 10-year schedule for management activities is found in Table 3-2.

b. Recent Timber Harvest History

Forest management actions between 1992 and 2003 included thinning, precommercial thinning, seed tree cuts, clearcuts, salvage cuts, removal of Virginia pine, and the harvest of large pines and seed trees. These efforts were mainly directed toward timber stand improvement. Approximately 2,100 MBF of sawtimber and 2,882 cords of pulpwood were harvested during this time period. A summary of forest revenues for 1982 through 2020 is provided in Table 3-3.

**Table 3-1. Forest Condition Class Acreage and Volume from 2009 Inventory**

Forest Condition Class	# of Stands	Acreage		Pulpwood Vol		Sawtimber Vol	
		Acres	%	cu ft	%	MBF	%
Oak Sawtimber	6	92.6	5.8	65,724	5.0	1,025	6.0
Mixed Gum	9	108.5	6.8	147,235	11.3	829	4.8
Virginia Pine	1	5.8	0.4	14,128	1.1	6	0.03
Loblolly Pulpwood	6	97.3	6.1	192,247	14.7	355	2.1
Loblolly Sawtimber	11	478.8	29.8	307,390	23.5	7,498	43.7
Yellow Poplar	2	212.8	13.3	169,176	12.9	3,979	23.2
Mixed Hardwood & Pine	8	404.2	25.2	412,688	31.5	3,480	20.3
Non-Merchantable	17	204.8	12.8	-	-	-	-
<b>Total</b>	<b>60</b>	<b>1604.8</b>	<b>100</b>	<b>1,308,588</b>	<b>100</b>	<b>17,172</b>	<b>100</b>

**Table 3-2. 10-Year Schedule of Forest Management Activities**

<b>10-Year Schedule of Activities (R = remove residuals, P = plant)</b>						
<b>Stand/Rx</b>	<b>Rx 2 Shelterwood</b>	<b>Rx 3 Selection Cut</b>	<b>Rx 4 Seed Tree</b>	<b>Rx 5 Clearcut/Plant</b>	<b>Rx 6 Thin Above</b>	<b>Rx 7 Thin Below</b>
<b>2011</b>	5, 106	1, 404	202	8, 20, 117		109, 114, 203, 14
<b>2012</b>	120		113	8P, 20P, 117P, 118		
<b>2013</b>				118P		
<b>2014</b>	19		116, 201, 113R, 202R			
<b>2015</b>	106R, 5R, 405	3, 6, 16, 206	401		4, 108	18, 204
<b>2016</b>		101, 102, 103, 104, 105				
<b>2017</b>	120R					
<b>2018</b>		111				122, 112
<b>2019</b>	19R, 405R	403	401R, 201R, 116R			
<b>2020</b>						
<b>2021</b>						

**Table 3-3. Naval Support Facility Dahlgren Forestry  
Revenues, 1982-2020**

Year	Sawtimber (MBF)	Pulpwood (Cords)	Revenue
1982	419	-	-
1983	249	601	-
1984	170	242	\$8,351
1987	229	26	\$20,610
1988	180	144	\$11,600
1990	184	87	\$10,473
1991	73	83	\$6,694
1992	126	894	\$19,020
1993	577	638	\$57,125
1994	234	665	\$22,464
1995	214	152	\$18,615
1996	200	264	\$18,525
1997	129	88	\$8,930
1998	136	51	\$13,794
1999	158	67	\$16,100
2000	Precommercial thinning only	Precommercial thinning only	\$0
2001	171	43	\$13,154
2003	155	20	\$19,063
2011	Precommercial thinning only	Precommercial thinning only	\$0
2013	Precommercial thinning only	Precommercial thinning only	\$0
2014	Construction tree removal	-	\$464
2018	Construction tree removal	-	\$786
2019	Construction tree removal	-	\$575
2020	Construction tree removal	-	\$799
1992-2018	Firewood Sales	-	\$7,068
<b>Total</b>	<b>2,936</b>	<b>3,464</b>	<b>\$273,411</b>

Total revenues for the period were over \$273,000, including firewood sales. See Appendix 7 for the Forest Products Permit Program which includes the sale of firewood. No timber harvests have been conducted since 2003 with the exception of a pre-commercial thinning on 65 acres in 2011. Additional pre-commercial thinning efforts are planned as warranted.

**(4) Silvicultural Practices**

See the 2010 Forest Management Plan in Appendix 5 for a more in-depth discussion of silvicultural systems for managing the installation forest resource.

#### **(5) Best Management Practices**

All forest management operations conducted at NSFDL are conducted using BMPs established by VDOF to minimize potential adverse environmental effects. All timber sale contracts include specific provisions requiring timber contractors to comply with BMPs to ensure protection of soils, water quality, wetlands, wildlife habitat, and aesthetics.

The Forestry BMP  
Guide for Virginia  
can be found at:

<http://www.dof.virginia.gov/>

#### **(6) Forest Pest Management**

To date, no serious or widespread tree insect or disease problems have been identified at the installation. One area of approximately 0.10 acres was infested with the southern pine beetle (*Dendroctonus frontalis*) in the past. This area was subsequently clearcut and there have been no further infestations. Another potential forest pest is gypsy moth (*Lymantria dispar*). Gypsy moth traps have been used historically to monitor for potential infestations. However, no serious problems have been identified and no controls have been necessary. Serious infestations and damage from both southern pine beetles and gypsy moths have occurred in the region.

Additional pests include the emerald ash borer (*Agrilus planipennis*) which has caused noticeable damage to the few ash trees located in Dahlgren's urban forest. The spotted lanternfly (*Lycorma delicatula*) native to China, India and Vietnam was first recorded in the United States in eastern Pennsylvania in 2014. Since then, the pest has spread to portions of western Maryland and northwestern Virginia. While experts are primarily concerned with its impacts on the wine grape and hop industries, it does prefer tree of heaven (*Ailanthus altissima*) which is found in several places on base. Accordingly, forest pests will continue to be monitored regularly and appropriate action will be taken if problems are identified. Technical assistance with forest pest management is available through a variety of agencies including the U.S. Forest Service, VDOF, and the Virginia Cooperative Extension Service.

#### **(7) Urban Forest Management**

In 1993, an installation-wide urban tree inventory and management plan was completed by Virginia Tech to assist the NRM and the PWD identify hazardous trees and improve management of urban forests (USN 1993). This inventory included documentation of approximately 3,000 trees and the creation of a GIS database for urban forest management. The NRM conducted annual dead and hazard tree surveys in urban forests until 2006. Since then, Lincoln Housing (PVV

contractor) assumed responsibility for the identification and removal of hazardous trees in the housing area. In 2016, the Installation Commanding Officer signed an Earth Day Proclamation that trees removed in urban areas shall be replaced by the planting of two trees, unless circumstances dictate otherwise. To date, the PVV contractor for housing has not agreed to discuss this initiative but the NRM is planning to improve replacement planting efforts (Appendix 1B, P18).

## **E. VEGETATIVE MANAGEMENT**

### **(1) Program Description**

Vegetative management primarily includes grounds maintenance activities that are not achieved through forest management. Contractors under the direction of PWD conduct routine maintenance activities such as grass mowing on improved and semi-improved grounds, herbicide use to control vegetation, and landscaping. The Grounds Maintenance Program is primarily the responsibility of the NAVFAC Washington PWD. The NRM reviews and provides input on grounds maintenance contracts regarding issues such as mowing frequency and the identification and establishment of areas that should not be mowed. The NRM also reviews landscaping plans for all development projects and provides recommendations regarding the use of appropriate native plants and maintenance requirements. Vegetative management is closely linked with the Pest Management, Fish and Wildlife, Forest Management, Wetland (and Watershed) Management, and Invasive Species Programs.

### **(2) Program Goals**

The overall goal of the Vegetative Management Program is to maintain and enhance landscaped areas and urban forests at NSFDL, while minimizing the use of energy, water, chemical herbicides, and fertilizers (Appendix 1A, G10).

### **(3) Vegetation Management Practices**

Guidance for landscaping and grounds maintenance at NSFDL is provided by EO 13148 - Greening the Government through Leadership in Environmental Management. This EO 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). Specifically, federal projects are required, to the extent practicable, to:

- Use regionally native plants (Appendix 1C, M79)



- Use construction practices that minimize adverse effects on the natural habitat (Appendix 1C, M80)
- Reduce fertilizer and pesticide use (Appendix 1C, M81)
- Use water-efficient practices (Appendix 1C, M82)
- Create outdoor demonstrations to promote awareness of the environmental and economic benefits of beneficial landscaping (Appendix 1C, M83)

The use of regionally native plant species is particularly important as they are generally better suited for local site conditions than non-native species and reduce the need for intensive maintenance and the use of fertilizers and pesticides. Greater use of native plant species will also help reduce the introduction of aggressive, invasive species that may become common in the developed areas of NSFDL and threaten the integrity and biodiversity of the installation's natural areas.

## **F. MIGRATORY BIRD MANAGEMENT**

### **(1) Program Description**

Migratory birds are a large, diverse group of birds that utilize breeding grounds in the United States and Canada, and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. The MBTA, 16 USC §703-711 is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. An exemption to the rule that allows for the incidental take of migratory birds by DoD during military readiness activities was finalized in February 2007 (72 FR 8931). As directed by Section 315 of the 2003 National Defense Authorization Act, this rule authorizes such take, with limitations, that result from military readiness activities. If DoD determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.

Military readiness activities include 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. Military readiness does not include: the routine operation of installation operating support functions, such as: administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; Morale, Welfare, and Recreation (MWR) activities; shops; mess halls; the operation of industrial activities; or, the construction or demolition of facilities listed above (72 FR 8931). 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.

A list of bird species not covered by the MBTA and summary of the Migratory Bird rule is available at:  
<https://www.fws.gov/birds/index.php>

Additional protection for migratory birds on federal properties is provided by EO 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds of 2001. This EO stresses incorporating bird conservation principles in agency management plans and requires federal agencies enter into a memorandum of understanding on migratory birds with the USFWS. DOD 18 August 2017 memorandum *Guidance for Addressing Migratory Bird Management in INRMPs* consolidates the current legal and policy requirements and best practices for migratory bird conservation on military installations requiring INRMPs (DoD 2017).

In 1991, the DoD joined the Partners in Flight (PIF) cooperative effort involving federal, state, and private organizations that are dedicated to the conservation and management of migratory birds. From 1992 to 2000, NSFDL supported the DoD PIF effort by participating in the monitoring Avian Productivity and Survivorship (MAPS) program. This mist-netting and banding program was reinitiated in 2012 and has been conducted annually since then with the exception of 2017. The MAPS program is a cooperative effort established by The Institute for Bird Populations in 1989 to provide long-term demographic data on landbirds.

## **(2) Program Goals**

The overall goal of the Migratory Bird Management Program at NSFDL is to support the conservation of migratory birds through habitat conservation and enhancement and to avoid the incidental take of

migratory birds through military readiness actions in accordance with the MBTA to the greatest extent practicable (Appendix 1A, G11). Guidance for addressing migratory bird management in INRMPs is provided in the *Guidance for Addressing Migratory Bird Management in INRMPs* (DoD 2017).

### **(3) Management Practices**

In accordance with the MBTA and EO 13186, NSFDL employs operational and conservation measures that avoid, minimize, or mitigate take of migratory birds. As stated before, a Bald Eagle Management Plan was completed in early 2007 and outlines management of this migratory species at NSFDL (USN 2007b).

Natural resources management at NSFDL also supports the conservation of migratory birds through a number of measures including conservation objectives identified by Partners in Flight (PIF) for the Mid-Atlantic Coastal Plain region (Watts 1999). PIF is a cooperative effort involving federal, state, and private organizations that are dedicated to the conservation and management of most landbirds and other birds requiring terrestrial habitats (Ruth 2006). PIF identifies bird species and habitats most in need of conservation and outlines conservation objectives in its *Bird Conservation Plan for the Mid-Atlantic Coastal Plain* (Watts 1999).

Conservation objectives that are applicable to natural resources management at NSFDL include:

- Identifying and maintaining significant blocks of mixed upland forest and considering the value of hardwood-dominated forests in management decisions (Appendix 1C, M84)
- Preventing any loss of forested wetlands (Appendix 1C, M85)
- Avoiding the conversion of mixed forests or hardwood-dominated forests to pine monocultures (Appendix 1C, M86)
- Using open spacing for planting and conducting multiple thinnings in pine stands to delay canopy closure and promoting understory vegetation (Appendix 1C, M87)
- Conducting migratory bird monitoring programs (Appendix 1B, P6; Appendix 1C, M88)
- Minimizing land disturbance during the breeding season (Appendix 1C, M89)

- Minimizing the use of pesticides (Appendix 1C, M90)
- Maximizing the use of natives in landscaping (Appendix 1C, M91)
- Controlling populations of terrestrial and aquatic invasive species (Appendix 1B, P9; Appendix 1C, M92)
- Controlling feral cat populations (Appendix 1C, M93)
- Mitigating the negative impacts of reflective glass (Appendix 1C, M94)

The NRM has also improved migratory bird nesting habitat with the installation, monitoring, and maintenance of nesting boxes for eastern bluebirds and wood ducks, and nesting platforms for ospreys. In 1989, ten wood duck nest boxes were erected near Hideaway Pond and eight were erected near Black Marsh. Since then, the number of boxes has increased to 24. Over 40 bluebird boxes have been maintained since the late 1980's producing up to and over 200 fledglings per year. Osprey nesting platforms have been erected in proximity to inactive nests that had to be removed due to mission-related reasons. Nesting osprey pairs exceed 40, with new nests appearing annually. Maintenance and monitoring of these nesting boxes/platforms, and the periodic replacement of nesting structures in disrepair (Appendix 1B, P8 and DL2) is a scheduled NRO activity.

## **G. INVASIVE SPECIES MANAGEMENT**

### **(1) Program Description**

The NRO and PWD are responsible for the Invasive Species Management Program at NSFDL. Implementation of this program allows NSFDL to comply with EO 13112 - Invasive Species, which was issued on February 3, 1999. This EO requires that federal agencies coordinate complimentary, cost-effective activities concerning invasive species with existing organizations addressing invasive species. The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), The Nature Conservancy, and the VDCR-DNH provide guidance on invasive species management issues and projects.

The Invasive Species Management Program is applicable to all areas of NSFDL that are affected by invasive plant species. The term "invasive species" may refer to any alien species whose introduction does or is likely to cause economic or environmental harm to human health (EO 13112, 1999). Invasive Species Management

is closely linked with the Fish and Wildlife and Forest Management Programs.

## **(2) Program Goals**

The overall goal of Invasive Species Management Program is to reduce or eliminate invasive populations in order to protect ecosystems and native plant and animal species from invasive species through compliance with EO 13112 and EO 13751 (Appendix 1A, G12). EO 13112 requires federal facilities, to the extent practicable and permitted by law, to perform the following activities that are also management practices at NSFDL:

- Prevent the introduction of invasive species (Appendix 1C, M95)
- Detect and control such species (Appendix 1B, P9; Appendix 1C, M96)
- Accurately monitor invasive species populations (Appendix 1C, M97)
- Provide for restoration of native species and habitats that have been invaded (Appendix 1C, M98)
- Promote public education on invasive species (Appendix 1C, M99)
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control (Appendix 1C, M100)
- Not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species (Appendix 1C, M101)

## **(3) Management Practices**

A comprehensive invasive plant species inventory was conducted on Mainside in 2011 (USN 2011a) to supplement an earlier less intensive effort in 2001 (USN 2001c). Fourteen selected plant species were surveyed utilizing two methods; a whole forest stand survey and a visual edge (forest edge) survey. These two methods allowed documentation of population size, habitat occurrence, and abundance. A management plan was prepared that documented inventory results, addressed the individual plant species and their control methods, identified hotspots, and recommended priorities. This effort provided the focus to enhance the control

program. Between 2008 and 2018, over 230K has been spent on controlling invasive plant species at NSFDL.

Fourteen invasive plant species were surveyed and mapped during the inventory. Additional non-native species that occur at NSFDL are identified on the plant species list in Appendix 2G. The following are considered the most problematic nuisance species at NSFDL.

- tree of heaven (*Ailanthus altissima*)
- mimosa (*Albizia julibrissin*)
- porcelain-berry (*Ampelopsis brevipedunculata*)
- Oriental bittersweet (*Celastrus orbiculatus*)
- autumn olive (*Elaeagnus umbellata*)
- Chinese bush clover (*Lespedeza serica*)
- Chinese privet (*Ligustrum sinense*)
- Japanese honeysuckle (*Lonicera japonica*)
- Japanese stiltgrass (*Microstegium vimineum*)
- princess tree (*Paulownia tomentosa*)
- common reed (*Phragmites australis*)
- Japanese knotweed (*Polygonum cuspidatum*)
- multiflora rose (*Rosa multiflora*)
- wineberry (*Rubus phoenicolasius*)

In accordance with EO 13112 and the goals of this program, NSFDL will control populations of invasive plants in a cost-effective and environmentally sound manner. When practicable, control efforts will be coordinated with other local or regional control programs. A variety of control measures will be employed based on species-specific and site-specific requirements. In some cases, a combination of control measures may be appropriate. Various options for invasive plant control methodologies include the following:

a. Avoidance

Several avoidance measures are already in place at NSFDL and include prohibiting the use of invasive plants for landscaping or

other purposes, implementing BMPs to minimize land disturbances that promote invasion, and re-vegetating disturbed areas with native species. Avoidance will remain the preferred control measure.

b. Mechanical Controls

This method involves physical removal of invasive plants through means such as hand pulling of individual stems, digging, cutting, and mowing. This method can be very effective for certain species on a localized basis and is often preferred to avoid impacts to non-target species and the use of herbicides. However, it can be labor intensive on a larger scale and repeated removal is typically required to ensure success. When implemented on a large scale, measures must be taken to avoid impacts to non-target species and to minimize the potential for erosion. If used inappropriately, large-scale mechanical methods that disturb the ground can encourage invasive plant growth. Mechanical methods are often used in combination with selective use of a glyphosate-based herbicide.

c. Biological Controls

Biological controls typically involve the introduction of a species (biological control agent) that feeds on or impedes the growth of the target invasive plant. The science of biological controls has made significant advances in recent years, but effective and approved methods are currently limited. Where applicable this method can be very cost effective and avoids the potential impacts associated with chemical and mechanical controls. However, many biological control agents are non-native species, which raises concerns.

d. Chemical Controls

Herbicide application can be a very effective means of controlling invasive plants. However, herbicides have the potential to impact non-target plants, as well as fish and wildlife resources. When appropriately used, non-persistent herbicides can be the most appropriate control measure for many circumstances.

e. Controlled Burning

This method is typically only used in combination with selective herbicide applications and may promote the invasion of many species. However, herbicide use in combination with controlled burning has been proven an effective means of control for common reed, which is considered the most prevalent invasive wetland plant at NSFDL.

## H. LAND MANAGEMENT

### (1) Program Description

The Land Management Program provides the foundation for the conservation of all other natural resources components and serves as the basic land use and conservation management guide. Sound land and water management practices that conserve soil and water are paramount to the overall natural resources conservation program. Soil and water resources form the basis for supporting the remaining components of the system. Consequently, every effort is made to ensure this foundation is protected from man-induced and natural impacts.

This program is integrated with other mission, land use, and environmental planning processes at the installation, as well as all other natural resources management programs. In addition, many of the activities implemented under the Land Management Program help to ensure sustainable use of NSFDL's ranges. Issues addressed under the Land Management Program include:

- Land use planning
- Erosion and sediment control
- Stormwater management
- Shoreline protection
- Estuary and watershed protection

Because of the variety of issues addressed under the Land Management Program, several departments share responsibility for implementation. The PWD FEAD Office is responsible for development of erosion and sediment control plans and specifications for construction projects that are designed in-house and oversight of those produced by offsite contractors. Erosion and sediment control plans are implemented for ground disturbing activities exceeding 10,000 square feet. The PWD also has overall management responsibility for the stormwater sewer system and administers ground maintenance contracts for the installation. Other individuals within the Environmental Office also have specific responsibilities with respect to Environmental Restoration, Range Sustainability, NEPA, and cultural resources management. The NRM is primarily responsible for ensuring that sound land and watershed management practices are integrated with other mission, land use, and environmental planning functions.



## **(2) Program Goals**

The overall goal of the Land Management Program is to support mission related activities while providing the foundation for all other natural resources programs (Appendix 1A, G13). In accordance with DoD Directive 4715.11, Environmental and Explosives Safety Management on Department of Defense Active and Inactive Ranges within the United States, August 17, 1999, it is NSFDL's policy to ensure the long-term viability of its ranges, while protecting human health and the environment.

## **(3) Land Use Planning**

Future development at NSFDL will be inevitable in order to meet mission requirements. Area Development Plans were developed for NSFDL in 2001 (Michael Baker Jr., Inc.) to guide orderly future development at the Installation. Since then, several master plans have been finalized with the 2019 Installation Development Plan, being the most current (USN 2019e). Principles of sustainable development, including minimizing impacts to natural areas, increasing density in previously developed areas, and utilizing energy efficient design, are promoted in the Installation Development Plan. Land use planning is primarily the responsibility of the PWD Asset Management Office. Natural resources considerations and constraints are integrated into the overall land use planning process. The NRM provides input on proposed development activities to ensure the continued protection and conservation of habitat and significant resources to the greatest extent practicable. Specifically, the NRO:

- Maintains contact with the PWD regarding land use planning and proposed development;
- Provides information about natural resources constraints on land use to NSFDL planners and other personnel;
- Reviews and provides input on project-specific site plans and conceptual plans for future development;
- Assists in the development of alternatives to proposed development to avoid and minimize impacts to natural resources; and
- Provides input to the NEPA process.

Input is provided early and throughout the planning process, as well as during the NEPA process. Specific natural resources constraints to land use (e.g., wetlands, rare species habitat, etc.) are discussed throughout this INRMP.

#### **(4) Erosion and Sediment Control**

Minimizing the effects of erosion and sedimentation is a primary goal of the NSFDL land management program. Erosion and sediment control issues at NSFDL are primarily related to construction activities. Policies and procedures are currently in place to minimize soil erosion and associated impacts to surface water quality. Construction projects at the installation exceeding 10,000 square feet require an approved erosion and sediment control (E&S) plan and construction monitoring is conducted to ensure that the plan is being properly implemented. The E&S Plan is submitted to VDEQ for review and approval when a Stormwater Management Plan (SWM) is required (see below).

The FEAD is responsible for oversight of all design and construction projects at the installation, including review of SWPPPs and erosion and sediment control plans prepared by contractors. The FEAD monitors daily construction activities to ensure that contractors comply with the plan and has authority to implement corrective or enforcement actions. The NRM and Stormwater Program Manager provides technical review support and approval for all Erosion and Sediment Control and SWPPPs and conducts periodic inspections. Although they have no jurisdiction over construction projects at NSFDL, the VDEQ can conduct periodic inspections upon request and provide input regarding BMPs. The NRM or VDEQ representatives provide their inspection findings to the FEAD, who takes corrective or enforcement action, if necessary. All coordination with general contractors and sub-contractors regarding construction projects is performed through the FEAD. Natural resources personnel interact with construction contractors via the FEAD.

An eight-hour class (i.e., Responsible Land Disturber) is offered by VDEQ to train general contractors, sub-contractors, and Navy personnel on erosion and sediment control measures. This training is vital when planning and undertaking construction projects. This class is mandatory for general contractors working on NSFDL construction projects.

Portions of the Pumpkin Neck test range contain little or no vegetation because of mission requirements. These areas are cleared on a regular basis in order to discourage the establishment of any vegetation that could interfere with the range mission and range safety. These ranges are relatively flat and are surrounded by vegetated buffers. The buffers and flat topography prevent significant erosion of these areas and no significant erosion problems exist. However, because of the lack of vegetation and high level of disturbance, the NRM conducts semi-annual

inspections of the ranges to determine if significant erosion is taking place.

#### **(5) Stormwater Management**

The stormwater management system at NSFDL is rather extensive due to the relatively flat nature of the property. It consists of man-made features (pipes, ditches, and ponds) and natural features (streams, wetlands, and floodplains) that control the quantity and enhance the quality of stormwater leaving NSFDL.

Ground disturbing activities exceeding one acre require a Stormwater Management (SWM) Plan and Stormwater Pollution Prevention Plan (SWPPP) to obtain a General Permit for Stormwater Discharges from Construction from Sites. The SWM plan is reviewed and approved by VDEQ while the SWPPP is reviewed and approved by the Navy. Upon SWPPP approval, the contractor completes the Permit Registration Statement and forwards it to VDEQ. VDEQ responds with the permit fee amount. The SWM and SWPP Plans must conform to VR 625-02-00 and VAR 10, respectively.

The 1998 Mainside SWMP (USN 1998b) discussed the deficiencies with the existing stormwater system and made recommendations on how to correct these deficiencies. The primary deficiencies identified are an aging infrastructure, stormwater capacity, and subsequent erosion problems associated with recent or on-going construction activities. Stormwater management designs for new development and several BMPs that should be implemented in order to comply with the Chesapeake Bay Preservation Act are presented. However, these designs are typically site-specific and do not correct the existing deficiencies. A more installation-wide approach to stormwater management was recommended to improve the efficiency and effectiveness of the system.

The basewide SWPPP for VPDES Stormwater Permit #VA007636, updated in 2020 (USN 2020b), addresses the prevention and reduction of pollution in stormwater runoff caused by industrial, construction, and daily activities. The base discharges stormwater associated with industrial activities from nine outfalls (seven on Mainside and two on Pumpkin Neck). The base also operates a wastewater treatment plant (WWTP) under VPDES Permit #VA0021067. The permit covers discharges from the WWTP to Upper Machodoc Creek and includes effluent limitations and monitoring requirements.

All stormwater system retrofits, upgrades, and new facilities are required to incorporate low impact development (LID) strategies in accordance with the DoD Unified Facilities Criteria: Low Impact Development (UFC 3-210-10), to the greatest extent practicable. LID is a stormwater management strategy concerned with maintaining

or restoring natural hydrologic function to achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID employs a variety of natural and built features that reduce the rate of runoff, filter out pollutants, and facilitate the infiltration of water into the ground. By reducing water pollution and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters and stabilize the flow rates of nearby streams.

The PWD is primarily responsible for implementation of the SWPPP and the NRM provides input to the process. Specifically, the NRM:

- Supports the PWD in identifying and addressing problems associated with the installation's stormwater and sewer management system;
- Reviews stormwater management and stormwater pollution prevention plans to ensure compliance with applicable laws and regulations; and
- Provides technical oversight support on stormwater and sewer management system design and construction.
- The NRM also conducts litter cleanups while performing field work to help eliminate some stormwater pollution and wildlife hazards (Appendix 1B, DL3).

No stormwater management plan has been prepared for Pumpkin Neck due to the lack of development and impervious area. Grass swales, culverts, and drainage ditches are the primary stormwater management features at Pumpkin Neck. No storm sewer system is in place at Pumpkin Neck, with the exception of a few drop inlets.

#### **(6) Shoreline Protection**

NSFDL is located along the shorelines of the tidal Potomac River and Upper Machodoc Creek. Over the years, these shorelines have experienced significant erosion from the effects of hurricanes and nor'easters. Long fetches, multi-directional currents, increased boat traffic, and overland flow have also increased the erosion rate. Various shoreline protection measures have been implemented in the past. However, tidal shoreline erosion continues to be a major issue that threatens real property resources, as well as water quality and aquatic resources.

In November 1998, NSFDL contracted the NRCS to conduct a study and develop a plan to address the shoreline erosion issues. The study

included an inventory of existing conditions along the Mainside and Pumpkin Neck shorelines; erosion rate estimates; identification of "hot spots" and priorities; evaluation of alternatives for shoreline protection; and cost estimates associated with shoreline protection. Findings of the study are detailed in the NSFDL Shoreline Management Plan (USN 1998c).

The study identified several buildings and roads that could be impacted by shoreline erosion if protection measures are not taken. The study also determined that 93 percent of the soil loss from the installation is from shoreline erosion. The amount of sediment delivered to the Chesapeake Bay from NSFDL was compared to the amount of sediment delivered from the entire Potomac River watershed. The results indicated that, per unit area, NSFDL is contributing sediment to the Bay at a rate that is four to six times greater than the rate for the entire watershed. These data suggest that shoreline erosion at the installation is excessive.

The NSFDL Shoreline Management Plan recommended erosion control measures be implemented on over 10,000 feet of shoreline along the Potomac River. Breakwaters, revetments, sills, and other types of hard armaments were the primary types of shoreline stabilization measures that were recommended.

The DoD Bay Coordinator coordinates riparian forest buffer initiative activities on DoD lands in the Chesapeake Bay Watershed:  
[https://www.chesapeakebay.net/managementstrategies/strategy/forest\\_buffer](https://www.chesapeakebay.net/managementstrategies/strategy/forest_buffer)

Vegetation management was recommended in areas such as vertical slopes and eroding banks where falling trees could increase potential erosion. Shoreline protection measures at NSFDL are characteristically expensive and time consuming because of the potential for UXO along the shoreline. Due to budget constraints, implementation of shoreline protection must be accomplished in order of highest priority. The Shoreline Management Plan has prioritized this work based on criteria including the threat to a structure, the amount of erosion that is occurring, and the needs of NSFDL.

An EA was developed for the stabilization of three sites equaling approximately 1,500 feet along the Potomac River shoreline (USN 2007c). A series of revetments and sills were constructed to stabilize the shoreline at these sites. A second EA was prepared in 2014 to address the proposed shoreline stabilization project of over an additional 11,000 linear feet (USN 2014c).

A project was funded in FY19 to develop designs for reaches identified in the 2014 shoreline stabilization EA and is expected

to be complete by the end of 2021 (Appendix 1B, P10). Funding will be programmed for the higher priority reaches.

**(7) Estuary and Watershed Protection**

NSFDL lies within the Chesapeake Bay Watershed, which is recognized as one of the most important and productive estuaries in the world and is protected by federal, state, and local regulations. The Navy is a signatory to a number of agreements designed to restore the Chesapeake Bay. Included are the 1994 *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*, the 1998 *Federal Agencies' Chesapeake Ecosystem Unified Plan* (FACEUP), and the 2000 *Chesapeake 2000 Agreement* (C2K). 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 nutrients and toxins 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. A primary initiative of the Chesapeake Bay Program is the restoration of riparian forest buffers on at least 70 percent of all streams and shorelines.

In support of the Chesapeake Bay agreements, the Navy conducted an assessment of potential riparian forest buffer restoration sites for each naval installation within the Chesapeake Bay Watershed (USN 2000b). Four sites at NSFDL were recommended for treatment (Table 3-4). Of these sites, Kitts Marsh (Site 6) is the only site on which restoration goals have been met. Through restricting mowing, the area has succeeded into an early successional shrub/tree habitat. Riparian forest buffer restoration at the Yardcraft Area (Site 1) has been accomplished with the construction of two stormwater wetlands. The Conservation Marsh (Site 2), is still under consideration. Caskey Road is considered unsuitable for riparian forest buffer establishment. Fulfilling the remaining restoration goals and the identification and restoration of additional riparian forest buffers areas at NSFDL would be consistent with the Navy's commitment to the Chesapeake Bay agreements.

**Table 3-4. Riparian Forest Buffer Restoration Sites**

Site Name	Site #	Buffer Length (ft)	Total Acres	Status
Yardcraft Area	1	400	1.5	Completed
Conservation Marsh	2	300	0.7	No action
Caskey Road	5	100	0.1	Not feasible
Kitts Marsh	6	1,200	1.1	Restored

Source: USN 2000b

An equally important initiative for estuary/watershed protection is the formulation and implementation of a spill prevention plan. NSFDL's Spill Prevention, Control, and Countermeasure Plan (USN 2020c) identifies measures to prevent the occurrence of oil spills, measures for preventing a spill from entering navigable waters, and countermeasures to contain, clean up, and mitigate the effects of an oil spill that can impact navigable waters. Daily inspections of oil-containing structures are conducted in support of this program.

**I. AGRICULTURAL OUTLEASING**

Navy policy mandates that installations with suitable land areas conduct multiple-use natural resources management provided it does not interfere with accomplishment of the military mission. The leasing of land for grazing and agricultural use is one such use. The potential for establishing an agricultural/grazing outleasing program at NSFDL was thoroughly evaluated in the 1980s and was determined to be marginal at best and no demand for out-leasing was identified. Therefore, no further action is planned regarding agricultural outleasing.

**J. GEOGRAPHIC INFORMATION SYSTEMS MANAGEMENT**

**(1) Program Description**

Geographic data and information are an integral part of natural resources and environmental protection and planning at NSFDL. NAVFAC created the GeoReadiness Repository to provide geospatial information relative to the Navy's Real Property Inventory to support functional areas including facilities management, environmental management, antiterrorism/force protection, base development/planning, regional planning, and range management. The GeoReadiness Repository, completed in 2004, provides a single source of authoritative strategic level geospatial data for Class I (land) and Class II (facilities) properties (Carlen and Bason 2004). The GeoReadiness Repository enforces the Spatial Data

Standards for Facilities, Infrastructure, and Environment. The GeoReadiness Repository provides a corporate resource for sharing existing data at the Regional level and was not designed to replace current NSFDL natural resource GIS management.

The NSFDL GIS is maintained within NAVFAC. The South Potomac GIS Analyst position had been vacant for nearly two years and critical geodatabase updates suffered during that time. The NRM has the ability to conduct data development, map creation, and environmental geodatabase updates. The NRM is also responsible for collection of natural resources related spatial data and overseeing the integration of this information into the GIS. This program enhances the efficiency with which NSFDL manages its property and natural resources, thereby providing essential support to the military mission.

## **(2) Program Goals**

The overall goal of the GIS Management Program at NSFDL is to support the military mission and Natural Resources Program by providing easy access to accurate information for both management and decision making (Appendix 1A, G14). The program addresses data development, hardware, software, and training needs, as well as general system administration. The program is applicable to the entire installation and interacts with all-natural resources management, engineering, planning, and safety programs for NSFDL.

## **(3) Management Practices**

NSFDL has a well-developed, ArcInfo platform GIS that includes over 80 data coverages. Detailed information about the themes included in the GIS is provided in the GIS Data Dictionary, which is maintained by NAVFAC. Standards for data development have been established and include use of Spatial Data Standards (formerly Tri-Services Spatial Data Standards) and development of metadata in accordance with Federal Geographic Data Committee Standards.

Numerous data coverages exist with respect to natural resources. Core coverages include digital orthophotography, infrastructure, surface water, wetlands, soils, forest cover types, Special Interest Areas, bald eagle nesting sites, cultural resources, and other land use constraints. Special applications such as the urban forest inventory have also been developed; however, data for this application have not been updated or routinely maintained.

The NSFDL GIS must be maintained with up to date information in order for the NRM to effectively use the GIS for planning and decision-making. Virtually all inventory and monitoring data collected will be incorporated into the GIS. When necessary, a



global position system (GPS) will be used to delineate changes in features such as bald eagle nesting sites, Special Interest Areas, wetlands, and forest stands. New and ongoing natural resources related GIS data development activities are discussed under the resource-specific sections of this INRMP.

The following management practices are part of the Information Management Program at NSFDL:

- NSASP NAVFAC Asset Management personnel are responsible for data development, map creation, and maintaining the NSFDL specific GIS layers (Appendix 1C, M102).
- The NRM provides support in maintaining and updating natural resources-related GIS data (Appendix 1B, P20, DL8; Appendix 1C, M103).
- Enhance the efficiency with which NSFDL manages its property and natural resources, thereby providing essential support to the military mission (Appendix 1C, M104).

## **K. OUTDOOR RECREATION**

### **(1) Program Description**

The Outdoor Recreation Program addresses consumptive and non-consumptive natural resources-based recreation at NSFDL. Various natural resources-based recreational activities, such as fishing, hunting, hiking, birding, and boating are available at the installation. For the purposes of this INRMP, the Outdoor Recreation Program does not address outdoor recreational activities that are not natural resources-based, such as basketball, baseball, tennis, and golf. Hunting and fishing activities are included in this section, although management of fish and game populations is addressed under the Fish and Wildlife Management Program. The NRM is responsible for overseeing the hunting and fishing activities at NSFDL, as well as non-consumptive recreational activities.

### **(2) Program Goals**

The overall goal of the Outdoor Recreation Program is to enhance quality of life for NSFDL personnel and employees by allowing for maximum natural resources-based recreational use of the installation in a manner that is compatible with the military mission (Appendix 1A, G15).

### (3) Management Practices

The Sikes Act requires sustainable use of natural resources by the public and public access to military installations for such use, subject to requirements necessary to ensure safety and military security. EO 12962 requires federal agencies, where practicable, to enhance recreational fishing opportunities.

- The hunting program shall be implemented to promote the balanced management of the installation white-tailed deer population to ensure continued harvesting by hunters, promote sound ecological benefits, and meet safety goals by reducing human/deer interactions (i.e., vehicle collisions; Appendix 1C, M105)
- The NRM shall ensure non-consumptive outdoor recreational activities are accessible within the framework of the installation military mission (Appendix 1c, M106)
- The NRM shall continue collection of permit fees to support the outdoor recreation program per Sikes Act authorization (Appendix 1B, P14; Appendix 1C, M107). This includes future plans to transition collection activities to an electronic permit system (Appendix 1B, P12).

Due to the nature of the NSFDL mission, general public access to the installation is not permitted. Those eligible to participate include:

- NSASP, supporting and supported active duty military personnel and civilian government employees
- Active and retired military personnel
- NSASP, supporting and supported command base residents and their dependents
- NSASP, supporting and supported command contractors with a Common Access Card (CAC)
- NSASP, supporting and supported command retired civilian government employees with a DoD Retiree CAC
- Guests of all of the above with the exception of retired civilian government employees

In addition, outdoor recreational opportunities shall be provided to disabled veterans, military dependents with disabilities, and other persons with disabilities when practical. A 1999 amendment (Disabled Sportsmen Access Act) to the National Defense Authorization Act championed this cause.

Access to recreational areas for specific activities is limited based on time of day, day of the week, and time of year. Specific information on access restrictions is provided in the NSASP Hunting and Fishing Instructions. Proper credentials are required for access and user permits are required for hunting, fishing, and trapping. Other outdoor recreational pursuits shall be coordinated with the NRM and Base Security as warranted.

The Outdoor Recreation Program is designed to support mission objectives by improving the quality of life for the NSFDL community. An outdoor recreation survey of NSFDL employees was conducted in 1989 by a group from the University of Maryland's Department of Recreation. An outdoor recreation plan was formally initiated in 1997 with the preparation of an Integrated Natural Resource Conservation Plan, which addressed the status and direction of outdoor recreation opportunities at both Mainside and Pumpkin Neck. The plan assessed recreational opportunities with regard to the constraints of the installation's military mission.

a. Non-consumptive Outdoor Recreation

Non-consumptive outdoor recreation opportunities at NSFDL include jogging, walking, bicycling, camping, hiking, birding, wildlife viewing, picnicking, and boating. The Beaver Pond Nature Trail on Mainside allows for access to forested areas and the Gambo Creek Marsh. Interpretive signs, including tree species placards and trail markings, have been posted at various locations on the trail but are currently in disrepair. A brochure available at the trailhead describes the trail features and discusses the marked trees and points of interest. Periodic maintenance of the trail and sign replacement by the NRM, volunteers, or an SCA employee is required to keep the trail in usable condition. This trail is currently in serious disrepair.

Birding opportunities exist throughout Mainside. Gambo Creek, the Beaver Pond Nature Trail, Hideaway Pond, and tidal shorelines are the most active birding areas at NSFDL. The Natural Resources Office provides a bird checklist that includes all the potential species at NSFDL. Camping areas are present at Gambo Creek along the nature trail and at Hideaway Pond. These campgrounds are available to special groups including local Boy and Girl Scout troops though they have not been used since security protocol

changed following the terrorist attacks on September 11, 2001. Canoeing is permitted in Gambo Creek and Hideaway Pond. Picnic tables are present at Hideaway Pond and Cooling Pond. An archery range on Mainside is available for all NSFDL personnel. A majority of Mainside's roads and paths are available for running, walking, and cycling. Outdoor recreation opportunities on the Potomac River, Upper Machodoc Creek, and Gambo Creek are provided by ensuring that these resources are accessible, to the extent allowed by mission and safety constraints.

b. Consumptive Outdoor Recreation

Consumptive outdoor recreation uses include hunting, fishing, and limited trapping. Demand for trapping is relatively low and little to no trapping has been conducted in recent years with the exception for nuisance species. In accordance with NSASP Hunting and Fishing Instructions, the NRM is responsible for developing and implementing recreational hunting, fishing, and trapping programs.

Base permits for hunting, fishing, and trapping are issued at the ITT Office within MWR. Base Police are responsible for the enforcement of existing laws and regulations during the hunting and fishing seasons. The NRM is responsible for administering a safe and effective recreational hunting and fishing program (Appendix 1B, DL7). Specifically, the NRM:

- Updates hunting and fishing instructions and annual notices based on current biological data and state regulations
- Administers the Game Check Stations
- Maintains the archery range and signage for hunting areas
- Schedules and conducts annual archery proficiency tests
- Maintains a hunter's log

The NRM also provides information regarding off-site hunter safety class availability.

c. Hunting Resources

Mainside and Pumpkin Neck encompass significant wildlife resources to support hunting activities. Hunting is permitted at specified areas within Pumpkin Neck and Mainside. Primary game species include white-tailed deer, wild turkey, quail, rabbit, dove, and squirrel. These wildlife populations are monitored as part of the Fish and Wildlife Management Program, and this information is used to determine management activities, particularly for white-tailed

deer. Areas open to hunting are subject to change based on testing schedules and bald eagle nesting activities.

The hunting areas at NSFDL are divided into hunting compartments. Mainside is divided into nine hunting compartments and Pumpkin Neck into five compartments. Designated bow and gun areas within these compartments are delineated in the NSASP Hunting Instruction. Hunting compartments on Mainside are located throughout the northern and eastern portions of the installation. The developed areas to the south are off limits to hunting. Pumpkin Neck's hunting compartments are located along its southern and western borders. The entire northern and eastern portions of Pumpkin Neck are off limits to hunting due to potential UXO contamination and range activities. Limited deer hunting in the "OFF LIMITS" area has benefitted the ability to effectively manage this herd.

d. Fishing Resources

Mainside provides fishing opportunities at several locations including Hideaway Pond, Cooling Pond, Gambo Creek, Upper Machodoc Creek, and the Potomac River. Largemouth bass, bluegill, redear sunfish, and channel catfish are present in both ponds. Hideaway Pond and Cooling Pond are catch and release fisheries only. Fish caught from the ponds may be kept for mounting purposes only, due to potential health risks from high levels of mercury. Flat-bottomed boats are available for use on Hideaway Pond. Personal boats may be used, but gasoline powered boats are prohibited on NSFDL ponds. No fishing is permitted on Pumpkin Neck because of potential safety issues due to UXO and range activities.

e. Prohibited Outdoor Recreation Activities

Although NSFDL provides multiple non-consumptive and consumptive recreation opportunities, the abuse of these opportunities has occasionally occurred throughout the installation. Road blockades have been removed, allowing access to closed roads within the installation. Off-road trails, which are closed, have been illegally accessed by off-road vehicles within several of the forested areas of Mainside. Disturbance to wildlife and vegetation, potential contamination from vehicles, littering, and widespread ground disturbances may result from these activities. In accordance with EO - Off-Road Vehicle Use on Public Lands, which restricts off-road traffic to officially designated areas, signs and blockades will continue to be installed in order to discourage these activities. All NSFDL rules and regulations are strictly enforced by the Police Department.

## **L. BIRD/ANIMAL AIRCRAFT STRIKE HAZARD**

### **(1) Program Description**

Per OPNAVINST 5090.1E, Bird/Animal Aircraft Strike Hazard (BASH) management is not the responsibility of OPNAV N45, and as such, BASH management actions are not eligible for OPNAV N45 funding (USN 2019a). Due to the potential impact on natural resources by a command's BASH program, however, NRMs must provide biological expertise to assist naval air installations, air operations, and aviation safety officers in preparing and implementing BASH plans where necessary. BASH plans should be reviewed to ensure consistency and compliance with installation INRMPS and applicable natural resources laws and regulations. In support of BASH efforts, NRC actions that affect the abundance and distribution of wildlife and their habitats around active airfields are eligible for OPNAV N45 funding and should be identified and addressed in INRMPS. Airfield mowing and clear-zone establishment and maintenance are not considered OPNAV N45 NRC actions or military readiness activities under 50 CFR Part 21.

Although NSFDL previously had an active air-to-ground RDT&E mission with fixed wing aircraft, the airfield currently supports helicopter operations only and was redesignated as a heliport in 2006 (Fletcher 2007). Current operations at the airfield are minimal with less than 20 flights per year. Recently, the runway was decommissioned for fixed wing aircraft.

Because of the low level of activity, the bird/animal aircraft strike hazard at NSFDL is minimal and there are no BASH incidents on record (Fletcher 2007). The existing BASH Plan was revised into a NSASP BASH Instruction that was signed in 2016 (see Appendix 3).

### **(2) Program Goals**

Although no accidents have occurred at the NSFDL, eliminating BASH to the maximum extent possible and maintaining airfield clear zone safety clearances are important management issues for potential future operations. BASH Program objectives include reducing the attractiveness to birds and wildlife by minimizing food sources, nesting sites, and roosting habitat within the airfield clear zones. The NRM will serve as a member of the BASH Hazard Working Group and BASH Reduction Team to facilitate communication among personnel and monitor program effectiveness.

### (3) Management Practices

#### a. Airfield Environment

The airfield clear zones are comprised of a mixture of grasses and herbaceous species. Pine and hardwood forests are located north and east of the airfield. Developed areas characterize the airfield's western and southern borders. Cultivated areas lie east of the runway. A sewage treatment plant and the Cooling Pond lie directly south of runway #34.

#### b. Decreasing Airfield Attractiveness to Birds

**Grass Height Management.** Mowing operations should maintain a uniform grass height between seven and fourteen inches. Taller grass discourages flocking species from utilizing the airfield's adjacent grasslands because reduced visibility disrupts interflock communication and flock integrity and reduces predator detection. Grass must be cut before it goes to seed to discourage seed-eating birds from utilizing the airfield. If possible, the airfield should be planted with one type of grass species, so that uniformed growing and cutting times can be established.

**Broad-leaf Weed Control.** Broad-leaf weeds should be kept to a minimum in the airfield environment. Herbicide applications can be scheduled as needed.

**Edge Effect.** Edge refers to the highly attractive transition zone between two distinct habitat types (e.g., forest/shrub, shrub/grassland, etc.). The airfield should be maintained as uniform as possible to reduce this effect.

**Shelters and Debris.** Birds are attracted to areas that provide shelter to roost and nest. All structures such as trees, unnecessary inactive planes, etc. should be removed from the airfield vicinity.

#### c. Species Specific Information for Hazard Reduction

**Gulls.** These species represent the most significant hazard to aircraft worldwide. Due to their omnivorous feeding habits and preference for flat, open areas to rest, they are commonly found on airfields. Gulls are most active just after sunrise and before sunset as they move to and from feeding areas. Maintenance of grass height between seven and fourteen inches is critical to reducing gull numbers. Even with this in effect, gulls may roost on the runway, particularly during inclement weather. Persistent harassment using pyrotechnics and bio-acoustics is necessary to discourage these birds. Occasionally acquiring a permit to use live ammunition should be considered to reinforce these

techniques. Gulls should not be allowed to establish the habit of using the airfield to feed and rest.

**Blackbirds, Grackles, Cowbirds, and Starlings.** These species can be particularly hazardous because they frequently occur in huge flocks, sometimes in the millions. Blackbirds and starlings are attracted to flat open areas to feed, rest, or stage before roosting. Maintenance of grass height between 7 and 14 inches is the best means of reducing airfield blackbird and starling numbers.

**Deer.** This species is a browser, preferring broad-leaf weed, shrubs, and trees, and a grazer. As a result, deer are commonly observed in and around the airfield environment. The presence of palatable plant species will serve to draw these animals to the airfield. Maintaining recommended grass heights makes grass less palatable and less attractive for grazing deer. However, deer like to rest on the airfield during the night regardless of grass height. Food plots have been established in nearby areas in an effort to keep deer from seeking forage in the airfield environment. Deer can be easily frightened from the airfield using scare tactics.

d. Guidelines for Dispersing Birds on the Airfield

**Bio-acoustics.** Bio-acoustics are taped distress or alarm calls of actual birds. The equipment required to adequately project these calls include a cassette tape deck mounted in a vehicle and a speaker mounted to its roof. Special care must be taken to play in short intervals to prevent habituation by the birds. Play the tape for 20-30 seconds and then pause briefly. Repeat the procedure several times if necessary. The birds should respond by taking flight or becoming alert/wary. These calls are effective for gulls, blackbirds, starlings, cowbirds, grackles, crows, and some shorebirds. Pyrotechnics should be used in conjunction with bio-acoustics to enhance complete dispersal.

**Pyrotechnics.** Pyrotechnics are 12-gauge scare cartridges that produce a secondary explosion to scare the birds from the area. The scare cartridges are launched from either a shotgun or a pyrotechnic pistol with a steel sleeve insert to modify the gun to the 12-gauge size. Pyrotechnics are effective for dispersing most bird species and can also be used for deer, fox, and turkey.

**Gas cannons.** Gas cannons may also be used. These devices should be operated, especially at dawn and dusk, as birds come in to feed and roost. Cannons must be relocated frequently to avoid habituation. These devices are very effective on waterfowl and other game birds and can also be used for gulls and blackbirds.



**Depredation.** Birds must be killed occasionally as a reinforcement of other methods. When it is determined that there is a need for such action, contact shall be made with the Natural Resources Office. Domestic pigeons, European starlings, and house sparrows can be killed without a federal permit, but state regulations must be checked before taking action. All other species require federal and state permits. The Natural Resources Office is responsible for obtaining these permits by contacting the USFWS and VDWR.

**Other devices.** Ingenuity is encouraged in the bird/deer strike hazard program. Other devices such as the crash truck, sirens, and a P.A. system may be used.

**Ineffective methods.** Ultrasound, rubber snakes, stuffed owls, rotating/flashing lights, loud music, and other such devices have not proved effective and should not be used.

## **M. WILDLAND AND PRESCRIBED FIRE MANAGEMENT**

### **(1) Program Description**

OPNAVINST 5090.1E provides the following information related to wildland fire management. Uncontrolled fires have the capacity to affect the developed environment as well as the undeveloped environment in ways that degrade the value of natural resources and capability of lands to support military readiness activities. INRMPS must address the need for management of fuel loads, including the use of prescribed burns, for habitat enhancement purposes and to reduce the potential for wildfires. A wildland fire management plan must be developed for installations with vegetation in undeveloped areas capable of sustaining fire and per habitat management objectives. As applicable, policies and guidance of EO 13855, Promoting Active Management of America Forests, Rangelands, and Other Federal Lands to Improve Conditions and Reduce Wildfire Risk, of 21 December 2108, will be incorporated into wildland fire management at NSFDL.

Wildfires have not historically been a problem at NSFDL; however, fire management remains a concern given the nature of the mission activities. The NSFDL Fire Department is responsible for all structural and wildfire control at the installation.

### **(2) Program Goals**

The primary goals of wildfire management at NSFDL are to minimize the potential for wildfire and reduce its impacts to the greatest extent practicable. Additional objectives are to use prescribed fire as a cost-effective management tool to enhance wildlife habitat and manage vegetation on operational lands.

### **(3) Management Practices**

The following management practices are part of the Wildfire Management Program at NSFDL:

- Minimize the potential for wildfire and reduce its impacts to the greatest extent practicable (Appendix 1C, M108).
- Use prescribed fire as a cost effective management tool to enhance wildlife habitat and manage vegetation on operational lands (Appendix 1C, M109).
- Where feasible, prescribed fire may be used to control invasive plant species (Appendix 1C, M110).
- Update the wildfire management plan every ten years or as necessary (Appendix 1C, M111).

Evaluating, monitoring, and where necessary, reducing the potential fire hazard are important components of wildfire management. Specific fire protection procedures include vegetation maintenance in and around explosive storage and test areas.

Natural resources management activities that have potential to increase the risk of fire include prescribed burning and timber operations. Prescribed fire is an efficient land management tool used for both timber and wildlife benefits. It is often used in natural resources management to:

- Reduce hazardous fuel accumulation
- Prepare sites for seeding and planting
- Manage early successional habitat
- Improve wildlife habitat
- Control undesirable vegetation

All prescribed burning has been conducted in accordance with a base standard operating procedure (SOP) and a site-specific prescribed burn plan, which is developed by the NRM. The burn plan follows the guidelines of the State Prescribed Burn Program and must include wildfire protection procedures. The plan must also provide for smoke management, state the objective of the treatment, and include a materials list and safety contact numbers. A map that indicates each burn unit and the location of all fire lines, firebreaks, roads, adjacent properties, and other important landscape features is also prepared.

Prescribed burns are recommended to be scheduled during the late winter. Approximately 30 to 50 acres should be burned per year with no more than 100 acres burned in a given year. Selected forest areas should be burned on a three- to five-year rotation to control woody understory growth and encourage herbaceous species. Burning may also be conducted following seed tree cuts in pine stands to assist in regeneration. Selected grassland and successional areas may be burned on a two to three-year rotation.

The failure to renew the existing prescribed burning standard operating procedures (SOP) and the logistics (i.e., obtain volunteers to conduct weekend burns under acceptable conditions) of conducting this activity has resulted in no prescribed burning activities over the past decade. Currently, the probability of conducting prescribed burn activities without trained, insured, professional personnel, as in the past, is very low and would need to be contracted. Forestry Program funds or the DoD Forestry reserve account are potential monetary sources for conducting prescribed burns.

Per OPNAVINST 5090.1E, NSFDL developed a Wildland Fire Management Plan in 2013 (Appendix 4; USN 2013c). The plan will be updated every ten years or as necessary (Appendix 1B, P15). The plan identifies current measures in place for combating wildland fires by the NSFDL Fire Department and the procedures for conducting prescribed burns in the future.

## **N. CONSERVATION LAW ENFORCEMENT**

### **(1) Program Description**

Per DoDI 5525.17, Conservation Law Enforcement Program, the NSA South Potomac Conservation Law Enforcement Program would work towards implementing the following objectives at both NSFDL and NSFIIH:

- Providing education and training to the installation populace, workforce, and general public to prevent inadvertent violation of natural resource and cultural resource laws
- Defining areas clearly to prevent hunting, fishing, and other outdoor recreational activities in unauthorized areas
- Reporting non-compliance with laws and regulations in accordance with Military Service criminal data reporting procedures

- Encouraging coordination with the USFWS and NMFS
- Reporting and tracking natural and cultural resources crimes and their disposition (both military and civil)

Currently, NSA South Potomac does not have a designated Conservation Law Enforcement Officer (CLEO), although the need does exist. Past efforts have been unproductive in securing funding to employ a CLEO who would split time between NSFDL and NSFIIH. An EPR project has been programmed to employ a CLEO, if funding is approved (Appendix 1B, P13). The CLEO's responsibility would be to ensure Navy, installation, federal, state, and county laws and regulations were adhered to for the Outdoor Recreation and Fish and Wildlife Management Programs outlined in the INRMP.

Base Police Department personnel currently conduct limited conservation law enforcement activities given the absence of a trained Conservation Officer. They are authorized to check anglers and hunters for the possession of required licenses and permits, and ensure they are abiding by state and federal fish and game regulations. They may also issue the sportsmen a ticket. The NRM and designated Game Check Station assistants are also responsible for reporting deviations from established regulations.

## **(2) Program Goals**

The goals of conservation law enforcement are to provide for the safe and lawful implementation of the hunting and fishing programs at NSFDL.

## **(3) Management Practices**

Current Police Department personnel are not trained in conservation law enforcement that includes attending annual wildlife law enforcement refresher training in order to stay abreast of changes in regulations and enforcement policies.

All sportsmen are subject to the rules established by the Commanding Officer. Violation of any federal, state, county, or Potomac River Fisheries Commission regulation may be cause for revocation of hunting and fishing privileges and/or prosecution in appropriate Federal or Commonwealth courts. The Base police may investigate alleged violations. Individuals violating established NSFDL rules and regulations shall be referred immediately to the three-person NSFDL Fish and Game Violations Committee for action. Committee members are the respective Natural Resources Managers at NSFDL and NSFIIH and the respective Environmental Site Manager. Individuals under investigation are not allowed to hunt or fish until the Committee deliberates their case.

**O. TRAINING OF NATURAL RESOURCES PERSONNEL**

A list of core training requirements is provided in OPNAVINST 5090.1E to ensure natural resources personnel are adequately trained in natural resources management. The following list of courses provides job-specific education and training that is required to perform assigned tasks. All training is based on the availability of funding; therefore, the completion of listed courses below may/may not be feasible.

OPNAVINST 5090.1E - Required Training for Natural Resources Managers

A. Civil Engineering Corps Officer's School Courses

1. Basic Environmental Law, course identification number (CIN): A 4A-0058
2. Environmental Protection, CIN: A-4A-0036
3. Introduction to NEPA, CIN: A-4A-0077
4. Natural Resources Compliance, CIN: A-4A-0087
5. Environmental Negotiation Workshop, CIN: A-4A-0067

B. Additional Training Requirements

1. Program Funding, EPR Web Online Training
2. Personnel responsible for federally-listed species management must also receive additional, specialized training, as applicable to their responsibilities
3. Personnel responsible for wetlands must also receive additional, specialized training, as applicable to their responsibilities

Relevant training certificates for the current designated NSFDL NRM are located in Appendix 8.

**P. COASTAL/MARINE MANAGEMENT**

**(1) Program Description**

The Federal CZMA allows states to develop comparable programs under Section 306. Virginia's Coastal Resources Management Program was approved under Section 306 in 1990. This permits state review of federal actions for consistency with its approved coastal management program. King George County is considered to be in the coastal area of Virginia's Management Area, or Tidewater Virginia (VDEQ 2007a).

Although federal lands are excluded from state-designated coastal resources management areas, activities on federal lands that are reasonably likely to affect land or water use or natural resources of coastal zones must be consistent, to the maximum extent practicable, with the enforceable policies of the state's coastal resources management program. Federal development projects inside the coastal zone are subject to consistency review and require a Federal Consistency Determination (FCD). In Virginia, the VDEQ and other Virginia agencies are responsible for the Coastal Resources Management Program. The VDEQ is the lead agency for conducting federal consistency reviews for activities affecting coastal management areas. A FCD is sent to the VDEQ, Office of Environmental Impact Review for concurrence. It may be sent as part of the NEPA process or can be sent as a stand-alone document.

Virginia's Chesapeake Bay Preservation Act defines Resource Protection Areas (RPAs) and Resource Management Areas (RMAs) in an effort to provide protection to the most vital areas within the state. In general, RPAs include tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams, tidal shores, and a 100-foot vegetated buffer area located adjacent to the above described wetlands. In King George County, all the remaining area is designated as RMAs. The Chesapeake Bay Preservation Act is promulgated through a county zoning ordinance. As such, federal agencies are not required to comply with this Act; however, the NSFDL environmental documents have addressed the requirements of this Act since its passage. NSFDL actions with potential to impact coastal zone resources are forwarded to the appropriate state agency for coastal zone consistency determination.

The Navy's extensive involvement in, and support for, the Chesapeake Bay Agreement is reflected by the establishment of a Navy Chesapeake Bay Program Office. NSFDL's location on a major tributary to the Chesapeake Bay, the Potomac River, makes it a major contributor to the program. This INRMP supports the ideals including riparian forest buffer enhancements, shoreline protection, reduced mowing, invasive species control, and habitat restoration outlined in the Chesapeake Bay Agreement.

Near shore areas are defined as all submerged lands titled to the military and all other submerged lands that are adjacent to installations that extend from the mean high-water level, offshore to the boundary of any security areas controlled by the military services. While NSFDL management responsibilities technically end at the mean high-water level along our shoreline, use of the PRTR by NSWCDD greatly expands our potential for impact into and beyond the near shore. The PRTR is 51 nautical miles long and covers 169

square nautical miles. It allows the Navy to conduct testing in a realistic, controlled environment by collecting real-time data from a number of instrumented stations. The affected environment, environmental impacts, cumulative impacts, and protective measures of these testing activities are thoroughly addressed in the NWSCDD EIS for Outdoor Research, Development, Test, and Evaluation Activities. The Record of Decision was signed in Nov 2013.

## **Q. FLOODPLAINS MANAGEMENT**

### **(1) Program Description**

The USACE 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 to the District Engineer. Floodplains receive additional protection through EO 11988 - Floodplain Management, which instructs federal agencies to restore and preserve floodplains and to reduce the risk of flood-related loss via changes in land use. If floodplain disturbance is unavoidable, appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken.

### **(2) Program Goals**

The overall goal of the Floodplains Management Program at NSFDL is to ensure the avoidance, protection, and restoration of floodplains in accordance with the CWA, EO 11988, and the Chesapeake Bay Agreement to the greatest extent practicable (Appendix 1A, G16).

### **(3) Management Practices**

Approximately 700 acres of NSFDL along the shores of the Potomac River, Upper Machodoc Creek, and Gambo Creek lie within the 100-year floodplain. Shore and wetland areas associated with the Potomac River, Upper Machodoc Creek, Gambo Creek, and unnamed tributaries to these waterways are mapped as a Chesapeake Bay RPAs by the Commonwealth of Virginia. Land use changes proposed in the 100-year floodplain are reviewed through the FCD and NEPA documentation process.

## **R. CULTURAL RESOURCES MANAGEMENT**

### **(1) Program Description**

The regulations and procedures in 36 CFR 800, which implements Section 106 of the NHPA, requires federal agencies to consider the effects on properties listed in or eligible for inclusion in the National Register. Prior to approval of any action with potential to impact these resources, Section 106 requires that the Advisory Council on Historic Preservation, represented by the Virginia

State Historic Preservation Office (SHPO), be afforded the opportunity to comment. In the Commonwealth of Virginia, the SHPO is within the Virginia Department of Historic Resources (VDHR). NSFDL currently has a cultural resources management program and Cultural Resources Manager that oversees the protection of these resources. An updated Integrated Cultural Resources Management Plan (ICRMP) was prepared in 2020 (USN 2020a) that addresses aspects of the program.

## **(2) Program Goals**

The goals of cultural resources management are to protect all significant cultural resources to the greatest extent practicable and meet the compliance requirements of federal laws and DoD policies.

## **(3) Management Practices**

Extensive archaeological survey work has been completed on Mainside. However, the presence of restricted areas and safety constraints prohibits subsurface archaeological investigations throughout a majority of Pumpkin Neck. All known sites have been mapped in the NSFDL GIS and are identified in the ICRMP. None of the archaeological sites are currently on the National Register of Historic Places (NRHP). However, some sites are potentially eligible for the NRHP and additional sites may be determined to be eligible following Phase II surveys. All-natural resources management activities that involve ground disturbance are coordinated with the NSFDL Cultural Resources Manager to ensure that archaeological resources are not affected.

### a. Archaeological Resources

The property at NSFDL has a rich historical and pre-historical past.

Prehistoric archaeological features are present from the Archaic, Woodland, and historic periods. Since the property lies on the Potomac River and its tidal tributaries, it is likely that trading between Indians and early European settlers took place within or nearby the Dahlgren property. The property also contains sites of historical significance from the eighteenth through the twentieth century. Based on previous surveys conducted during the 1990s up to the present, approximately 40 archaeological sites have been identified and formally recorded at Mainside and Pumpkin Neck. These sites include both prehistoric and historic archaeological resources that range in occupation from the early Middle Archaic subperiod through the early twentieth century.



b. Architectural Resources

Establishment of NSFDL in 1918 is recognized as a significant event in our nation's history. As a result of historic architectural surveys conducted, two National Register-eligible Historic Districts have been identified. These districts are the Dahlgren Residential Historic District and the Dahlgren Mainside Historic District that contains four non-contiguous areas which are the Airfield Area, the Main Battery Area, the Wharf Area and the Ammunition Handling area.

**S. IMPLEMENTATION**

**(1) Preparing Prescriptions That Drive the Projects**

During development of this INRMP, the working group members have defined goals, identified legal drivers, and collaborated to develop natural resources management objectives at NSFDL. A list of projects, actions, and management strategies necessary to meet these goals and objectives were also developed. Detailed prescriptions including management actions, cost estimates, funding classification, and an implementation schedule are provided in the Appendices.

The INRMP is considered implemented if the installation

- actively requests, receives, and uses funds for all Level 4 projects and activities;
- ensures that sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP;
- coordinates annually with all cooperating offices; and
- documents specific INRMP action accomplishments undertaken each year.

**(2) Achieving No Net Loss**

The Sikes Act states that an INRMP shall provide for no net loss in the capability of military installation lands to support the military mission of the installation. Therefore, mission requirements and considerations have been integrated into this INRMP and the capability to support the mission is a natural resources priority.

### **(3) Use of Cooperative Agreements**

Per DoDI 4715.03, DoD installations may enter into cooperative agreements with states, land-grant universities, local governments, nongovernmental organizations, and individuals to provide for the maintenance and improvement of natural resources or conservation research on or off DoD installations. A Cooperative Agreement is used to carry out an activity undertaken for public purpose. Use of cooperative agreements requires substantial involvement between the federal agency and cooperator during performance of the activity. Sikes Act Cooperative Agreements may be used to accomplish work identified in the INRMP and such partnerships may be entered into with state and local governments, nonprofit organizations, and universities to provide for the maintenance and improvement of natural resources or to benefit natural resources research on DoD installations. Cooperative agreements authorized by the Sikes Act are not subject to the provisions of the Federal Grant and Cooperative Agreement Act but must comply with the procedural requirements of the DoD Grant and Cooperative Agreement Regulations. Funds approved for a particular fiscal year may be obligated to cover the costs of assistance provided under a cooperative agreement during any 18-month period beginning in that fiscal year in accordance with the Sikes Act. Using cooperative agreements to accomplish projects is an efficient means to implement INRMPs and can be administered through NAVFAC Washington.

### **(4) Use of Cooperative Ecosystem Studies Units**

The purpose of the Cooperative Ecosystem Studies Unit (CESU) National Network is to provide coordinated research, technical, and educational assistance to federal agencies and their partners for natural and cultural resources through a network of 17 regional partnerships. The scope includes the biological, physical, social, and cultural sciences needed to address natural and cultural resource management issues at multiple scales and in an ecosystem context. DoD is currently a member of all 17 CESU regions. Each CESU is competitively developed under a single cooperative agreement based on the need of INRMP approved projects. DoD and host university/partner universities collaborate on specific projects with the host/partner universities providing space, faculty expertise, students and educational services while DoD provides scientists and funding. CESU objectives include the following:

- Provide resource managers with high-quality scientific research, technical assistance, and education.

- Deliver research and technical assistance that is timely, relevant to resource managers, and needed to develop and implement sound adaptive management approaches.
- Ensure the independence and objectivity of research.
- Create and maintain effective partnerships among federal agencies and universities to share resources and expertise.
- Take full advantage of university resources while benefiting faculty and students.
- Encourage professional development of federal scientists.
- Manage federal science resources efficiently.

Using CESUs to accomplish projects is another efficient means to implement INRMPs and can be administered through the NAVFAC Washington Regional Natural Resources Office.

#### **(5) Appropriated Funding**

Appropriated funding accounts for most of the total expenditures of the NSFDL natural resources program. The main source of appropriated funding at NSFDL is Operations and Maintenance, Navy (O&MN) appropriations. These funds support salaries, materials procurement, contracts support, travel, and training. In addition, the DoD Legacy Program was established to develop and fund natural and cultural resources stewardship projects at the regional level. DoD Legacy Program Projects are funded with DoD O&MN appropriations.

Per DoDI 4715.03, the Office of Management and Budget and the USEPA require federal agencies to classify natural resources projects based in part on compliance requirements. Navy funding classification consists of four Environmental Readiness Levels

(ERLs). ERL4 are "must fund" conservation requirements that are required to meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including EOs.

Specifically, ERL4:

- supports all actions specifically required by law, regulation or EO;

- supports all DoD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, reporting and record keeping;
- supports recurring administrative, personnel, and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements;
- supports DoD policy requirement to comply with overseas Final Governing Standards and Overseas Environmental Baseline Guidance Document; and
- 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:

- supports all capabilities provided by ERL4;
- 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; and
- supports proactive initiatives critical to the protection of Navy operational readiness.

ERL 2:

- supports all capabilities provided under ERL3;
- supports enhanced proactive initiatives critical to the protection of Navy operational readiness;
- supports all Navy and DoD policy requirements; and

- supports investments in pollution reduction, compliance enhancement, energy conservation and cost reduction.

ERL 1:

- supports all capabilities provided under ERL2;
- supports proactive actions required to ensure compliance with pending/strong anticipated laws and regulations in a timely manner and/or to prevent adverse impact to Navy mission; and
- supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

An additional assessment level is assigned to projects to assist in recognizing appropriate funding sources in environmental program requirements exhibit. The following descriptions of Navy Assessment Levels are summarized from the Navy Environmental Requirements Guidebook (CNO 2003).

- Level 1 requirements are prescribed by state or federal laws, regulations, and EOs.
- Level 2 requirements are derived from DoD or Navy policy.
- Level 3 requirements are for pending regulations.
- Level 4 requirements meet future requirements.
- Level 5 requirements are leadership initiatives.

All conservation, compliance, and stewardship projects must be entered into the Environmental Projects Request (EPR)-web and receive approval up the chain of command. When INRMP projects are entered in EPR-web, all INRMP conservation project requirements will automatically be submitted for consideration and tracked during the development of the Shore Environmental Quality (Shore EQ) program Baseline Assessment Memorandum (BAM) and annual review process. The CNO N45 is the final authority for designating the appropriate ERL.

#### **(6) Non-Appropriated Funds**

Non-appropriated funds are raised through user fees, timber sales, and land leases (e.g., agricultural outleasing) and are not appropriated by Congress. These funds do not expire at the end of

each fiscal year as do most appropriated funds. Non-appropriated funding sources include the following:

**Forestry Revenues.** Revenues from the sale of forest products on Navy lands are a source of funding for two different funding programs: (1) Annual Navy Forest Funds and (2) DoD Forestry Reserve Account. Annual Navy Forestry Funds are supported by revenues derived from commercial forestry operations on participating DoD installations. Installations participating in the forestry program must submit an annual budget (increment) for the following fiscal year (FY) to the NAVFAC Forester by 1 September of the previous year. The annual increment supports commercial forestry operations at installations (which must also be identified in an approved management plan). Forty percent of installation net proceeds are also distributed to the counties within which a military installation is located. Once the commercial forestry expenses are reimbursed and the distribution has been made to the counties, any remaining funds are transferred to the DoD Forestry Reserve Account.

The DoD Forestry Reserve Account may be used for improvements of forest lands, unanticipated contingencies in the administration of forest lands, the production of forest products for which other sources of funds are not available in a timely manner, and for natural resources management that implements approved plans and agreements. NAVFAC usually solicits project proposals for the Forestry Reserve Account once there is an indication of the level of funding available (usually January or February). Proposals submitted to NAVFAC are reviewed by the NAVFAC HQ before being forwarded to the DoD Forestry subcommittee (comprised of the HQ level Forester from each of the four military services and the OSD NRM) for final selection. Installations need not harvest timber to be eligible for DoD Forestry Reserve Account funds.

**Navy Agricultural Outleasing.** Money collected through the leasing of Navy-owned property for agricultural use is directed back into the natural resources program and reallocated throughout the Navy by NAVFAC HQ. Priority is given to those actions that support the Agriculture outleasing program.

**Sikes Act Fees Account.** User fees collected for the privilege of hunting, fishing, or trapping are collected, deposited, and expended in accordance with the Sikes Act and the DoD financial management regulations. They may be used only for the protection, conservation, and management of fish and wildlife such as habitat improvement and related activities. These funds are collected by MWR and maintained in an onsite account for use at the installation.

**Recycling Funds.** Installations with a Qualified Recycling Program (QRP) may use proceeds for some types of natural resource projects. Proceeds must first be used to cover QRP costs then up to 50 percent of net proceeds may then be used for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support and vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation's pollution prevention plans. Natural resource projects could be funded as pollution prevention/abatement such as wetlands or riparian forest restoration or outdoor recreation projects such as trail construction and maintenance.

**Alternative Funding Sources.** Other special DoD initiatives to fund natural resources projects also become available on a limited basis from time to time. The most appropriate special initiatives currently available for natural resources management are Legacy Resources Management Program (Legacy), SERDP/ESTCP, and non-DoD funds.

The Legacy fund is a special congressionally mandated initiative to fund military conservation projects. See <http://www.denix.osd.mil/nr/Legacy/ProjectFactSheets.cfm>. SERDP and ESTCP are DoD's environmental research programs, harnessing the latest science and technology to improve DoD's environmental performance, reduce costs, and enhance and sustain mission capabilities. See <http://www.serdp.org/>. Funds from non-DoD grant programs provide financial support for natural resources management projects. They include Sustaining Our Forests, Preserving Our Future, and National Public Lands Day to name a few.

A project proposal must be submitted in order to be eligible for Legacy funds, Annual Navy Forest funds, or DoD Forestry Reserve Account funds. Across the Navy, projects are prioritized and funded annually. It is required by the Sikes Act and is Navy policy to include noncompliance/stewardship-type projects that may be associated with forestry, fish and wildlife, or Legacy funding criteria in the list of projects recommended in this INRMP.

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#### **4. ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY**

##### **A. NATURAL RESOURCES CONSULTATION AND PERMITTING REQUIREMENTS**

A number of state and federal laws and executive orders, including the ESA, BGEPA, CWA, CZMA, MBTA, Marine Mammal Protection Act (MMPA), and Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) require consultation with a designated federal regulatory agency such as USFWS, National Marine Fisheries Service (NMFS), or the U.S. Army Corps of Engineers (USACE) if a federal action has the potential to adversely impact a regulated resource.

##### **(1) Endangered Species Act**

Under the ESA, each federal agency must consult with the USFWS and/or NMFS to ensure that its actions are not likely to threaten the continued existence of any threatened or endangered species or result in the destruction or adverse modification of habitat of such species. Section 7 of the ESA 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 USFWS/NMFS if an action may affect a listed species. The federally-listed endangered Atlantic and shortnose sturgeons are known to inhabit the waters off the shore of the installation and must also be considered during actions that may affect near-by aquatic habitats.

The federally-listed threatened northern long-eared bat has not been identified at NSFDL through multiple survey efforts. However, NSFDL falls within the white nose syndrome (WNS) zone and actions mainly related to tree removal must be addressed through the 4(d) rule. Federal agency actions that involve incidental take not prohibited under the final 4(d) rule may result in effects to individual northern long-eared bats. Per Section 7 of the ESA, if a federal agency's action may affect a listed species, consultation with USFWS is required. This requirement does not change when a 4(d) rule is implemented. However, for this 4(d) rule, USFWS created a framework to streamline Section 7 consultations when federal actions may affect the northern long-eared bat but will not cause prohibited take. Federal agencies have the option to rely upon the finding of the programmatic biological opinion for the final 4(d) rule to fulfill their project-specific Section 7 responsibilities by using the framework (USFWS 2016b).

The USFWS has developed an Online Project Review Process (<https://www.fws.gov/northeast/virginiafield/endangered/projectreviews.html>) that generates an official species list, critical habitat, and bald eagle nest and concentration area requirements for proposed actions submitted by project proponents. This allows timely reviews for species under their jurisdiction. Consultation with NMFS for species under their jurisdiction is conducted through written correspondence.

### **(2) Bald and Golden Eagle Protection Act**

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d) prohibits take of bald eagles and golden eagles (*Aquila chrysaetos*) except pursuant to federal regulations. The taking of bald and golden eagles includes possession and transportation of birds and their parts, nests, and eggs for scientific, educational, and depredation control purposes. BGEPA authorizes the Secretary of the Interior to issue regulations to permit the "taking" of eagles for various purposes, including the protection of "other interests in any particular locality" (16 U.S.C. 668a), provided the taking is compatible with the preservation of eagles. In 2009, USFWS promulgated regulations at 50 CFR Part 22 that established two new permit types for take of eagles and eagle nests (74 FR 46836; 11 September 2009; Eagle Permit Rule). One permit authorizes, under limited circumstances, the take (i.e., removal, relocation, or destruction) of eagle nests (50 CFR 22.27). The other permit type authorizes non-purposeful take (i.e., disturbance, injury, or killing) of eagles (50 CFR 22.26) where the take is incidental to an otherwise lawful activity. While the bald eagle was listed under the ESA, the USFWS authorized incidental take of bald eagles through take statements under ESA Section 7 and through Section 10 incidental take permits. In May 2008, a final rule extended BGEPA authorizations to holders of existing ESA authorizations (FR Vol. 73, No. 98). Annual aerial and ground surveys are conducted to assess nest productivity and exclusion zones are enforced during the nesting season to minimize disturbances.

### **(3) Clean Water Act**

Under Section 404 of the CWA, discharge of dredge and fill material into waters of the United States, including wetlands, is prohibited unless a permit is issued by the USACE. MILCON and other activities at NSFDL with the potential to disturb wetlands must be reviewed individually with regard to wetland impacts, and federal and state permits are sought as needed. A permit application is submitted to the Virginia Marine Resource Commission (VMRC) who acts as the clearinghouse for this regulatory process. The VMRC forwards the permit application to USACE, Virginia Department of Environmental

Quality (VDEQ), and the King George County Wetlands Board (KGCWB). A jurisdictional determination is required from each agency to accomplish the regulatory process.

**(4) Executive Order 11990, Protection of Wetlands**

EO 11990 requires that federal agencies adopt a policy to avoid, to the extent possible, long- and short-term adverse impacts associated with destruction and modification of wetlands and to avoid the direct and indirect support of new construction in wetlands whenever there is a practicable alternative. In support of the Navy's goal of "no net loss of wetlands," all Navy construction and operational actions must avoid adverse impacts on, or destruction of, wetlands. If this is impossible, then designs shall be made to minimize wetland degradation and shall include mitigation to replace affected wetlands in another location.

**(5) Executive Order 11988, Floodplain Management**

EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development unless it is the only practicable alternative. Flood potential of a site is usually determined by the 100-year floodplain, which is defined as the area that has a one-percent chance of inundation by a flood event in a given year.

**(6) Rivers and Harbors Act of 1899**

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through the USACE, for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States and applies to all structures from the smallest floating dock to the largest commercial undertaking. Examples of regulated activities include construction of wires and cables over the water and pipes; cables or tunnels under the water; dredging and excavation; any obstruction or alteration of navigable waters; depositing fill and dredged material; filling of wetlands adjacent or contiguous to waters of the United States; construction of riprap, revetments, groins, breakwaters, and levees; and transportation of dredged material for dumping into ocean waters.

**(7) Coastal Zone Management Act (CZMA)**

The Federal CZMA allows states to develop comparable programs under Section 306. Virginia's Coastal Resources Management Program was approved under Section 306 in 1990. This permits state review of federal actions for consistency with its approved coastal management program. King George County is considered to be in the coastal area of Virginia's Management Area, or Tidewater Virginia (VDEQ 2007a).

Although federal lands are excluded from state-designated coastal resources management areas, activities on federal lands that are reasonably likely to affect land or water use or natural resources of coastal zones must be consistent, to the maximum extent practicable, with the enforceable policies of the state's coastal resources management program. Federal development projects inside the coastal zone are subject to consistency review and require a Federal Consistency Determination (FCD). In Virginia, the VDEQ and other Virginia agencies are responsible for the Coastal Resources Management Program. The VDEQ is the lead agency for conducting federal consistency reviews for activities affecting coastal management areas. An FCD is sent to the VDEQ, Office of Environmental Impact Review for concurrence. It may be sent as part of the NEPA process or can be sent as a stand-alone document.

Virginia's Chesapeake Bay Preservation Act defines Resource Protection Areas (RPAs) and Resource Management Areas (RMAs) in an effort to provide protection to the most vital areas within the state. In general, RPAs include tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams, tidal shores, and a 100-foot vegetated buffer area located adjacent to the above described wetlands. In King George County, all the remaining area is designated as RMAs. The Chesapeake Bay Preservation Act is promulgated through a county zoning ordinance. As such, federal agencies are not required to comply with this Act; however, the NSFDL environmental documents have addressed the requirements of this Act since its passage. NSFDL actions with potential to impact coastal zone resources are forwarded to the appropriate state agency for coastal zone consistency determination.

**(8) Migratory Bird Treaty Act**

The MBTA protects migratory birds and their habitats and establishes a regulatory permitting process for legal taking. Prohibited actions include the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests.

A large number of migratory birds are known to occur in the vicinity of NSFDL. Methods for avoiding incidental take during air operations are outlined in Section 4.L. and in the NSASP BASH Instruction (see 3). Natural resources actions geared toward the management and enhancement of migratory bird habitat is discussed in Section 3.F.

**(9) Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds**

EO 13186 directs executive departments and agencies to take certain actions to further implement the MBTA. The EO requires that each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within two years, a MOU with the USFWS that shall promote the conservation of migratory bird populations.

a. Fiscal Year (FY) 2003 National Defense Authorization Act - Military Readiness Activities

While some courts had held that MBTA did not apply to the federal agencies, in July 2000, the United States Court of Appeals for the District of Columbia ruled that federal agencies are subject to the take prohibitions of the MBTA. In May 2002, the CBD obtained an injunction prohibiting live-fire military training exercises by the Navy that killed migratory birds on the island of Farallon de Medinilla in the Pacific Ocean. In December 2002, following a series of legal determinations on the case from the District Court for the District of Columbia and the Circuit Court, Congress authorized (in the FY2003 National Defense Authorization Act, Section 315) an interim period during which the prohibitions on incidental take of migratory birds would not apply to otherwise authorized military readiness activities. Congress believed the authorization to be an appropriate balance between the needs of national security and those of bird conservation. The final rule was published in the Federal Register on 28 February 2007. The measure directs DoD to assess the effects of military readiness activities on migratory birds, in accordance with NEPA. It also requires DoD to develop and implement appropriate conservation measures if a proposed action may have a significant adverse effect on a migratory bird population. The rule also provides that when conservation measures require monitoring of migratory bird populations, DoD retain the data for five years.

b. Memorandum of Understanding (MOU) - Military Non-Readiness Activities

On 31 July 2006, DoD and USFWS entered into a MOU to Promote the Conservation of Migratory Birds, in accordance with EO 13186,

Responsibilities of Federal Agencies to Protect Migratory Birds. This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD operations—other than military readiness activities—are consistent with the MBTA. The MOU also describes how USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; USFWS, however, may develop incidental take authorization for federal agencies that complete an EO MOU. It strongly encourages all DoD personnel to work cooperatively with USFWS to implement the actions described in the MOU and to take steps to further migratory bird conservation. This MOU specifically pertains to the following categories of DoD activities:

- natural resources management activities, including but not limited to, habitat management, erosion control, forestry activities, agricultural outleasing, conservation law enforcement, invasive weed management, and prescribed burning
- installation support functions, including but not limited to, the maintenance, construction or operation of administrative offices, military exchanges, road construction, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, non-tactical equipment, laundries, morale, welfare, and recreation activities, shops, landscaping, and mess halls
- operation of industrial activities
- construction or demolition of facilities relating to these routine operations
- hazardous waste cleanup

The 2014 MOU between DoD and the USFWS describes specific actions that DoD should take to advance migratory bird conservation, reasonably avoid or minimize the take of migratory birds, and ensure DoD activities (excluding military readiness) comply with the MBTA in ways that are “consistent with imperatives of safety and security.” In addition, Armed Forces must ensure that its operations are consistent with the MBTA and, in ways that help sustain the use of military managed lands and airspace for testing, training, and operations, should avoid or minimize the take of

migratory birds and advance migratory bird conservation through its natural resources management activities.

c. Deputy Assistant Secretary of Defense (DASD) Memo on Incidental Take of Migratory Birds

The DASD memo as of 06 February 2018, Incidental Take of Migratory Birds, provided DoD guidance in response to the U.S. Department of the Interior's Office of the Solicitor issued Solicitor's Opinion M-37050. The opinion stated that the MBTA prohibition on the "taking" or "killing" of migratory birds applies only to deliberate acts intended to take migratory birds, their nests, or their eggs. This opinion permanently withdraws and replaces Solicitor's Opinion M-37041 (issued 10 January 2017 and suspended pending review on 06 February 2017).

Per DASD, this opinion alone does not rescind the "military readiness rule" (50 CFR Part 21.15), Part 315 of the Bob Stump National Defense Authorization Act for FY2003, EO 13186, or the resulting MOU with USFWS. Neither does it address the split of opinions among the five Circuit Courts of Appeal that have addressed the question of whether the MBTA criminalizes some instances of incidental take, an issue that can be resolved only by U.S. Supreme Court review or congressional action. Consequently, DASD advises that until further clarification is provided, the Military Departments should continue to follow existing DoD guidance designed to minimize—to the extent practicable and without diminishing the effectiveness of military readiness activities—the incidental take of migratory birds.

**(10) Marine Mammal Protection Act**

The MMPA established a moratorium on the "taking" of marine mammals in waters or on lands under the jurisdiction of the United States (16 U.S.C. Section 1361). The MMPA defines a take as "to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal" (16 USC Section 1312[13]). It also prohibits the importation of any marine mammal or marine mammal parts into the United States, unless it is for the purpose of scientific research or public display, as permitted by the Secretary of Commerce or Secretary of the Interior.

Formal transect surveys are conducted by the Potomac-Chesapeake Dolphin Project at the confluence of the Potomac River and Chesapeake Bay but not further up river. Citizen science sightings collected in the Dolphin Watch App have identified common bottlenose dolphin (*Tursiops truncatus*) presence within the PRTR between 2015-2020 with one sighting as far north as the Nice-Middleton bridge in 2017. Sightings have been consistent in the

vicinity of Coles Point. The Potomac-Chesapeake Dolphin Project lead by Duke University deployed acoustical receivers in 2019 and 2020 along the Potomac River to track dolphin presence and will provide the results in 2021 (Wray 2020).

**(11) Magnuson-Stevens Fishery Conservation and Management Act**

The MSFCMA sets mandates for the NMFS, regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The councils, with assistance from NMFS, are required to delineate EFH in fishery management plans or fishery management plan amendments for all managed species. Authority to implement the MSFCMA is given to the Secretary of Commerce through the NMFS and requires that the EFH be identified and described for each federally managed species. The MSFCMA requires federal agencies to consult with the NOAA NMFS on actions that may reduce the quality or quantity of an EFH, as required by 50 CFR Sections 600.905-930, and OPNAV ltr 5090 Ser N456M/11U1588080 of 22 March 2011, Essential Fish Habitat Assessments and Consultations (USN 2019a). EFH assessments must be commensurate with anticipated effects (i.e., complexity and magnitude) and contain the requirements (e.g., elements, level of detail, maps) outlined in 50 CFR Section 600.920, paragraphs (e)(3) and (e)(4), and in OPNAV ltr 5090 Ser N456M/11U1588080 of 22 March 2011, Essential Fish Habitat Assessments and Consultations (USN 2019a).

EFH has been designated for eight species in the Potomac River including windowpane flounder (*Scopthalmus aquosus*), summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix*), Atlantic herring (*Clupea harengus*), red hake (*Urophycis chuss*), little skate (*Leucoraja erinacea*), winter skate (*leucoraja ocellata*), and clearnose skate (*Raja eglanteria*). Three additional species, Atlantic butterfish (*Peprilus triacanthus*), scup (*Stenotomus chrysops*), and black sea bass (*Centropristis striata*) have EFH designation at the confluence of the Potomac River and the Chesapeake Bay which is the eastern boundary of the Lower Danger Zone of the PRTR but which is not currently utilized. Military operations, shoreline stabilization and other construction projects at NSFDL with potential to adversely affect EFH requires consultation with NMFS.

These designations are based on the NOAA EFH mapper tool located at (<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>) which states the following, "Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data cannot fully



represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert." The consultation process is initiated using the NOAA Fisheries Greater Atlantic Regional Fisheries Office Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Worksheet and adhering to the guidelines on NOAA's EFH website (MAFMC 1998a and 1998b, NEFMC 2017; Appendix 2B).

#### **(12) Fish and Wildlife Coordination Act (FWCA)**

The Fish and Wildlife Coordination Act (FWCA), as amended in 1964, requires that all federal agencies consult with NOAA NMFS when proposed actions might result in modifications to a natural stream or body of water. Under this authority, NOAA NMFS works to protect, conserve, and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not managed by the federal fishery management councils and do not have designated EFH. NSFDL serves as important habitat for many aquatic species and their forage, including alewife (*Alosa pseudoharengus*), blueback herring (*A. aestivalis*), striped bass (*Morone saxatilis*), American eel (*Anguilla rostrata*), and other assorted baitfish and invertebrates. As part of the consultation, the Navy must provide NOAA NMFS with the information necessary to make FWCA recommendations. The information provided during the EFH consultation process is generally adequate for NOAA NMFS to make determinations and offer recommendations under the FWCA. The NSFDL NRM shall consult with NOAA NMFS for proposed actions within Gambo and Upper Machodoc Creeks and the Potomac River.

#### **(13) Clean Air Act**

The Clean Air Act (CAA); 42 U.S.C. Section 7401 et seq. [1970]), is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorizes the USEPA to establish National Ambient Air Quality Standards to protect public health and public welfare and to regulate emissions of hazardous air pollutants. The NSFDL Air Program Manager is responsible for ensuring compliance with the CAA at the installation. The NRM will discuss potential CAA impacts related to natural resources projects with the Air Program Manager as necessary. CAA consultation, if required, would be conducted by the Air Program Manager.

**(14) National Historic Preservation Act**

Section 106 of the NHPA (16 U.S.C. Section 470f) requires federal agencies to take into account the effects of their undertakings on historic properties. Historic properties in this instance include both standing structures and archaeological resources. The Section 106 process involves efforts to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties. The NSFDL CRM is responsible for ensuring compliance with the NHPA at the installation. The NRM will discuss potential NHPA impacts related to natural resources projects with the CRM as necessary. NHPA consultation with the MHT, State Historic Preservation Officer, if required, would be conducted by the CRM.

**(15) Archaeological Resources Protection Act**

The Archaeological Resources Protection Act (ARPA); 16 U.S.C. Section 470aa-470mm) governs the excavation of archaeological sites on federal and Indian lands in the United States. The ARPA also governs the removal and disposition of archaeological resources collected at these sites. The NSFDL CRM is responsible for ensuring compliance with the ARPA at the installation. The NRM will discuss potential ARPA impacts related to natural resources projects with the CRM as necessary. ARPA consultation, if required, would be conducted by the CRM.

**B. PLANNING FOR NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE**

The NEPA of 1969, 42 USC §4232 et seq., requires all federal agencies take into consideration the potential environmental consequences of proposed actions in their decision-making process. The objectives of NEPA are to ensure the government makes informed decisions and the public is included in the decision-making process, and that all reasonable alternatives for an action are considered.

The Secretary of the Navy Instruction (SECNAVINST) 5090.6A and OPNAVINST 5090.1E establish Navy policy, procedures, and responsibilities for NEPA documentation for Navy actions. It is Navy policy to initiate the NEPA process at the earliest possible time to be an effective decision-making tool when identifying a proposed action and to develop and carefully consider a reasonable range of alternatives for achieving the purpose of the proposed action.

NEPA is a procedural law that requires review and compliance with other laws. These include, but are not limited to, the CAA, CWA,

CZMA, the NHPA, the Marine Protection, Research and Sanctuaries Act (MPRSA), and the ESA.

Per Section 102 of NEPA, all agencies of the federal government must address the following environmental planning requirements:

- Utilize a systematic, interdisciplinary approach to ensure the consideration of natural resources and the environment in planning and decision making.
- Prepare a detailed statement (i.e., an environmental impact statement) for major federal actions significantly affecting the quality of the environment.
- Study, develop, and describe appropriate alternatives to actions that use or impact natural resources or the environment.
- Recognize the worldwide and long-range character or environmental problems.
- Initiate and utilize ecological information in the planning and development of resource-oriented projects.

To ensure compliance with NEPA and other substantive regulations, the proponent of any action at NSFDL with potential to impact the environment or may require state or federal permits must contact the NSFDL NEPA Program Manager. Project review and oversight was formalized and markedly improved with the development of the Comprehensive Work Approval Process (CWAP) in 2010. The CWAP provides a framework for documenting institutional decisions to invoke categorical exclusions and initiating the development of EAs and, if necessary, environmental impact statements. The CWAP also considers the cumulative, long-term effects of activities at NSFDL.

## **C. SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT**

### **(1) Military Mission and Sustainable Land Use**

One of the primary goals at NSFDL is to integrate natural resources management responsibilities with military activities, installation planning and programming, and other activities to ensure no net loss to the Navy mission (Appendix 1A, G1). Mission requirements are met through the protection and enhancement of significant resources such as wetlands and habitat for migratory birds and other at-risk species, as well as the maintenance of range areas

through prescribed burning and periodic mowing. Sustainable management of these resources helps ensure compliance with environmental laws and regulations and the continued availability of training lands.

## **(2) Defining Impact to the Military Mission**

Plant and wildlife populations (specifically federally-listed threatened or endangered species) and migratory bird species, and wetlands are the primary natural resources at NSFDL with potential to impact the military mission. Natural resources management efforts are focused on reducing these impacts.

The Atlantic and shortnose sturgeons, rusty patched bumble bee, northern long-eared bat, and the sensitive joint-vetch are currently the only federally listed species that may potentially occur on or adjacent to NSFDL.

Bald eagles were delisted in 2007 but still receive protection under the BGEPA, MBTA, and the Lacey Act. Potential impacts to the mission from bald eagles include restrictions on activities within protection zones around existing and new nest sites, which are shown in Figure 3-2. A Bald Eagle Management Plan (USN 2007b) and Assessment of Vulnerabilities of Bald Eagles to Outdoor Testing (USN 2007d) were prepared for NSFDL in 2007 to identify potential mission activity impacts and required mitigation measures. While the Bald Eagle Management Plan has not been formally updated since, the NRM develops new annual nest maps and enforces eagle nest protection zones (PZ) at 660 and 1000 foot buffers depending on the activity. NWSCDD's Environmental Impact Statement that covered testing activities in the Potomac River Test Range (USN 2013a) also assessed any impacts to bald eagles. The same best management practices detailed in the original Bald Eagle Management Plan continue to be incorporated in updates to the RCA and associated SOPs, construction, demolition and renovation projects and helicopter/UAV operations. To date there have been no impacts to activities listed above that have resulted in a net loss to the military mission. See Appendix 6 for a copy of the NSFDL Bald Eagle Management Plan and regional USFWS guidelines for compliance with the BGEPA.

Atlantic and shortnose sturgeon, documented in low numbers in adjacent waterways, are addressed in a Biological Assessment that was prepared for NWSCDD's Environmental Impact Statement that covered testing activities in the Potomac River Test Range (USN 2013a). A Legacy Program project proposal was submitted in 2018 to obtain more information on the use of the Potomac River by the sturgeon species to fill in data gaps. Unfortunately, the project

was not funded by the legacy program, but an EPR approved project was funded in FY20 for a one and a half year study to improve the Navy and scientific community's understanding of sturgeon distribution in the Potomac River. ESA Section 7 consultation shall be conducted with the NOAA NMFS prior to conducting activities, projects, or training in the Potomac River and Upper Machodoc and Gambo Creeks that have the potential to adversely affect the Atlantic and/or shortnose sturgeons. Based on the type of activity proposed, time-of-year restrictions may be required by NOAA NMFS for in-water work.

The USFWS listed the northern long-eared bat as a threatened species under the ESA in April 2015. The final 4(d) rule became effective 16 February 2016. Federal agency actions that involve incidental take not prohibited under the 4(d) rule may still affect individual northern long-eared bats. Per Section 7 of the ESA, if a federal agency's action may affect a listed species, consultation with USFWS is required. This requirement does not change when a 4(d) rule is implemented. However, for this 4(d) rule, USFWS provided a framework to streamline Section 7 consultations when federal actions may affect the northern long-eared bat but will not cause prohibited take. Federal agencies have the option to rely upon the finding of the programmatic biological opinion for the final 4(d) rule to fulfill their project-specific Section 7 responsibilities by using the streamlined framework. To determine whether a project fits into the streamlined framework and to obtain a letter of determination from USFWS, the agency may use the IPAC Determination Key located at <https://ecos.fws.gov/ipac/> (USFWS 2019). Based on the ruling, 4(d) Section 7 streamlined consultation is still required at NSFDL for activities described below, even if the species has not been identified at the base since it is within the USFWS's WNS Zone.

Mist netting conducted in 2017 and 2019 and acoustic monitoring conducted between 2014-2020 has not identified the Northern long-eared bat but has identified the presence of other bat species including the little brown and tricolored. The existing forests at NSFDL do not provide landscape features necessary to provide suitable habitat for fall swarming and hibernacula sites. However, the forests do provide suitable summer roosting and maternity colony sites. Therefore, training, operations, and projects conducted from 01 June-31 July that require forest clearing will require the 4(d) Section 7 streamlined consultation.

A 2017 sensitive joint-vetch survey resulted in no specimens being found. The investigator noted that most of the marshes surveyed did not have potential to support this species and that any future

surveys should concentrate on the upper reaches of Gambo Creek and Black Marsh.

A rusty patched bumble bee survey is scheduled to take place in the spring and summer of 2021. The historic distribution of the species does not overlap with NSFDL but is close enough to warrant targeted surveys.

The occurrence of wetlands on a future construction project may impact the installation's ability to proceed with planned development. Under the CWA, a jurisdictional determination and appropriate permits must be obtained from USACE and MDE Wetland and Waterways Program if impacts to wetlands cannot be avoided. Wetland permit application fees and compensatory wetland mitigation may also be required. Spotted turtles used the extensive forested wetlands located at NSFDL which will continue to be surveyed.

### **(3) Relationship to Other Operational Plans**

#### **a. Installation Development Plan (IDP)**

The NSASP IDP is a consolidated planning document that integrates strategic planning and real property development to meet current and projected mission needs at the installation. The IDP was developed to achieve feasible and implementable planning solutions influenced by mission excellence and fiscal realities. Based on stakeholder interviews and interactive workshops, the IDP provides the NSASPICO, NSFDL PWD, NAVFAC, and tenant commands with a clear picture of master planning priorities and actions over the short-, mid-, and long-term planning horizons (five, ten, and 20 years, respectively; USN 2019e).

#### **b. Bird/Animal Strike Hazard Reduction Program**

The NSASP Bird/Animal Strike Hazard (BASH) Reduction Instruction was updated in 2016 (Appendix 3). The instruction and accompanying appendices identify specific areas of concern, designates responsibilities to various offices and activities, and provides management recommendations to reduce bird and wildlife strikes to aircraft. The airfield was decommissioned for fixed wing aircraft due to runway complex not meeting FAA standards and is now restricted to rotary wing use only.

#### **c. Environmental Restoration Program**

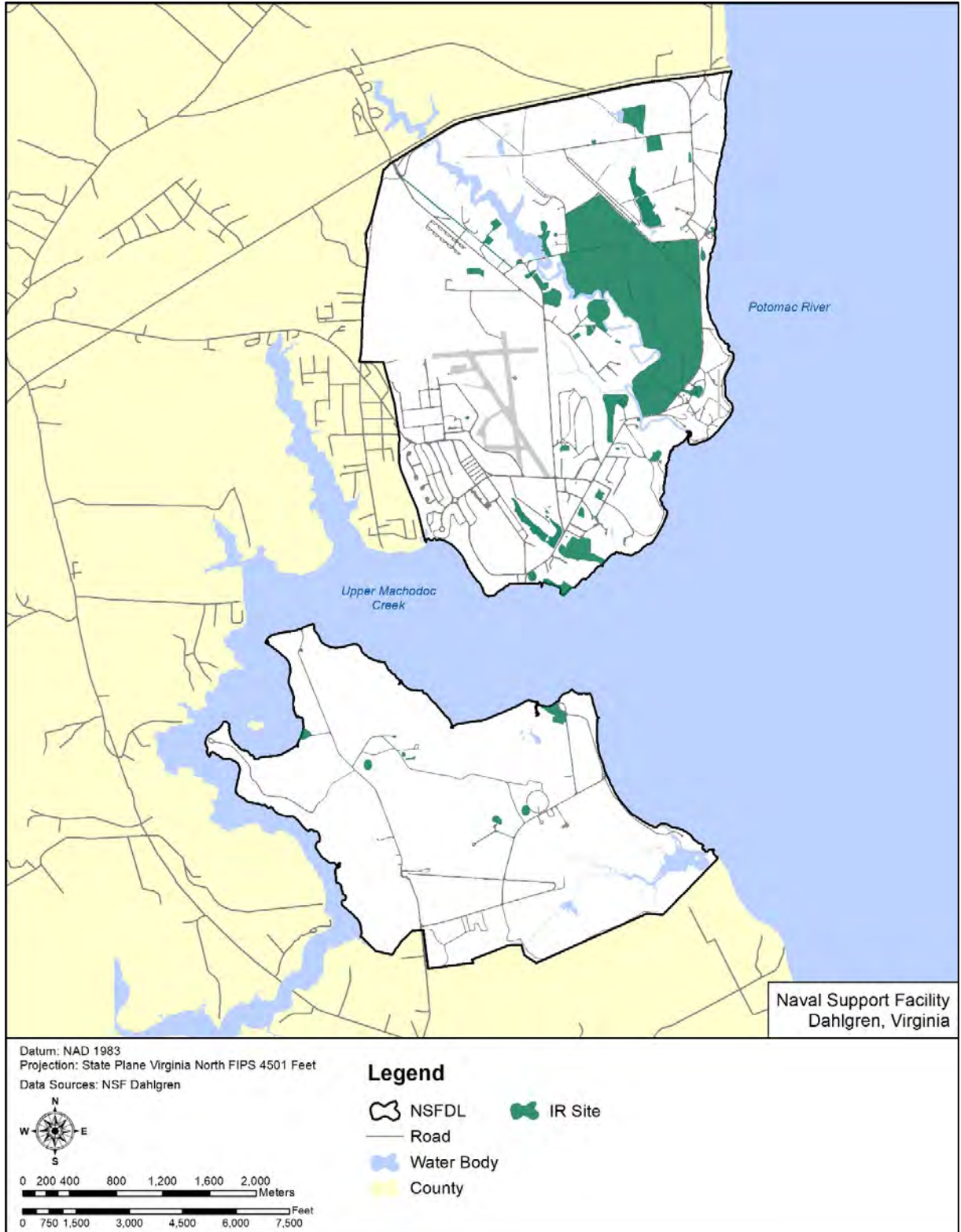
The installation recognizes that adverse impacts to natural resources addressed in this INRMP may result from the release of hazardous substances, pollutants, and contaminants into the environment. The NAVFAC Environmental Restoration (ER) Program is

responsible for identifying CERCLA releases, Resource Conservation and Recovery Act (RCRA) releases, and releases under related provisions. The consideration of risks and assessment of impacts to human health and the environment that includes endangered species, migratory birds, and biotic communities is a critical aspect of this program. The final program emphasis is the development and selection of response actions for a release that may result in an unacceptable risk.

When appropriate, the regional or installation natural resources management staff will help the ER Program Remedial Project Manager (RPM) identify potential impacts to natural resources caused by the release of these contaminants. Regional or installation natural resources staff will also participate, as appropriate, in the ER Program decision-making process by communicating natural resource issues on the installation to the RPM, attending Restoration Advisory Board meetings, reviewing and commenting on ER Program documents (e.g., Remedial Investigation, Ecological Risk Assessment), and ensuring that response actions, to the maximum extent practicable, are undertaken in a manner that minimizes impacts to natural resources on the installation.

When appropriate, regional or installation natural resources staff will make recommendations to the RPM regarding cleanup strategies and site restoration. During initial monitoring protocols, the Natural Resources Manager may suggest sampling and testing be accomplished so as to not impact sensitive or critical areas. Also, during site restoration, the Natural Resources Manager has the opportunity to recommend site restoration practices that are outlined within this INRMP. Examples include, landfill caps restored to grasslands, excavation areas restored to wetland/pond areas, and treated water relocated to enhance a pond area.

Remedial investigations at NSFDL have revealed sites contaminated with hazardous and nonhazardous waste resulting from past land uses and waste disposal practices at NSFDL (Figure 4-1). The ER Program Site Management Plan (USN 2017a) describes all current and former ER Program sites, screening site areas (SSAs), and areas of concern (AOCs) and sets priorities for remedial response activities to be conducted at NSFDL.



**Figure 4-1. Environmental Restoration Sites at Naval Support Facility Dahlgren**



d. Stormwater Management Program

A Mainside Stormwater Management Plan (SWMP) was prepared in 1998 (USN 1998a). The plan was prepared in accordance with The Commonwealth of Virginia's Stormwater Management Act and Regulations (VR 215-02-00), the general and water quality requirements of Virginia's Stormwater Management and Erosion and Sediment and Control Regulations (VR 625-02-00), and the Chesapeake Bay Preservation Act and Regulations (VR 173-02-01). This plan includes considerations of channel improvements, retention/detention facilities, infiltration devices, infrastructure maintenance, retrofitting of existing structures, filtration practices, and impervious area restrictions.

The Navy adopted a Low Impact Development (LID) Policy for stormwater management in 2007. LID utilizes strategies that infiltrate, filter, store, evaporate, and/or retain runoff close to its source. Also, in 2007, Congress enacted the Energy Independence and Security Act. Section 438 of the Act requires that federal development and redevelopment projects maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow. Both initiatives are being implemented on NSFDL to assist in meeting evolving stormwater management regulations that require reductions in nitrogen, phosphorus, and sediments into receiving waters.

A Nonpoint Source Pollution Inventory/Erosion Inspection was conducted in 2011 (USN 2011c). The report provides planning-level nonpoint source pollution documentation, stabilization recommendations, planning-level sketches, and rough-order-of-magnitude cost estimates to remedy 11 areas of erosion identified by base personnel during a 2010 inspection. The erosion potential at 3 of the 11 sites has been reduced to date through stabilization projects performed by Public Works Department (PWD) personnel.

e. Regional Pesticide Compliance and Pest Management Plan

The NSASP Integrated Pest Management Plan (USN 2018c), updated and signed in 2018, describes installation pest management requirements, resources, and procedures. In accordance with Navy policy, NSFDL employs an integrated pest management (IPM) approach to pest control. IPM is an environmentally sound approach to pest management that promotes non-chemical controls and stresses prevention to avoid unacceptable levels of pest damage. The pest management plan further requires that a certified pest controller must approve the use of all pesticides at the installation and only pre-approved pesticides, listed below, may be used (see Appendix H of IPM). Sensitive areas such as wetlands, waterways,

and nontarget organisms must be identified and protected from contamination. The NSFDL pest management coordinator is a certified pesticide applicator and oversees grounds maintenance and contract personnel in the control of insect pests, nuisance wildlife, invasive exotic species, and noxious weeds.

#### **D. BENEFICIAL PARTNERSHIPS AND COLLABORATIVE RESOURCE PLANNING**

The diversity of natural resources encountered at NSFDL creates the need for a variety of expertise and assistance in developing and implementing sound management practices. The development of partnerships with state and federal resources agencies as well as local conservation and academic institutions makes such expertise available to natural resources personnel to accomplish set goals and objectives. An added benefit of inviting volunteers and conservation groups to assist with natural resources projects is that it fosters good community relationships and allows the volunteers to become invested in the area's natural resources. The following is a list of groups and agencies that have formed significant partnerships with the NSFDL.

- The USFWS provides assistance in matters that concern the conservation, protection, and management of fish and wildlife species.
- The NMFS provides assistance in matters that concern the conservation, protection, and management of riverine, estuarine, and oceanic aquatic species.
- The VDWR also provides assistance in matters that concern the conservation, protection, and management of fish and wildlife species.
- The VDOF provides technical assistance and plant materials for the establishment and maintenance of trees on the installation.
- The Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDCR-DNH) have conducted rare, threatened, and endangered species surveys on the installation.
- The VDEQ provides assistance in matters that concern erosion and sediment control, stormwater management, and shoreline stabilization.

- The VMRC, USACE, VDEQ, and KGCWB provide assistance in matters that concern the protection of wetlands by administering the permitting process.

## **E. PUBLIC ACCESS AND OUTREACH**

### **(1) Public Access and Outdoor Recreation**

Due to the highly classified and potentially hazardous nature of the NSFDL mission and increased national security measures, the installation is closed to all public entry. However, public access is arranged for organized groups to participate in special events on a case-by-case basis. Military and civilian personnel and their guests are permitted access to the installation for outdoor recreation.

### **(2) Public Outreach**

The Conservation Education Program at NSFDL is designed to increase awareness of the NSFDL residents and local community about land stewardship practices and the processes of the natural environment. Increased awareness fosters good stewardship, improves quality of life, and supports mission objectives.

Information regarding conservation at NSFDL was previously distributed via the *Dahlgren Bullet* (the primary news publication of NSFDL), and via newsletters and postings located at the Natural Resources Office (NRO) and community gathering areas throughout the developed portions of Mainside. Information is currently routed via an email distribution list for hunters and anglers that utilize NSFDL.

## **F. ENCROACHMENT PARTNERING**

NSFDL has prepared an Encroachment Action Plan (EAP) (USN 2015) in accordance with OPNAVINST 11010.40 (Encroachment Management Program). The NSFDL EAP provides a proactive strategy that addresses all types of encroachment pressures (e.g., adjacent private development, certain environmental restrictions, or growing competition for resources such as waterfront) at the installation and operating areas to preserve the ability to meet existing and future mission requirements and to provide effective test and training capabilities.

Incompatible urban development could present NSFDL with a long-range threat to the military mission. Potential pressure to modify training or test procedures is possible as King George County continues to grow toward the boundaries of NSFDL, and as Charles and St Mary's Counties in Maryland develop along the Potomac River

Test Range. Additionally, land adjacent to safety zones, which cover much of NSFDL, may not be suitable for certain types of land use or economic development.

The NSFDL EAP identifies, quantifies, and provides mitigation strategies for the potential encroachment threats to the installation. The INRMP and natural resource goals and objectives will be integrated, and the projects coordinated as much as possible with the EAP.

#### **G. CLIMATE CHANGE**

The approximately 25 million ac of land managed by DoD are integral to the military's mission of keeping the nation secure (Stein et al. 2019). As such, there is an operational need to ensure that current and future climatic changes do not compromise the ability of the installations to serve their essential operational, training, and testing functions. Understanding climate risks and vulnerabilities will greatly improve the chance for sustaining the capacity of ranges and bases to meet their mission now and into the future (Stein et al. 2019).

To address these risks, DoDI 4715.03 calls for installations to address climate considerations when updating or revising their INRMPs. When doing so, NRMs are required to incorporate climate adaptation into their management goals and actions. Adaptation actions are intended to reduce climate-related vulnerabilities or enhance resilience. Adaptation planning should be tailored to the particular mission, resources, and needs of an installation (Stein et al. 2019).

To ensure general principles and processes of climate adaptation are captured in all INRMPs, DoD developed the guide, *Climate Adaptation for DoD Natural Resource Managers* (Stein et al. 2019). The guide provides overarching adaptation concepts and principles for NRMs to incorporate into INRMPs.

Based on the DoD guide, NSFDL will develop a climate change management plan that will be included in the INRMP as an appendix (Appendix 1B, P19). Climate change and adaptation principles and processes will be incorporated into future updates of other existing NSFDL management plans.

#### **H. STATE COMPREHENSIVE WILDLIFE PLANS**

The VDWR is responsible for developing a Comprehensive Wildlife Conservation Strategy, referred to as the State Wildlife Action Plan (SWAP) for Virginia ([www.bewildva.org](http://www.bewildva.org)). The SWAP is a 10-year strategic plan that is required for continued funding through the

State Wildlife Grant Program administered by the USFWS (VDGIF 2015). The SWAP was developed with extensive input from other state and federal agencies, non-governmental organizations, and private citizens. A DoD representative served as the Conservation Team Leader on the External Steering Committee, which acted as an advisory board to ensure that a wide range of resource conservation interests were addressed in the development and implementation of the SWAP.

The SWAP focuses on species and habitats of greatest conservation need in Virginia; however, it is also an action plan for the conservation of all of Virginia's wildlife. Natural resources conservation is addressed in 21 planning regions in Virginia. NSFDL is located within the Northern Neck Planning Region.

Statewide, the SWAP identifies 883 species in some degree of decline including those on the USFWS and VDWR protected species lists. The state plan stratifies the species into four tiers of relative conservation need: critical (Tier I), very high (Tier II), high (Tier III), and moderate (Tier IV), to allow for prioritization of threats facing species. Of the 480 species listed that may occur within a 10-mile radius of NSFDL, 12 are listed as Tier I, 10 as Tier II, 21 as Tier III, and 50 as Tier IV (VDWR 2020) (see Appendix 2A).

The SWAP identified a large number of conservation actions to address problems facing Virginia's species of greatest conservation need. The general categories of conservation actions were coordination; education and outreach; enforcement; habitat management; land protection; planning; regulations, policy, and law; and species management.

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## Appendices

- Appendix 1A Integrated Natural Resources Management Plan Goals and Objectives
- Appendix 1B List of Appropriated Funding (Operations and Maintenance, Navy), Non-Appropriated Funded (Sikes Act Permit Fees), Navy Forestry Account and In-House Projects/Actions
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**Appendix 1A  
Integrated Natural Resources Management Plan Goals  
and Objectives**

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<b>Chapter</b>	<b>#</b>	<b>INRMP Goals and Objectives</b>	<b>Page #</b>
1	G1	Integrate natural resources management responsibilities with military activities, installation planning and programming, and other activities to ensure no net loss to the Navy mission.	1-2
1	G2	Ensure sustainable multipurpose use of the resources and public access when consistent with the mission, safety, and security requirements.	1-3
1	G3	Ensure natural resources management requirements are implemented by or coordinated with professionally trained natural resources managers.	1-3
1	G4	Apply ecosystem-based principles to natural resources management by shifting from single-species to multiple-species conservation; forming partnerships necessary to consider and manage ecosystems that cross installation boundaries; and using the best available scientific information and scientifically sound strategies for adaptive management.	1-3
1	G5	The stewardship goal of NSFDL is to sustain multiple uses of natural resources over the long term, while promoting the health of the ecosystems in which these activities occur.	1-11
3	G6	The overall goal of the Rare Species Management Program is to ensure compliance with applicable state and federal regulations and to protect and enhance rare species populations and their habitats.	3-1
3	G7	The overall goal of the Wetlands Management Program is to ensure compliance with the CWA, EO 11990, EO 11988, and applicable state regulations, as well as to protect and enhance wetland communities at NSFDL.	3-31
3	G8	The overall goal of the Fish and Wildlife Management Program is to manage fish and wildlife resources to maintain and enhance ecosystem functions and values in a manner that is consistent with the military mission.	3-35
3	G9	The overall goal of the Forest Management Program is to employ ecosystem management techniques to promote healthy and diverse forest communities at NSFDL.	3-52

<b>Chapter</b>	<b>#</b>	<b>INRMP Goals and Objectives</b>	<b>Page #</b>
3	G10	The overall goal of the Vegetative Management Program is to maintain and enhance landscaped areas and urban forests at NSFDL, while minimizing the use of energy, water, chemical herbicides, and fertilizers	3-60
3	G11	The overall goal of the Migratory Bird Management Program at NSFDL is to support the conservation of migratory birds through habitat conservation and enhancement and to avoid the incidental take of migratory birds through military readiness actions in accordance with the MBTA to the greatest extent practicable.	3-63
3	G12	The overall goal of the Invasive Species Management Program is to reduce or eliminate invasive populations in order to protect ecosystems and native plant and animal species from invasive species through compliance with EO 13112 and EO 13751.	3-65
3	G13	The overall goal of the Land Management Program is to support mission related activities while providing the foundation for all other natural resources programs.	3-69
3	G14	The overall goal of the GIS Management Program at NSFDL is to support the military mission and Natural Resources Program by providing easy access to accurate information for both management and decision making.	3-76
3	G15	The overall goal of the Outdoor Recreation Management Program is to enhance the quality of life for NSFDL personnel and employees by allowing for maximum natural resources-based recreational use of the installation in a manner that is compatible with the military mission.	3-77
3	G16	The overall goal of the Floodplains Management Program at NSFDL is to ensure the avoidance, protection, and restoration of floodplains in accordance with the CWA, EO 11988, and the Chesapeake Bay Agreement to the greatest extent practicable.	3-91
1	O1	Identify the responsible parties and stakeholders concerned with natural resources management at NSFDL.	1-3
1	O2	Describe the current and future military mission and its requirements and constraints on natural resources.	1-3

<b>Chapter</b>	<b>#</b>	<b>INRMP Goals and Objectives</b>	<b>Page #</b>
1	O3	State the policies, management philosophy, and objectives of natural resources management at NSFDL.	1-3
1	O4	Provide information regarding the existing biological and physical conditions and the desired future conditions of the installation and the surrounding area.	1-3
1	O5	Identify key natural resources management issues and concerns at the installation and in the surrounding area.	1-3
1	O6	Identify and describe projects and management actions required to meet the objectives of natural resources management while ensuring no net loss in the capability of installation lands to support the military mission.	1-3
1	O7	Identify scheduling priorities and funding opportunities for the implementation of natural resources projects and management actions.	1-4
1	O8	Ensure training requirements for the Natural Resources Manager (NRM) are met per OPNAVINST 5090.1E.	1-4
1	O9	Provide review of all construction and demolition projects, training, mission operations and environmental restoration remediation sites to ensure impacts to natural resources are avoided and/or minimized.	1-4
1	O10	Develop partnerships with state and federal resource agencies as well as local conservation and academic institutions to better manage natural resources.	1-4
1	O11	Coordinate events to promote environmental education and outreach with installation personnel and the local community.	1-4

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**Appendix 1B**  
**List of Appropriated Funding (Operations and**  
**Maintenance, Navy), Non-Appropriated Funded (Sikes**  
**Act Permit Fees), Navy Forestry Account and In-**  
**House Projects/Actions**

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Chapter/ Page	Number	Project #	Project Description	Implementation Schedule (FY)	Prime Legal Driver/ Initiative	Fund Sources	ERL Level
<b>RT&amp;E Species</b>							
3-10, 3-18, 3-20	P1	6102NR075	1 S NDW NSFDL Northern Long-Eared, Little Brown, and Tri-Colored Bat Surveys and Anabat Analysis	2020–2026	ESA, Sikes Act, DODI 4715.03	O&MN	4
3-6	P2	61002NR087	1 S NDW NSFDL Atlantic and Shortnose Sturgeon Telemetry Habitat/Movement Assessment	2020–2026	ESA, Sikes Act, DODI 4715.03	O&MN	4
3-13	P3	61002NR078	3 CP NDW NSFDL - Monarch Butterfly Pollinator Habitat Creation	2021–2026	ESA, Sikes Act, EO 13751	O&MN	4
3-27	P4	6102NR064	5 DL NDW NSFDL - Bald Eagle Nest Aerial Surveys	2020–2026	BGEPA, MBTA, Sikes Act	O&MN	4
3-7	P5	61002NR086	1 S NDW NSFDL Rusty Patched Bumble Bee and Native Bee Survey	2020–2026	ESA, Sikes Act, DODI 4715.03	O&MN	4
3-22, 3-24	DL1	N/A	Herpetofauna Surveys	Annual	ESA, Sikes Act, 5090.1E	In-House	4
<b>Migratory Bird Management</b>							
3-63	P6	61002NR077	MBTA NDW NSFIIH Migratory Birds MAPS Program	2020–2026	MBTA, EO 13186, Sikes Act	O&MN	4
3-47	P7	61002NR056	MBTA NDW NSFDL - Nuisance Resident Goose Control	2024-2026	MBTA, Sikes Act, DODI 4715.03	O&MN	4
3-64	P8	N/A	Migratory Bird Nest Boxes and Supplies	Annual	MBTA, Sikes Act, 5090.1E	Sikes Act Permit Fees	1
3-64	DL2	N/A	Migratory Bird Nest and Box Monitoring	Annual	MBTA, Sikes Act, 5090.1E	In-House	4
<b>Invasive Species Management</b>							
3-13, 3-64, 3-65	P9	61002NR057	EO 13751 NDW NSFDL Invasive Species Plant Control	2020–2026	EO 13751, PPA7701, Sikes Act	O&MN	4

Chapter/ Page	Number	Project #	Project Description	Implementation Schedule (FY)	Prime Legal Driver/ Initiative	Fund Sources	ERL Level
<b>Land and Watershed Management</b>							
3-74	P10	61002SHORE	CWA NSF Dahlgren Living Shoreline Project	2020–2026	CWA, CZMA, EO 13158	O&MN	4
3-6, 3-11, 3-14, 3-16, 3-18, 3-23	P11	61002SHORE	CWA NSF Dahlgren Stream Restoration	2022-2023	CWA	O&MN	4
3-72	DL3	N/A	Watershed Cleanup/Trash Collection	Annual	CWA, Sikes Act, 5090.1E	In-House	4
3-38	DL4	N/A	Right-of-Way, Food Plot and ER Site Vegetation Maintenance	Annual	Sikes Act, CERCLA	In-House	4
3-46	DL5	N/A	Nuisance Wildlife Trapping and Beaver Activity Cleanup	Annual	Sikes Act	In-House	4
<b>Outdoor Recreation</b>							
3-78	P12	61002NR089	Sikes NDW NSFDL Outdoor Recreation Electronic Permit System	2020–2026	Sikes Act, EO13443, 5090.1E	O&MN	4
3-88	P13	61038NR117	Sikes NDW NSFIDH Conservation Law Enforcement (includes NSFDL)	2020–2026	Sikes Act	O&MN	4
3-78	P14	N/A	Tractor Maintenance and Outdoor Recreation Supplies	Annual	Sikes Act	Sikes Act Permit Fees	1
3-39	DL6	N/A	White-Tailed Deer Spotlight Surveys	Annual	Sikes Act	In-House	4
3-80	DL7	N/A	Hunting Program Maintenance and Bow Proficiency Tests	Annual	Sikes Act	In-House	4
<b>Forestry Management</b>							
3-87	P15	61002NR091	Sikes NDW NSFDL Wildland Fire Management Plan Update	2023	Sikes Act, 5090.1E, DoDI 4715.03	Forestry Account	4
3-52	P16	61002NR058	SWCA NDW NSFDL – Forest Regeneration	2024-2026	Sikes Act, 5090.1E, USC2665: 10 U.S.C. Section 2665, DoDI 4715.03	Forestry Account	4

Chapter/ Page	Number	Project #	Project Description	Implementation Schedule (FY)	Prime Legal Driver/ Initiative	Fund Sources	ERL Level
3-11, 3-18, 3-20, 3-52	P17	N/A	Forestry Management Plan Update	Every 10 years	Sikes Act	Forestry Account	4
3-60	P18	N/A	Earth Day Tree Planting	Annual	Sikes Act	Sikes Act Permit Fees	1
<b>Implementation</b>							
1-12, 4-21	P19	61002NR065	CHS NDW NSFDL INRMP	2020–2026	ESA, Sikes Act, BGEPA	O&MN	4
3-2 ,3-7, 3-9 3-27, 3-77	P20	61002NR067	SIKES NDW NSFDL – INRMP Landscape Delineation and Mapping	2020–2026	Sikes Act, ESA, MBTA	O&MN	4
3-51	P21	61002NR085	SIKES NDW NSFDL – Surveys and Habitat Assessment	2020–2026	Sikes Act, MBTA, EO 13751	O&MN	4
3-2 ,3-7, 3-9 3-27, 3-77	DL8	N/A	Natural Resources GIS Updates	Annual	Sikes Act, 5090.1E, MBTA, BGEPA, CWA	In-House	4

\*\*All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341 *et seq.*).

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**Appendix 1C  
General Management Practices**

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<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
1	M1	In accordance with the Sikes Act, INRMPs must be reviewed and if necessary, revised, at intervals of not more than five years	1-12
1	M2	Navy policy requires that INRMPs be reviewed annually by the installation with the cooperation of the appropriate field-level offices of the USFWS and state fish and wildlife agency	1-13
2	M3	The INRMP development and implementation process at NSFDL must address various constraints to ensure compatibility with the military mission, safety, and various federal, state and Navy regulations	2-5
2	M4	Navy INRMPs must address installation watersheds, shorelines, and near-shore areas such that conservation benefits are provided to aquatic species and habitats in waters adjacent to Navy installations	2-27
3	M5	Ensure species surveys are conducted and/or updated to determine the presence or absence of rare, threatened, and endangered species	3-1
3	M6	Regularly manage and update the GIS database to ensure rare, threatened, and endangered species locations and habitats are accurately identified	3-2
3	M7	Avoid impacts to rare, threatened, and endangered species and their habitat through environmental review of installation activities	3-2
3	M8	Maintain existing population levels and habitat, and where feasible increase populations and enhance habitat for rare, threatened, and endangered species	3-2
3	M9	Identify and control invasive plant and animal species that have the potential to negatively impact known rare, threatened, and endangered species at NSFDL	3-2

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M10	Partner with local sturgeon research experts to provide Navy assistance for sampling efforts to improve understanding of shortnose and Atlantic sturgeon densities, movement, and spawning locations within the Potomac River and PRTR	3-6
3	M11	Shortnose and Atlantic sturgeon habitat are delineated in the GIS database. This provides the NRM with the ability to consider these species and their habitat while reviewing CWAPs and PRTR testing plans to avoid or minimize impacts	3-6
3	M12	Consult with NMFS, as required, and ensure special restrictions are adhered to for the duration of the project or testing program	3-6
3	M13	Conduct native bee and pollinator surveys to determine if the rust patched bumble bee is present at NSFDL and if identified, delineate habitat in the GIS	3-7
3	M14	Modify the current mowing schedules on testing ranges to protect pollinators and pollinator-friendly plants	3-7
3	M15	Reduce the use of pesticides	3-7
3	M16	Expand and protect existing bee-friendly landscapes	3-7
3	M17	Educate the general populace about the importance of bee conservation	3-7
3	M18	Consult with USFWS, as required, when landscape changes have the potential to impact this species or its habitat	3-8, 3-9, 3-11

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M19	Conduct periodic surveys to document presence and suitable habitat	3-9
3	M20	If identified, delineate in the GIS and protect marshes where it grows including adjacent upland buffer zones buffering the identified marshes	3-9
3	M21	Conduct passive acoustical monitoring annually to assess presence/absence of this species throughout the installation	3-10, 3-18, 3-20
3	M22	Update the 2010 Integrated Forest Management Plan to include management guidelines related to forest harvest/silvicultural practices that promote forest bat species. This includes retaining large snags that provide suitable roosting habitat	3-11, 3-18, 3-20
3	M23	Follow guidelines for the removal of bats from buildings during summer roosting periods	3-11, 3-18, 3-20
3	M24	Provide comments to avoid/minimize impacts to forests and wetlands during project reviews to ensure habitat quality is maintained for this species	3-11, 3-18, 3-20
3	M25	Identify mature/late successional forested areas to preserve their ecological significance as they provide potential high-quality summer habitat	3-11, 3-18, 3-20
3	M26	Review proposed vegetation clearing related to construction and testing through the CWAP process to ensure impacts to milkweed plants and other native forbs are avoided or minimized	3-13
3	M27	Ensure herbicide usage adheres to contract to protect sensitive areas (wetlands, streams, native vegetation) and milkweed plants	3-13

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M28	Carry out monarch butterfly/pollinator habitat enhancement projects and protect existing landscapes	3-13
3	M29	Conduct invasive species plant control throughout the installation to promote native plant establishment and growth. Targeted species include lespedeza, tree-of-heaven, and Japanese stilt grass	3-13
3	M30	Delineate river herring habitat in the GIS database. This provides the NRM with the ability to consider these species and their habitat while reviewing CWAPs and PRTR testing plans in an effort to avoid or minimize impacts	3-16
3	M31	Conduct annual tidal and non-tidal stream surveys to determine presence/absence of fish species and assess stream quality. Surveys will provide data on river herring and better enable management of the species and habitat at NSFDL	3-16
3	M32	Follow the VDWR guidelines on best management practices (BMPs) and processes for conserving little brown bats and tri-colored bats (VDGIF 2016)	3-18, 3-21
3	M33	Conduct periodic herpetofaunal surveys to identify species and update the INRMP and species lists	3-22, 3-24
3	M34	Review proposed wetland disturbance and in-water work projects related to construction, demolition, and operations/training through the CWAP process to ensure impacts to these habitats are eliminated or minimized	3-22, 3-24
3	M35	Restrict proposed dredging activities during northern red-bellied cooter hibernation (November-March)	3-22
3	M36	Conduct wetland habitat enhancement and construction projects as funding is provided. Areas are identified based on suitable site conditions and are approximately 0.5 acres in size	3-23, 3-24

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M37	Strive to deter/prevent collection of turtles and other wildlife species for the illegal pet trade and consumption	3-23, 3-24
3	M38	Implement practices detailed in the Legacy funded <i>Recommended BMPs for Spotted Turtles on DoD Installations</i> guidance document (DoD 2019)	3-24
3	M39	Conduct annual bald eagle aerial surveys to assess productivity	3-27
3	M40	Ensure GIS database is updated as needed to reflect current bald eagle nest sites and nest protection zones	3-27
3	M41	Erect barriers and signs identifying nest protection zones on base during the time of year restriction period (December 15 through June 15) and conduct environmental review of projects to ensure compliance	3-27
3	M42	Implement ecosystem management practices to achieve Wetland Management Program goals	3-31
3	M43	Protect and enhance the biodiversity, functions, values, and habitat availability of wetland communities	3-31
3	M44	Maintain no net loss of size, function and value of installation wetlands and preserve the natural and beneficial values of wetlands	3-31
3	M45	Enhance and/or create wetlands at NSFDL to provide wildlife habitat, improve water quality and return hydrology to identified areas. This will only be conducted in areas that have no impact on Mission operations	3-31

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M46	Comply with existing federal, state and Navy wetland regulations and policies and ensure all permits/consultations are completed to remain compliant with applicable regulations	3-31
3	M47	Ensure wetland delineations are conducted, per USACE Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), for all MILCONs, projects and activities that may have impacts to wetlands	3-32
3	M48	Participation in off-site mitigation banks or in-lieu fee instruments is encouraged when impact avoidance to wetlands and waterways is not practicable	3-32
3	M49	Adverse impacts to floodplains shall be avoided when possible	3-32
3	M50	SIAs with unique ecological characteristics and/or high-quality habitat for rare species are recognized. Such areas may require special natural resources management practices and may be given special consideration during land use planning	3-36
3	M51	Wetlands protection and adherence to the Navy's "no net loss" of wetlands policy	3-36
3	M52	Maintenance of vegetated riparian buffers	3-36
3	M53	Enforcement of Virginia's erosion and sediment control and stormwater regulations	3-36

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M54	Enforcement of Best Management Practices for timber harvests	3-36
3	M55	Manage forest resources to minimize fragmentation and preserve large blocks of forested communities, when possible	3-36
3	M56	Improve connectivity between forested communities and maintain wildlife corridors by allowing forest edge habitat to develop	3-36
3	M57	Maintain a balance of forest stand types and do not convert hardwood or pine-hardwood forest stands to pine stands	3-37
3	M58	Reduce residual forest stand basal area to 70 to 80 square feet per acre by thinning	3-37
3	M59	Retain or encourage snags 10 inches in diameter at breast height (DBH) or greater and preserve potential nest/den trees. Cluster snags where possible. Larger snags are especially valuable in proximity to wetlands or a water source	3-37
3	M60	Encourage hard and soft mast-producing species during forest management activities	3-37
3	M61	Conduct prescribed burning on a rotation of 3 to 5 years to improve wildlife habitat in designated early successional habitats	3-37

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M62	Maintain open grasslands and early successional habitats through prescribed burning and/or mowing to promote overall biodiversity	3-37
3	M63	Conduct mowing, disking, and replanting of wildlife food plots on an annual or biannual basis	3-37
3	M64	Maintain vegetated buffers, preferably forested buffers, along streams, wetlands, shorelines and roadsides	3-37
3	M65	Use native species that benefit wildlife in landscape plantings	3-37
3	M66	Create brush piles using slash generated by forest management activities to create wildlife cover	3-37
3	M67	Schedule and conduct active habitat management activities (e.g., timber harvests, prescribed burning, mowing, etc.) outside the breeding season for birds and other species whenever possible	3-37
3	M68	Identify land management practices that may be modified to benefit pollinators and their habitat	3-37
3	M69	Ensure the present and future well-being of white-tailed deer and their habitat	3-38



<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M70	Maintain deer populations at or below the cultural carrying capacity of their habitat and at levels necessary to ensure compatibility with mission land uses and natural ecological communities	3-39
3	M71	Reduce military mission and human-related conflicts	3-39
3	M72	Provide and promote high quality recreational hunting experiences that do not interfere with the military mission	3-39
3	M73	Maintain the health and integrity of a diversity of healthy and productive natural forested ecosystems that support a full complement of native wildlife species	3-52
3	M74	Provide for sustained multipurpose uses to the extent consistent with the mission and ecosystem management	3-52
3	M75	Protect unique and sensitive natural areas and habitats	3-52
3	M76	Protect real property investments for the installation	3-52
3	M77	Protect soil and water resources through the use of BMPs	3-52

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M78	Provide recreational opportunities for installation personnel and their dependents and community members	3-52
3	M79	Use regionally native plants	3-60
3	M80	Use construction practices that minimize adverse effects on the natural habitat	3-61
3	M81	Reduce fertilizer and pesticide use	3-61
3	M82	Use water-efficient practices	3-61
3	M83	Create outdoor demonstrations to promote awareness of the environmental and economic benefits of beneficial landscaping	3-61
3	M84	Identifying and maintaining significant blocks of mixed upland forest and considering the value of hardwood-dominated forests in management decisions	3-63
3	M85	Preventing any loss of forested wetlands	3-63

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M86	Avoiding the conversion of mixed forests or hardwood-dominated forests to pine monocultures	3-63
3	M87	Using open spacing for planting and conducting multiple thinnings in pine stands to delay canopy closure and promoting understory vegetation	3-63
3	M88	Conducting migratory bird monitoring programs	3-63
3	M89	Minimizing land disturbance during the breeding season	3-63
3	M90	Minimizing the use of pesticides	3-64
3	M91	Maximizing the use of natives in landscaping	3-64
3	M92	Controlling populations of terrestrial and aquatic invasive species	3-64
3	M93	Controlling feral cat populations	3-64

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M94	Mitigating the negative impacts of reflective glass	3-64
3	M95	Prevent the introduction of invasive species	3-65
3	M96	Detect and control such species	3-65
3	M97	Accurately monitor invasive species populations	3-65
3	M98	Provide for restoration of native species and habitats that have been invaded	3-65
3	M99	Promote public education on invasive species	3-65
3	M100	Conduct research on invasive species to prevent their introduction and provide for environmentally sound control	3-65
3	M101	Not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species	3-65

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M102	NSASP NAVFAC Asset Management personnel are responsible for data development, map creation, and maintaining the NSFDL specific GIS layers	3-77
3	M103	The NRM provides support in maintaining and updating natural resources-related GIS data	3-77
3	M104	Enhance the efficiency with which NSFDL manages its property and natural resources, thereby providing essential support to the military mission	3-77
3	M105	The hunting program shall be implemented to promote the balanced management of the installation white-tailed deer population to ensure continued harvesting by hunters, promote sound ecological benefits, and meet safety goals by reducing human/deer interactions	3-78
3	M106	The NRM shall ensure non-consumptive outdoor recreational activities are accessible within the framework of the installation military mission	3-78
3	M107	The NRM shall continue collection of permit fees to support the outdoor recreation program per Sikes Act authorization (Appendix 1C, M). This includes future plans to transition collection activities to an electronic permit system	3-78
3	M108	Minimize the potential for wildfire and reduce its impacts to the greatest extent practicable	3-86
3	M109	Use prescribed fire as a cost effect management tool to enhance wildlife habitat and manage vegetation on operational lands	3-86

<b>Chapter</b>	<b>#</b>	<b>General Management Practices</b>	<b>Page #</b>
3	M110	Where feasible, prescribed fire may be used to control invasive plant species	3-86
3	M111	Update the wildfire management plan every ten years or as necessary	3-86

**Appendix 2A**  
**USFWS and VDWR Species Lists for Potential**  
**Occurrence at or Near Naval Support Facility**  
**Dahlgren**

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## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Virginia Ecological Services Field Office  
6669 Short Lane  
Gloucester, VA 23061-4410  
Phone: (804) 693-6694 Fax: (804) 693-9032  
<http://www.fws.gov/northeast/virginiafield/>



In Reply Refer To:  
Consultation Code: 05E2VA00-2021-SLI-1278  
Event Code: 05E2VA00-2021-E-03653  
Project Name: NSF Dahlgren INRMP Update

December 23, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

12/23/2020

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species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](http://www.fws.gov/windenergy/eagle_guidance.html)). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

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Event Code: 05E2VA00-2021-E-03853

## Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Virginia Ecological Services Field Office**

6669 Short Lane  
Gloucester, VA 23061-4410  
(804) 693-6694

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

**Chesapeake Bay Ecological Services Field Office**

177 Admiral Cochrane Drive  
Annapolis, MD 21401-7307  
(410) 573-4599

12/23/2020

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## Project Summary

Consultation Code: 05E2VA00-2021-SLI-1278

Event Code: 05E2VA00-2021-E-03653

Project Name: NSF Dahlgren INRMP Update

Project Type: \*\* OTHER \*\*

Project Description: Generating an official species list to include as an appendix in the NSF Dahlgren INRMP.

### Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/38.32317163890616N77.03731429292917W>



Counties: Charles, MD | King George, VA

12/23/2020

Event Code: 05E2VA00-2021-E-03653

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## Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

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## USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

REFUGE INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED.  
PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

## IPaC Information for Planning and Consultati

U.S. Fish & Wildlife Service

# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resource*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area that could potentially be directly or indirectly affected by activities in the project area. However, determining the like and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

## Project information

### NAME

NSF Dahlgren INRMP Update

### LOCATION

Maryland and Virginia



### DESCRIPTION

Generating an official species list to include as an appendix in the NSF Dahlgren INRMP

## Local offices

### Chesapeake Bay Ecological Services Field Office

☎ (410) 573-4599

📠 (410) 266-9127

177 Admiral Cochrane Drive  
Annapolis, MD 21401-7307

<http://www.fws.gov/chesapeakeba>

<http://www.fws.gov/chesapeakebay/endsppweb/ProjectReview/Index.html>

### Virginia Ecological Services Field Office

IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>

☎ (804) 693-6694

📠 (804) 693-9032

6669 Short Lane  
Gloucester, VA 23061-4410

<http://www.fws.gov/northeast/virginiafi>

NOT FOR CONSULTATION



## Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether a species which is listed or proposed to be listed may be present in the area of such proposed action" for any project to be conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries).

Species and critical habitats under the sole responsibility of NOAA Fisheries are not shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

### Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species: <a href="https://ecos.fws.gov/ecp/species/904">https://ecos.fws.gov/ecp/species/904</a>	Threatened

### Critical habitats:

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

## Migratory birds

Certain birds are protected under the Migratory Bird Treaty<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and habitats should follow appropriate regulations and consider implementing appropriate conservation measures described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- **Birds of Conservation Concern** <http://www.fws.gov/birds/management/managed-spec-birds-of-conservation-concern.pdf>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance-conservation-measures.pdf>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the [FAQ](#). This is not a list of every bird you may find in this location nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birds are sighted in and around your project area, visit [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps detailing the relative occurrence and abundance of bird species on your list are available. Links to add information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

**Bald Eagle** *Haliaeetus leucocephalus*

**Breeds Oct 15 to Aug 31**

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.  
<https://ecos.fws.gov/ecp/species/162>

IPaC: Resources	<a href="https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...">https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...</a>
<p><b>Black Scoter</b> <i>Melanitta nigra</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	Breeds elsewhere
<p><b>Bobolink</b> <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 20 to Jul 31
<p><b>Bonaparte's Gull</b> <i>Chroicocephalus philadelphia</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	Breeds elsewhere
<p><b>Brown Pelican</b> <i>Pelecanus occidentalis</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/603">https://ecos.fws.gov/ecp/species/603</a></p>	Breeds Jan 15 to Sep 30
<p><b>Buff-breasted Sandpipe</b> <i>Calidris subruficollis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. <a href="https://ecos.fws.gov/ecp/species/948">https://ecos.fws.gov/ecp/species/948</a></p>	Breeds elsewhere
<p><b>Common Loon</b> <i>Gavia immer</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/446">https://ecos.fws.gov/ecp/species/446</a></p>	Breeds Apr 15 to Oct 31
<p><b>Common Tern</b> <i>Sterna hirundo</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/496">https://ecos.fws.gov/ecp/species/496</a></p>	Breeds May 10 to Sep 10
<p><b>Double-crested Cormorant</b> <i>Phalacrocorax auritus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/347">https://ecos.fws.gov/ecp/species/347</a></p>	Breeds Apr 20 to Aug 31
<p><b>Great Black-backed Gull</b> <i>Larus marinus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	Breeds Apr 15 to Aug 20
<p><b>Herring Gull</b> <i>Larus argentatus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	Breeds Apr 20 to Aug 31

IPaC: Resources	<a href="https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...">https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...</a>
<p><b>Kentucky Warbler</b> <i>Oporornis formosus</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.</p>	<b>Breeds Apr 20 to Aug 20</b>
<p><b>Lesser Yellowlegs</b> <i>Tringa flavipes</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.  <a href="https://ecos.fws.gov/ecp/species/967">https://ecos.fws.gov/ecp/species/967</a></p>	<b>Breeds elsewhere</b>
<p><b>Long-tailed Duck</b> <i>Clangula hyemalis</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.  <a href="https://ecos.fws.gov/ecp/species/723">https://ecos.fws.gov/ecp/species/723</a></p>	<b>Breeds elsewhere</b>
<p><b>Northern Gannet</b> <i>Morus bassanus</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	<b>Breeds elsewhere</b>
<p><b>Prairie Warbler</b> <i>Dendroica discolor</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.</p>	<b>Breeds May 1 to Jul 31</b>
<p><b>Prothonotary Warbler</b> <i>Protonotaria citrea</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.</p>	<b>Breeds Apr 1 to Jul 31</b>
<p><b>Red-breasted Merganser</b> <i>Mergus serrator</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	<b>Breeds elsewhere</b>
<p><b>Red-headed Woodpecker</b> <i>Melanerpes erythrocephalus</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.</p>	<b>Breeds May 10 to Sep 10</b>
<p><b>Red-throated Loon</b> <i>Gavia stellata</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continent USA and Alaska.</p>	<b>Breeds elsewhere</b>
<p><b>Ring-billed Gull</b> <i>Larus delawarensis</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	<b>Breeds elsewhere</b>
<p><b>Royal Tern</b> <i>Thalasseus maximus</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	<b>Breeds Apr 15 to Aug 31</b>
6 of 14	12/23/2020, 1:14 PM

IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>

<p><b>Ruddy Turnstone</b> <i>Arenaria interpres morinella</i>                  This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	<p><b>Breeds elsewhere</b></p>
<p><b>Rusty Blackbird</b> <i>Euphagus carolinus</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p><b>Breeds elsewhere</b></p>
<p><b>Semipalmated Sandpipe</b> <i>Calidris pusilla</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p><b>Breeds elsewhere</b></p>
<p><b>Surf Scoter</b> <i>Melanitta perspicillata</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities</p>	<p><b>Breeds elsewhere</b></p>
<p><b>Whimbrel</b> <i>Numenius phaeopus</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.  <a href="https://ecos.fws.gov/ecp/species/946">https://ecos.fws.gov/ecp/species/946</a></p>	<p><b>Breeds elsewhere</b></p>
<p><b>White-winged Scoter</b> <i>Melanitta fusca</i>                  This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities</p>	<p><b>Breeds elsewhere</b></p>
<p><b>Willet</b> <i>Tringa semipalmata</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p><b>Breeds Apr 20 to Aug 5</b></p>
<p><b>Wood Thrush</b> <i>Hyllocichla ustellina</i>                  This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p><b>Breeds May 10 to Aug 31</b></p>

## Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to them. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (10)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. You can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 10 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee

IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>

week 12 is 0.25.

- To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ . On week 20 it is  $0.05/0.25 = 0.2$ .
- The relative probability of presence calculated in the previous step undergoes a statistical conversion so that possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

#### Breeding Season (B)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

#### Survey Effort (E)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for a species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example 33 to 64 surveys.

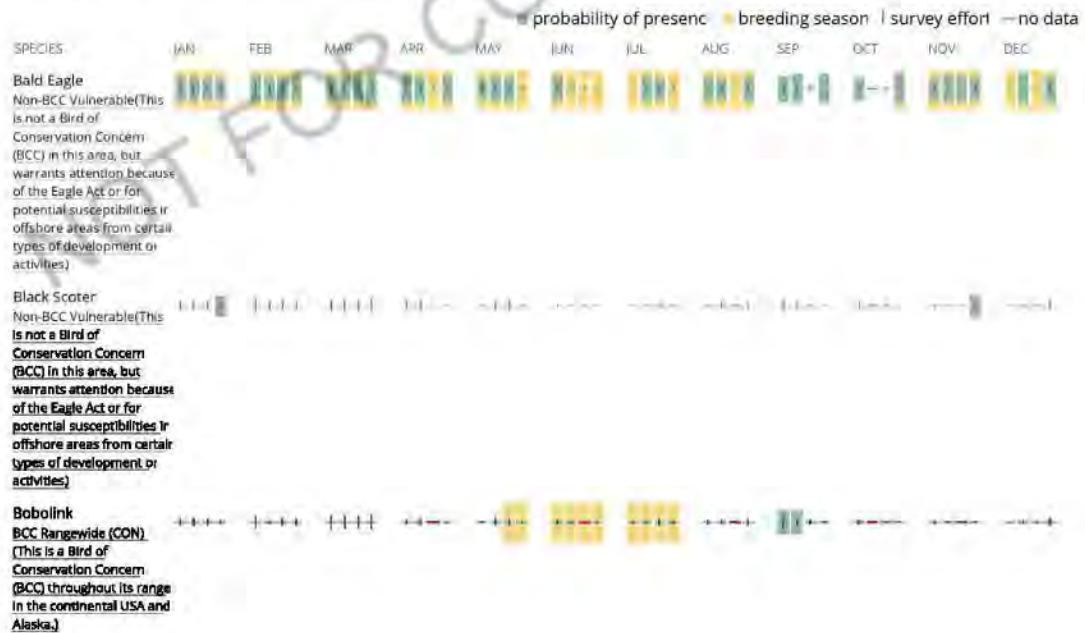
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

#### No Data (-)

A week is marked as having no data if there were no survey events for that week.

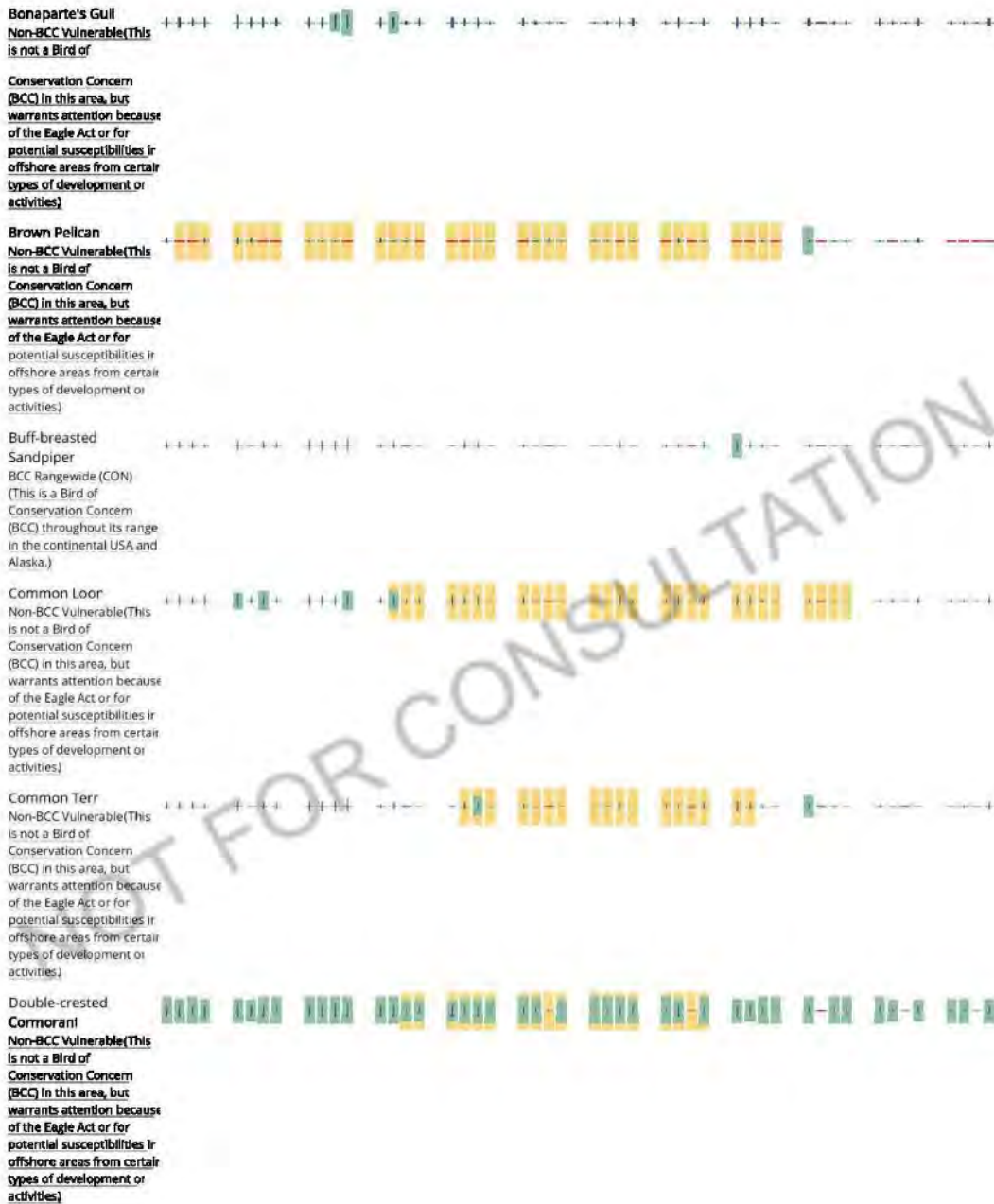
#### Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>



IPaC: Resources

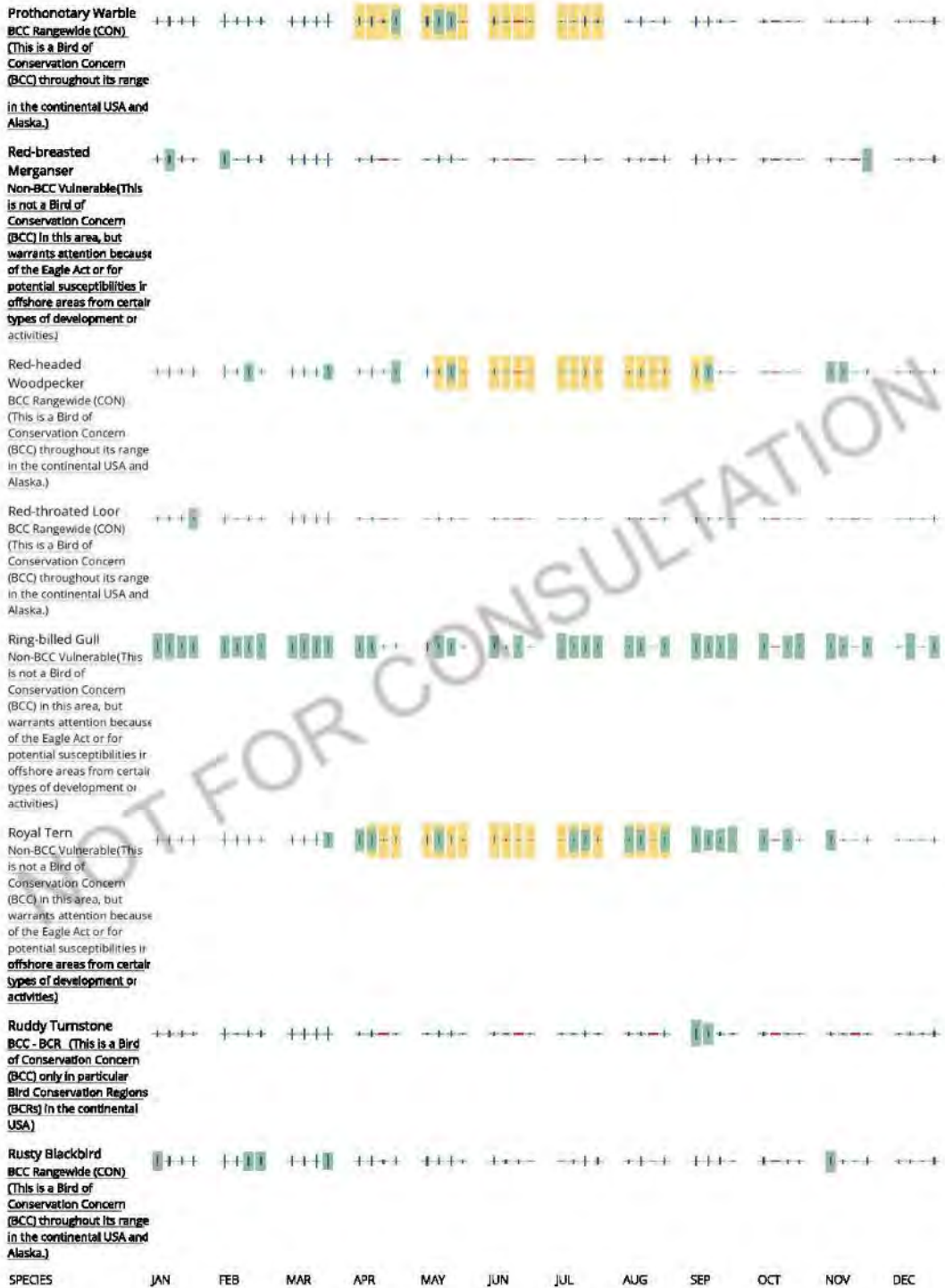
<https://ecos.fws.gov/ipac/project/2OOMP4DUVNB7EG4JFNY6XAD...>





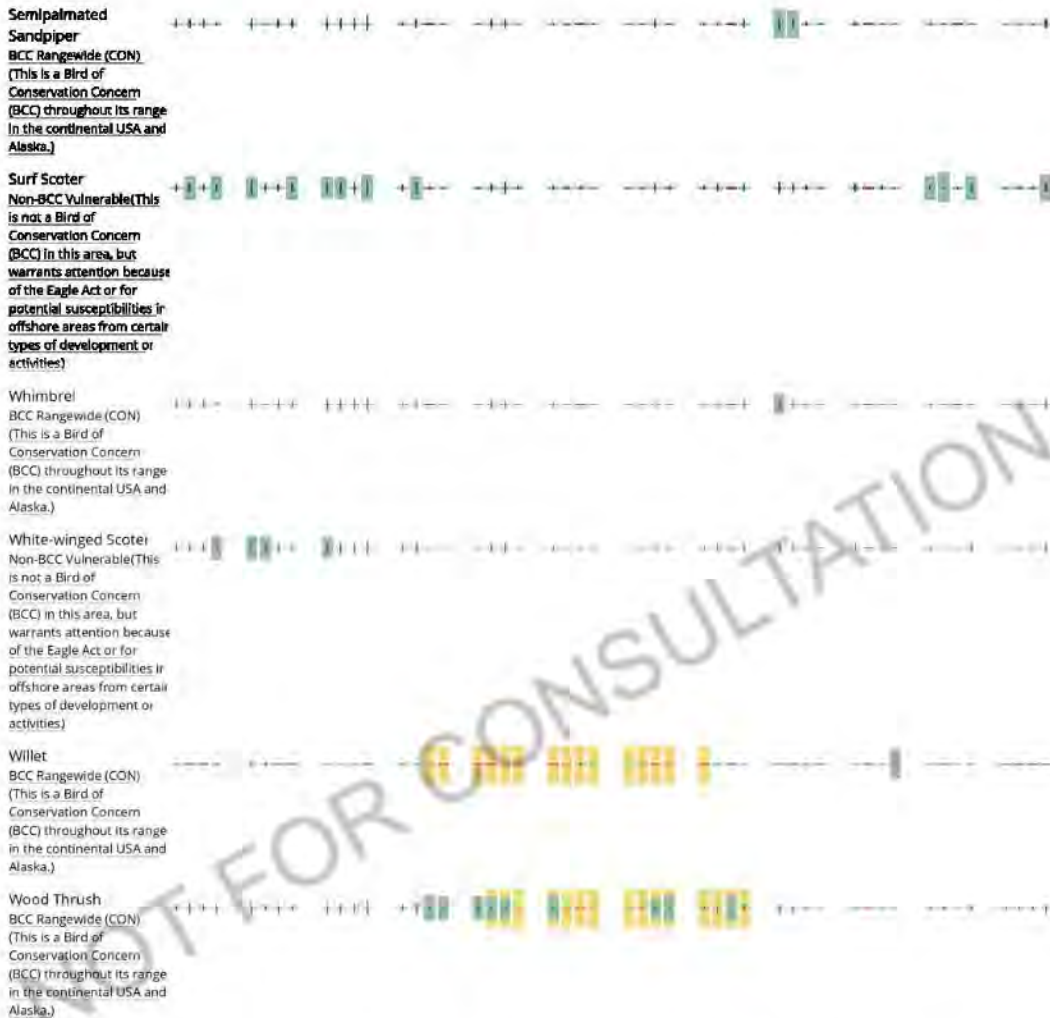
IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>



IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNB7EG4JFNY6XAD...>



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds are breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the [Probability of Presence Summary](#). [Additional measures and/or permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle [Eagle Act](#) requirements may apply, or a species that has a particular vulnerability.

IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>

#### offshore activities or development

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all that may occur in your project area. To get a list of all birds potentially present in your project area, please visit [AKN Phenology Tool](#)

#### What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#)

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how probability of presence graphs are produced and how to interpret them, go to the [Probability of Presence Summary](#) and then click on the "me about these graphs" link

#### How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may use the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#) or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "elsewhere" is indicated, then the bird likely does not breed in your project area

#### What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern \(BCC\)](#) that are of concern throughout their range anywhere within the U.S. (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands).
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing)

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics

#### Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. If relying on survey data may not include this information. For additional information on marine bird tracking data, visit [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#)

#### What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such an impact occur.

#### Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does the report use to generate the migratory birds potentially occurring in my specified location?". Please be aware this report provides the "probable presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal line)

IPaC: Resources

<https://ecos.fws.gov/ipac/project/2OOMP4DUVNBM7EG4JFNY6XAD...>

high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resource

## Facilities

### Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

## Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes

For more information please contact the Regulatory Program of the [U.S. Army Corps of Engineers District](#)

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects intersect many wetland areas. Try again, or visit the [NWI map](#) to view wetlands at this location

### Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type, and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through imagery analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the data source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences between **polygon boundaries or classifications between the information depicted on the map and the actual conditions on the ground.**

### Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercled worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

### Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

VaFWIS Search Report

https://vafwis.dgif.virginia.gov/fwis/NewPages/VaFWIS\_report\_search.a...



## Virginia Department of Game and Inland Fisheries

12/23/2020 9:58:29 AM

### Fish and Wildlife Information Service

VaFWIS Search Report Compiled on 12/23/2020, 9:58:29 AM

[Help](#)

Known or likely to occur within a **10 mile radius around point a point 1.1 miles from Dahlgren Populated Place King George**  
 (at 38,19.30.7 -77,01,57.7)  
 in 099 King George County, 193 Westmoreland County, VA

[View Map of Site Location](#)

481 Known or Likely Species ordered by Status Concern for Conservation

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>
060003	FESE	Ia	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon
010032	FESE	Ib	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus
040110	FTSE	Ia	<a href="#">Rail, eastern black</a>	Laterallus jamaicensis jamaicensis
050022	FTST	Ia	<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis
050020	SE	Ia	<a href="#">Bat, little brown</a>	Myotis lucifugus
050027	SE	Ia	<a href="#">Bat, tri-colored</a>	Perimyotis subflavus
020052	SE	IIa	<a href="#">Salamander, eastern tiger</a>	Ambystoma tigrinum
040293	ST	Ia	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus
040385	ST	Ia	<a href="#">Sparrow, Bachman's</a>	Peucaea aestivalis
040379	ST	Ia	<a href="#">Sparrow, I Henslow's</a>	Centronyx henslowii
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans
030067	CC	IIa	<a href="#">Terrapin, northern diamond-backed</a>	Malaclemys terrapin terrapin
030063	CC	IIIa	<a href="#">Turtle, spotted</a>	Clemmys guttata
040040		Ia	<a href="#">Ibis, glossy</a>	Plegadis falcinellus
100248		Ia	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia
040213		Ic	<a href="#">Owl, northern saw-whet</a>	Aegolius acadicus
040052		IIa	<a href="#">Duck, American black</a>	Anas rubripes
040029		IIa	<a href="#">Heron, little blue</a>	Egretta caerulea caerulea
040036		IIa	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea
040181		IIa	<a href="#">Tern, common</a>	Sterna hirundo
040320		IIa	<a href="#">Warbler, cerulean</a>	Setophaga cerulea
040140		IIa	<a href="#">Woodcock, American</a>	Scolopax minor
040203		IIb	<a href="#">Cuckoo, black-billed</a>	Coccyzus erythrophthalmus
040105		IIb	<a href="#">Rail, king</a>	Rallus elegans
010131		IIIa	<a href="#">Eel, American</a>	Anguilla rostrata
020005		IIIa	<a href="#">Frog, carpenter</a>	Lithobates virgatipes
020082		IIIa	<a href="#">Siren, eastern lesser</a>	Siren intermedia intermedia
030068		IIIa	<a href="#">Turtle, woodland box</a>	Terrapene carolina carolina
040037		IIIa	<a href="#">Bittern, least</a>	Ixobrychus exilis exilis
040100		IIIa	<a href="#">Bobwhite, northern</a>	Colinus virginianus
040046		IIIa	<a href="#">Brant</a>	Branta bernicla brota
040202		IIIa	<a href="#">Cuckoo, yellow-billed</a>	Coccyzus americanus
040099		IIIa	<a href="#">Grouse, ruffed</a>	Bonasa umbellus

VAFWIS Search Report

[https://vafwis.dgif.virginia.gov/fwis/NewPages/VaFWIS\\_report\\_search.a...](https://vafwis.dgif.virginia.gov/fwis/NewPages/VaFWIS_report_search.a...)

040094		IIIa	<a href="#">Harrier, northern</a>	Circus hudsonius
040035		IIIa	<a href="#">Night-heron, black-crowned</a>	Nycticorax nycticorax hoactii
040204		IIIa	<a href="#">Owl, barn</a>	Tyto alba pratincola
040180		IIIa	<a href="#">Tern, Forster's</a>	Sterna forsteri
040186		IIIa	<a href="#">Tern, least</a>	Sternula antillarum
040333		IIIa	<a href="#">Warbler, Kentucky</a>	Geothlypis formosa
040215		IIIa	<a href="#">Whip-poor-will, Eastern</a>	Antrostomus vociferus
100079		IIIa	<a href="#">Butterfly, monarch</a>	Danaus plexippus
040220		IIIb	<a href="#">Kingfisher, belted</a>	Megaceryle alcyon
010375		IIIc	<a href="#">Shiner, ironcolor</a>	Notropis chalybaeus
040247		IIIc	<a href="#">Swallow, bank</a>	Riparia riparia
010038		IVa	<a href="#">Herring, alewife</a>	Alosa pseudoharengus
010045		IVa	<a href="#">Herring, blueback</a>	Alosa aestivalis
010040		IVa	<a href="#">Shad, American</a>	Alosa sapidissima
020069		IVa	<a href="#">Salamander, eastern mud</a>	Pseudotriton montanus montanus
020058		IVa	<a href="#">Siren, greater</a>	Siren lacertina
030045		IVa	<a href="#">Ribbonsnake, common</a>	Thamnophis saurita saurita
030017		IVa	<a href="#">Scarletsnake, northern</a>	Cemophora coccinea copei
030046		IVa	<a href="#">Snake, common rainbow</a>	Farancia erythrogramma erythrogramma
030033		IVa	<a href="#">Snake, queen</a>	Regina septemvittata
040272		IVa	<a href="#">Catbird, gray</a>	Dumetella carolinensis
040337		IVa	<a href="#">Chat, yellow-breasted</a>	Icteria virens virens
040142		IVa	<a href="#">Dowitcher, short-billed</a>	Limnodromus griseus
040154		IVa	<a href="#">Dunlin</a>	Calidris alpina hudsonia
040173		IVa	<a href="#">Gull, laughing</a>	Leucophaeus atricilla
040229		IVa	<a href="#">Kingbird, eastern</a>	Tyrannus tyrannus
040003		IVa	<a href="#">Loon, red-throated</a>	Gavia stellata
040344		IVa	<a href="#">Meadowlark, eastern</a>	Sturnella magna
040054		IVa	<a href="#">Pintail, northern</a>	Anas acuta
040123		IVa	<a href="#">Plover, black-bellied</a>	Pluvialis squatarola
040106		IVa	<a href="#">Rail, clapper</a>	Rallus crepitans
040107		IVa	<a href="#">Rail, Virginia</a>	Rallus limicola
040065		IVa	<a href="#">Scaup, greater</a>	Aythya marila
040391		IVa	<a href="#">Sparrow, field</a>	Spizella pusilla
040378		IVa	<a href="#">Sparrow, grasshopper</a>	Ammodramus savannarum pratensis
040187		IVa	<a href="#">Tern, royal</a>	Sterna maxima maximus
040273		IVa	<a href="#">Thrasher, brown</a>	Toxostoma rufum
040375		IVa	<a href="#">Towhee, eastern</a>	Pipilo erythrophthalmus
040302		IVa	<a href="#">Warbler, black-and-white</a>	Mniotilta varia
040269		IVa	<a href="#">Wren, marsh</a>	Cistothorus palustris
050029		IVa	<a href="#">Bat, eastern red</a>	Lasiurus borealis
050030		IVa	<a href="#">Bat, hoary</a>	Lasiurus cinereus
050025		IVa	<a href="#">Bat, silver-haired</a>	Lasionycteris noctivagans
060157		IVa	<a href="#">Floater, Alewife</a>	Utterbackiana implicata
060074		IVa	<a href="#">Mucket, tidewater</a>	Leptodea ochracea
030050		IVb	<a href="#">Turtle, snapping</a>	Chelydra serpentina
040221		IVb	<a href="#">Flicker, northern</a>	Colaptes auratus
040028		IVb	<a href="#">Heron, green</a>	Butorides virescens

VAFWIS Search Report

[https://vafwis.dgif.virginia.gov/fwis/NewPages/VaFWIS\\_report\\_search.a...](https://vafwis.dgif.virginia.gov/fwis/NewPages/VaFWIS_report_search.a...)

040217		IVb	<a href="#">Swift, chimney</a>	<i>Chaetura pelagica</i>
040277		IVb	<a href="#">Thrush, wood</a>	<i>Hylocichla mustelina</i>
040340		IVb	<a href="#">Warbler, Canada</a>	<i>Cardellina canadensis</i>
040243		IVb	<a href="#">Wood-Pewee, Eastern</a>	<i>Contopus virens</i>
060184		IVb	<a href="#">Mussel, northern lance</a>	<i>Elliptio fisheriana</i>
010359		IVc	<a href="#">Lamprey, American brook</a>	<i>Lampetra appendix</i>
010001		IVc	<a href="#">Lamprey, least brook</a>	<i>Lampetra aepyptera</i>
010128		IVc	<a href="#">Madtom, tadpole</a>	<i>Noturus gyrinus</i>
010173		IVc	<a href="#">Sunfish, mud</a>	<i>Acantharchus pomotis</i>
020061		IVc	<a href="#">Spadefoot, eastern</a>	<i>Scaphiopus holbrookii</i>
030024		IVc	<a href="#">Snake, eastern hog-nosed</a>	<i>Heterodon platirhinos</i>
040248		IVc	<a href="#">Swallow, northern rough-winged</a>	<i>Stelgidopteryx serripennis</i>
060087		IVc	<a href="#">Snail, ridged lioplax</a>	<i>Lioplax subcarinata</i>
010188			<a href="#">Bass, largemouth</a>	<i>Micropterus salmoides</i>
010175			<a href="#">Bass, rock</a>	<i>Ambloplites rupestris</i>
010186			<a href="#">Bass, smallmouth</a>	<i>Micropterus dolomieu</i>
010187			<a href="#">Bass, spotted</a>	<i>Micropterus punctulatus</i>
010168			<a href="#">Bass, striped</a>	<i>Morone saxatilis</i>
010183			<a href="#">Bluegill</a>	<i>Lepomis macrochirus</i>
010034			<a href="#">Bowfin</a>	<i>Amia calva</i>
010123			<a href="#">Bullhead, brown</a>	<i>Ameiurus nebulosus</i>
010122			<a href="#">Bullhead, yellow</a>	<i>Ameiurus natalis</i>
010062			<a href="#">Carp, common</a>	<i>Cyprinus carpio</i>
010390			<a href="#">Catfish, blue</a>	<i>Ictalurus furcatus</i>
010125			<a href="#">Catfish, channel</a>	<i>Ictalurus punctatus</i>
010120			<a href="#">Catfish, white</a>	<i>Ameiurus catus</i>
010103			<a href="#">Chub, creek</a>	<i>Semotilus atromaculatus</i>
010106			<a href="#">Chubsucker, creek</a>	<i>Erimyzon oblongus</i>
010190			<a href="#">Crappie, black</a>	<i>Pomoxis nigromaculatus</i>
010250			<a href="#">Croaker, Atlantic</a>	<i>Micropogonias undulatus</i>
010101			<a href="#">Dace, blacknose</a>	<i>Rhinichthys atratulus</i>
010366			<a href="#">Dace, rosyside</a>	<i>Clinostomus funduloides</i>
010397			<a href="#">Darter, tessellated</a>	<i>Etheostoma olmstedii</i>
010104			<a href="#">Fallfish</a>	<i>Semotilus corporalis</i>
010176			<a href="#">Flier</a>	<i>Centrarchus macropterus</i>
010033			<a href="#">Gar, longnose</a>	<i>Lepisosteus osseus</i>
010312			<a href="#">Hogchoker</a>	<i>Trinectes maculatus</i>
010143			<a href="#">Killifish, banded</a>	<i>Fundulus diaphanus</i>
010146			<a href="#">Killifish, striped</a>	<i>Fundulus majalis</i>
010002			<a href="#">Lamprey, sea</a>	<i>Petromyzon marinus</i>
010129			<a href="#">Madtom, margined</a>	<i>Noturus insignis</i>
010043			<a href="#">Menhaden, Atlantic</a>	<i>Brevoortia tyrannus</i>
010408			<a href="#">Minnow, eastern silvery</a>	<i>Hybognathus regius</i>
010148			<a href="#">Mosquitofish, eastern</a>	<i>Gambusia holbrooki</i>
010054			<a href="#">Mudminnow, eastern</a>	<i>Umbra pygmaea</i>
010144			<a href="#">Mummichog</a>	<i>Fundulus heteroclitus</i>
010163			<a href="#">Perch, pirate</a>	<i>Aphredoderus sayanus sayanus</i>
010166			<a href="#">Perch, white</a>	<i>Morone americana</i>
010206			<a href="#">Perch, yellow</a>	<i>Perca flavescens</i>

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010056		<a href="#">Pickerel, chain</a>	<i>Esox niger</i>
010055		<a href="#">Pickerel, redfin</a>	<i>Esox americanus americanus</i>
010182		<a href="#">Pumpkinseed</a>	<i>Lepomis gibbosus</i>
010116		<a href="#">Redhorse, shorthead</a>	<i>Moxostoma macrolepidotum</i>
010407		<a href="#">Sculpin, Potomac</a>	<i>Cottus girardi</i>
010041		<a href="#">Shad, gizzard</a>	<i>Dorosoma cepedianum</i>
010039		<a href="#">Shad, hickory</a>	<i>Alosa mediocris</i>
010080		<a href="#">Shiner, common</a>	<i>Luxilus cornutus</i>
010068		<a href="#">Shiner, golden</a>	<i>Notemigonus crysoleucas</i>
010466		<a href="#">shiner, rosyface</a>	<i>Notropis rubellus</i>
010073		<a href="#">Shiner, satinfin</a>	<i>Cyprinella analostana</i>
010082		<a href="#">Shiner, spottail</a>	<i>Notropis hudsonius</i>
010086		<a href="#">Shiner, swallowtail</a>	<i>Notropis procer</i>
010303		<a href="#">Silverside, Atlantic</a>	<i>Menidia menidia</i>
010302		<a href="#">Silverside, inland</a>	<i>Menidia beryllina</i>
010458		<a href="#">Snakehead, northern</a>	<i>Channa argus</i>
010246		<a href="#">Spot</a>	<i>Leiostomus xanthurus</i>
010105		<a href="#">Sucker, white</a>	<i>Catostomus commersonii</i>
010178		<a href="#">Sunfish, bluespotted</a>	<i>Enneacanthus gloriosus</i>
010454		<a href="#">Sunfish, Genus = Lepomis</a>	<i>Lepomis</i> sp.
010181		<a href="#">Sunfish, green</a>	<i>Lepomis cyanellus</i>
010180		<a href="#">Sunfish, redbreast</a>	<i>Lepomis auritus</i>
010185		<a href="#">Sunfish, redear</a>	<i>Lepomis microlophus</i>
010177		<a href="#">Warmouth</a>	<i>Lepomis gulosus</i>
020004		<a href="#">Bullfrog, American</a>	<i>Lithobates catesbeianus</i>
020003		<a href="#">Frog, Brimley's chorus</a>	<i>Pseudacris brimleyi</i>
020016		<a href="#">Frog, Coastal Plains leopard</a>	<i>Lithobates sphenoccephalus utricularius</i>
020012		<a href="#">Frog, eastern cricket</a>	<i>Acris crepitans</i>
020008		<a href="#">Frog, green</a>	<i>Lithobates clamitans</i>
020013		<a href="#">Frog, pickerel</a>	<i>Lithobates palustris</i>
020018		<a href="#">Frog, upland chorus</a>	<i>Pseudacris feriarum</i>
020019		<a href="#">Frog, wood</a>	<i>Lithobates sylvaticus</i>
020065		<a href="#">Newt, red-spotted</a>	<i>Notophthalmus viridescens viridescens</i>
020071		<a href="#">Peeper, spring</a>	<i>Pseudacris crucifer</i>
020043		<a href="#">Salamander, eastern red-backed</a>	<i>Plethodon cinereus</i>
020029		<a href="#">Salamander, four-toed</a>	<i>Hemidactylium scutatum</i>
020035		<a href="#">Salamander, marbled</a>	<i>Ambystoma opacum</i>
020038		<a href="#">Salamander, northern dusky</a>	<i>Desmognathus fuscus</i>
020070		<a href="#">Salamander, northern red</a>	<i>Pseudotriton ruber ruber</i>
020050		<a href="#">Salamander, southern two-lined</a>	<i>Eurycea cirrigera</i>
020049		<a href="#">Salamander, spotted</a>	<i>Ambystoma maculatum</i>
020051		<a href="#">Salamander, three-lined</a>	<i>Eurycea guttolineata</i>
020080		<a href="#">Salamander, white-spotted slimy</a>	<i>Plethodon cylindraceus</i>
020059		<a href="#">Toad, eastern American</a>	<i>Anaxyrus americanus americanus</i>
020060		<a href="#">Toad, eastern narrow-mouthed</a>	<i>Gastrophryne carolinensis</i>
020062		<a href="#">Toad, Fowler's</a>	<i>Anaxyrus fowleri</i>
020006		<a href="#">Treefrog, Cope's gray</a>	<i>Hyla chrysoscelis</i>
020007		<a href="#">Treefrog, gray</a>	<i>Hyla versicolor</i>



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020009		<a href="#">Treefrog, green</a>	<i>Hyla cinerea</i>
030041		<a href="#">Brownsnake, Dekay's</a>	<i>Storeria dekayi</i>
030059		<a href="#">Cooter, eastern river</a>	<i>Pseudemys concinna concinna</i>
030057		<a href="#">Cooter, northern red-bellied</a>	<i>Pseudemys rubriventris</i>
030016		<a href="#">Copperhead, eastern</a>	<i>Agkistrodon contortrix</i>
030022		<a href="#">Cornsake, red</a>	<i>Pantherophis guttatus</i>
030049		<a href="#">Earthsake, eastern smooth</a>	<i>Virginia valeriae valeriae</i>
030044		<a href="#">Gartersnake, eastern</a>	<i>Thamnophis sirtalis sirtalis</i>
030038		<a href="#">Greensnake, northern rough</a>	<i>Opheodrys aestivus aestivus</i>
030026		<a href="#">Kingsnake, eastern</a>	<i>Lampropeltis getula</i>
030027		<a href="#">Kingsnake, northern mole</a>	<i>Lampropeltis rhombornaculata</i>
030002		<a href="#">Lizard, eastern fence</a>	<i>Sceloporus undulatus</i>
030029		<a href="#">Milksnake, eastern</a>	<i>Lampropeltis triangulum</i>
030018		<a href="#">Racer, northern black</a>	<i>Coluber constrictor constrictor</i>
030008		<a href="#">Racerunner, eastern six-lined</a>	<i>Aspidoscelis sexlineata sexlineata</i>
030023		<a href="#">Ratsnake, eastern</a>	<i>Pantherophis alleghaniensis</i>
030006		<a href="#">Skink, broad-headed</a>	<i>Plestiodon laticeps</i>
030004		<a href="#">Skink, common five-lined</a>	<i>Plestiodon fasciatus</i>
030007		<a href="#">Skink, little brown</a>	<i>Scincella lateralis</i>
030005		<a href="#">Skink, southeastern five-lined</a>	<i>Plestiodon inexpectatus</i>
030042		<a href="#">Snake, northern red-bellied</a>	<i>Storeria occipitomaculata occipitomaculata</i>
030020		<a href="#">Snake, northern ring-necked</a>	<i>Diadophis punctatus edwardsii</i>
030052		<a href="#">Turtle, eastern musk</a>	<i>Sternotherus odoratus</i>
030060		<a href="#">Turtle, eastern painted</a>	<i>Chrysemys picta picta</i>
030051		<a href="#">Turtle, southeastern mud</a>	<i>Kinostemon subrubrum subrubrum</i>
030034		<a href="#">Watersnake, northern</a>	<i>Nerodia sipedon sipedon</i>
030019		<a href="#">Wormsnake, eastern</a>	<i>Carpophis amoenus amoenus</i>
040038		<a href="#">Bittern, American</a>	<i>Botaurus lentiginosus</i>
040346		<a href="#">Blackbird, red-winged</a>	<i>Agelaius phoeniceus</i>
040282		<a href="#">Bluebird, eastern</a>	<i>Sialia sialis</i>
040068		<a href="#">Bufflehead</a>	<i>Bucephala albeola</i>
040361		<a href="#">Bunting, indigo</a>	<i>Passerina cyanea</i>
040401		<a href="#">Bunting, snow</a>	<i>Plectrophenax nivalis nivalis</i>
040064		<a href="#">Canvasback</a>	<i>Aythya valisineria</i>
040357		<a href="#">Cardinal, northern</a>	<i>Cardinalis cardinalis</i>
040258		<a href="#">Chickadee, Carolina</a>	<i>Poecile carolinensis</i>
040214		<a href="#">Chuck-will's-widow</a>	<i>Antrostomus carolinensis</i>
040113		<a href="#">Coot, American</a>	<i>Fulica americana</i>
040024		<a href="#">Cormorant, double-crested</a>	<i>Phalacrocorax auritus</i>
040023		<a href="#">Cormorant, great</a>	<i>Phalacrocorax carbo</i>
040353		<a href="#">Cowbird, brown-headed</a>	<i>Molothrus ater</i>
040264		<a href="#">Creepie, brown</a>	<i>Certhia americana</i>
040373		<a href="#">Crossbill, white-winged</a>	<i>Loxia leucoptera</i>
040255		<a href="#">Crow, American</a>	<i>Corvus brachyrhynchos</i>
040256		<a href="#">Crow, fish</a>	<i>Corvus ossifragus</i>
040364		<a href="#">Dickcissel</a>	<i>Spiza americana</i>
040198		<a href="#">Dove, mourning</a>	<i>Zenaidura macroura carolinensis</i>
040069		<a href="#">Duck, long-tailed</a>	<i>Clangula hyemalis</i>

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040076		<a href="#">Duck, ruddy</a>	<i>Oxyura jamaicensis</i>
040061		<a href="#">Duck, wood</a>	<i>Aix sponsa</i>
040093		<a href="#">Eagle, bald</a>	<i>Haliaeetus leucocephalus</i>
040030		<a href="#">Egret, cattle</a>	<i>Bubulcus ibis</i>
040032		<a href="#">Egret, great</a>	<i>Ardea alba egretta</i>
040367		<a href="#">Finch, house</a>	<i>Haemorhous mexicanus</i>
040366		<a href="#">Finch, purple</a>	<i>Haemorhous purpureus</i>
040239		<a href="#">Flycatcher, Acadian</a>	<i>Empidonax virescens</i>
040234		<a href="#">Flycatcher, great crested</a>	<i>Myiarchus crinitus</i>
040240		<a href="#">Flycatcher, willow</a>	<i>Empidonax traillii</i>
040053		<a href="#">Gadwall</a>	<i>Mareca strepera</i>
040284		<a href="#">Gnatcatcher, blue-gray</a>	<i>Poliptila caerulea</i>
040067		<a href="#">Goldeneye, common</a>	<i>Bucephala clangula americana</i>
040371		<a href="#">Goldfinch, American</a>	<i>Spinus tristis</i>
040045		<a href="#">Goose, Canada</a>	<i>Branta canadensis</i>
040049		<a href="#">Goose, lesser snow</a>	<i>Chen caerulescens caerulescens</i>
040410		<a href="#">Goose, snow</a>	<i>Chen caerulescens</i>
040352		<a href="#">Grackle, common</a>	<i>Quiscalus quiscula</i>
040005		<a href="#">Grebe, horned</a>	<i>Podiceps auritus</i>
040008		<a href="#">Grebe, pied-billed</a>	<i>Podilymbus podiceps</i>
040004		<a href="#">Grebe, red-necked</a>	<i>Podiceps grisegena</i>
040360		<a href="#">Grosbeak, blue</a>	<i>Passerina caerulea</i>
040365		<a href="#">Grosbeak, evening</a>	<i>Coccothraustes vespertinus</i>
040358		<a href="#">Grosbeak, rose-breasted</a>	<i>Phencticus ludovicianus</i>
040165		<a href="#">Gull, great black-backed</a>	<i>Larus marinus</i>
040167		<a href="#">Gull, herring</a>	<i>Larus argentatus</i>
040170		<a href="#">Gull, ring-billed</a>	<i>Larus delawarensis</i>
040089		<a href="#">Hawk, broad-winged</a>	<i>Buteo platypterus</i>
040086		<a href="#">Hawk, Cooper's</a>	<i>Accipiter cooperii</i>
040088		<a href="#">Hawk, red-shouldered</a>	<i>Buteo lineatus lineatus</i>
040087		<a href="#">Hawk, red-tailed</a>	<i>Buteo jamaicensis</i>
040090		<a href="#">Hawk, rough-legged</a>	<i>Buteo lagopus johannis</i>
040085		<a href="#">Hawk, sharp-shinned</a>	<i>Accipiter striatus velox</i>
040027		<a href="#">Heron, great blue</a>	<i>Ardea herodias herodias</i>
040034		<a href="#">Heron, tricolored</a>	<i>Egretta tricolor</i>
040218		<a href="#">Hummingbird, ruby-throated</a>	<i>Archilochus colubris</i>
040252		<a href="#">Jay, blue</a>	<i>Cyanocitta cristata</i>
040387		<a href="#">Junco, dark-eyed</a>	<i>Junco hyemalis</i>
040098		<a href="#">Kestrel, American</a>	<i>Falco sparverius sparverius</i>
040119		<a href="#">Killdeer</a>	<i>Charadrius vociferus</i>
040285		<a href="#">Kinglet, golden-crowned</a>	<i>Regulus satrapa</i>
040286		<a href="#">Kinglet, ruby-crowned</a>	<i>Regulus calendula</i>
040245		<a href="#">Lark, horned</a>	<i>Bremophila alpestris</i>
040001		<a href="#">Loon, common</a>	<i>Gavia immer</i>
040051		<a href="#">Mallard</a>	<i>Anas platyrhynchos</i>
040251		<a href="#">Martin, purple</a>	<i>Progne subis</i>
040078		<a href="#">Merganser, common</a>	<i>Mergus merganser americanus</i>
040079		<a href="#">Merganser, red-breasted</a>	<i>Mergus serrator serrator</i>
040271		<a href="#">Mockingbird, northern</a>	<i>Mimus polyglottos</i>

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040112		<a href="#">Moorhen, common</a>	<i>Gallinula chloropus cachinnans</i>
040216		<a href="#">Nighthawk, common</a>	<i>Chordeiles minor</i>
040263		<a href="#">Nuthatch, brown-headed</a>	<i>Sitta pusilla</i>
040262		<a href="#">Nuthatch, red-breasted</a>	<i>Sitta canadensis</i>
040261		<a href="#">Nuthatch, white-breasted</a>	<i>Sitta carolinensis</i>
040348		<a href="#">Oriole, Baltimore</a>	<i>Icterus galbula</i>
040347		<a href="#">Oriole, orchard</a>	<i>Icterus spurius</i>
040095		<a href="#">Osprey</a>	<i>Pandion haliaetus carolinensis</i>
040330		<a href="#">Ovenbird</a>	<i>Seiurus aurocapilla</i>
040209		<a href="#">Owl, barred</a>	<i>Strix varia</i>
040206		<a href="#">Owl, great horned</a>	<i>Bubo virginianus</i>
040211		<a href="#">Owl, short-eared</a>	<i>Asio flammeus</i>
040207		<a href="#">Owl, snowy</a>	<i>Bubo scandiacus</i>
040312		<a href="#">Parula, northern</a>	<i>Setophaga americana</i>
040101		<a href="#">Pheasant, ring-necked</a>	<i>Phasianus colchicus</i>
040236		<a href="#">Phoebe, eastern</a>	<i>Sayornis phoebe</i>
040197		<a href="#">Pigeon, rock</a>	<i>Columba livia</i>
040287		<a href="#">Pipit, American</a>	<i>Anthus rubescens</i>
040062		<a href="#">Redhead</a>	<i>Aythya americana</i>
040341		<a href="#">Redstart, American</a>	<i>Setophaga ruticilla</i>
040275		<a href="#">Robin, American</a>	<i>Turdus migratorius</i>
040134		<a href="#">Sandpiper, spotted</a>	<i>Actitis macularia</i>
040129		<a href="#">Sandpiper, upland</a>	<i>Bartramia longicauda</i>
040225		<a href="#">Sapsucker, yellow-bellied</a>	<i>Sphyrapicus varius</i>
040066		<a href="#">Scaup, lesser</a>	<i>Aythya affinis</i>
040075		<a href="#">Scoter, black</a>	<i>Melanitta americana</i>
040074		<a href="#">Scoter, surf</a>	<i>Melanitta perspicillata</i>
040205		<a href="#">Screech-owl, eastern</a>	<i>Megascops asio</i>
040060		<a href="#">Shoveler, northern</a>	<i>Anas clypeata</i>
040370		<a href="#">Siskin, pine</a>	<i>Spinus pinus</i>
040141		<a href="#">Snipe, Wilson's</a>	<i>Gallinago delicata</i>
040389		<a href="#">Sparrow, chipping</a>	<i>Spizella passerina</i>
040395		<a href="#">Sparrow, fox</a>	<i>Passerella iliaca</i>
040342		<a href="#">Sparrow, house</a>	<i>Passer domesticus</i>
040377		<a href="#">Sparrow, savannah</a>	<i>Passerculus sandwichensis</i>
040398		<a href="#">Sparrow, song</a>	<i>Melospiza melodia</i>
040397		<a href="#">Sparrow, swamp</a>	<i>Melospiza georgiana</i>
040383		<a href="#">Sparrow, vesper</a>	<i>Poocetes gramineus</i>
040393		<a href="#">Sparrow, white-crowned</a>	<i>Zonotrichia leucophrys</i>
040394		<a href="#">Sparrow, white-throated</a>	<i>Zonotrichia albicollis</i>
040294		<a href="#">Starling, European</a>	<i>Sturnus vulgaris</i>
040249		<a href="#">Swallow, barn</a>	<i>Hirundo rustica</i>
040246		<a href="#">Swallow, tree</a>	<i>Tachycineta bicolor</i>
040044		<a href="#">Swan, tundra</a>	<i>Cygnus columbianus columbianus</i>
040355		<a href="#">Tanager, scarlet</a>	<i>Piranga olivacea</i>
040356		<a href="#">Tanager, summer</a>	<i>Piranga rubra</i>
040057		<a href="#">Teal, blue-winged</a>	<i>Spatula discors</i>
040056		<a href="#">Teal, green-winged</a>	<i>Anas crecca carolinensis</i>
040189		<a href="#">Tern, Caspian</a>	<i>Hydroprogne caspia</i>

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040278		<a href="#">Thrush, hermit</a>	<i>Catharus guttatus</i>
040279		<a href="#">Thrush, Swainson's</a>	<i>Catharus ustulatus</i>
040260		<a href="#">Titmouse, tufted</a>	<i>Parolophus bicolor</i>
040102		<a href="#">Turkey, wild</a>	<i>Meleagris gallopavo silvestris</i>
040299		<a href="#">Vireo, red-eyed</a>	<i>Vireo olivaceus</i>
040301		<a href="#">Vireo, warbling</a>	<i>Vireo gilvus gilvus</i>
040295		<a href="#">Vireo, white-eyed</a>	<i>Vireo griseus</i>
040297		<a href="#">Vireo, yellow-throated</a>	<i>Vireo flavifrons</i>
040081		<a href="#">Vulture, black</a>	<i>Coragyps atratus</i>
040080		<a href="#">Vulture, turkey</a>	<i>Cathartes aura</i>
040316		<a href="#">Warbler, black-throated blue</a>	<i>Setophaga caerulescens</i>
040319		<a href="#">Warbler, black-throated green</a>	<i>Setophaga virens</i>
040325		<a href="#">Warbler, blackpoll</a>	<i>Setophaga striata</i>
040307		<a href="#">Warbler, blue-winged</a>	<i>Vermivora cyanoptera</i>
040323		<a href="#">Warbler, chestnut-sided</a>	<i>Setophaga pensylvanica</i>
040338		<a href="#">Warbler, hooded</a>	<i>Setophaga citrina</i>
040314		<a href="#">Warbler, magnolia</a>	<i>Setophaga magnolia</i>
040311		<a href="#">Warbler, Nashville</a>	<i>Leiosthlypis ruficapilla</i>
040329		<a href="#">Warbler, palm</a>	<i>Setophaga palmarum</i>
040326		<a href="#">Warbler, pine</a>	<i>Setophaga pinus</i>
040328		<a href="#">Warbler, prairie</a>	<i>Setophaga discolor</i>
040303		<a href="#">Warbler, prothonotary</a>	<i>Protonotaria citrea</i>
040305		<a href="#">Warbler, worm-eating</a>	<i>Helmitheros vermivorus</i>
040313		<a href="#">Warbler, yellow</a>	<i>Setophaga petechia</i>
040317		<a href="#">Warbler, yellow-rumped</a>	<i>Setophaga coronata</i>
040322		<a href="#">Warbler, yellow-throated</a>	<i>Setophaga dominica</i>
040332		<a href="#">Waterthrush, Louisiana</a>	<i>Parlesia motacilla</i>
040331		<a href="#">Waterthrush, northern</a>	<i>Parlesia noveboracensis</i>
040290		<a href="#">Waxwing, cedar</a>	<i>Bombocilla cedrorum</i>
040059		<a href="#">Wigeon, American</a>	<i>Mareca americana</i>
040058		<a href="#">Wigeon, Eurasian</a>	<i>Mareca penelope</i>
040227		<a href="#">Woodpecker, downy</a>	<i>Dryobates pubescens</i>
040226		<a href="#">Woodpecker, hairy</a>	<i>Dryobates villosus</i>
040222		<a href="#">Woodpecker, pileated</a>	<i>Dryocopus pileatus</i>
040223		<a href="#">Woodpecker, red-bellied</a>	<i>Melanerpes carolinus</i>
040224		<a href="#">Woodpecker, red-headed</a>	<i>Melanerpes erythrocephalus</i>
040268		<a href="#">Wren, Carolina</a>	<i>Thryothorus ludovicianus</i>
040265		<a href="#">Wren, house</a>	<i>Troglodytes aedon</i>
040270		<a href="#">Wren, sedge</a>	<i>Cistothorus platensis</i>
040266		<a href="#">Wren, winter</a>	<i>Troglodytes troglodytes</i>
040336		<a href="#">Yellowthroat, common</a>	<i>Geothlypis trichas</i>
050028		<a href="#">Bat, big brown</a>	<i>Eptesicus fuscus</i>
050033		<a href="#">Bat, evening</a>	<i>Nycticeius humeralis</i>
050037		<a href="#">Bear, American black</a>	<i>Ursus americanus</i>
050069		<a href="#">Beaver, American</a>	<i>Castor canadensis</i>
050051		<a href="#">Bobcat</a>	<i>Lynx rufus rufus</i>
050055		<a href="#">Chipmunk, Fisher's eastern</a>	<i>Tamias striatus fisheri</i>
050103		<a href="#">Cottontail, eastern</a>	<i>Sylvilagus floridanus mallurus</i>
050125		<a href="#">Coyote</a>	<i>Canis latrans</i>

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050108		<a href="#">Deer, white-tailed</a>	<i>Odocoileus virginianus</i>
050050		<a href="#">Fox, common gray</a>	<i>Urocyon cinereoargenteus cinereoargenteus</i>
050049		<a href="#">Fox, red</a>	<i>Vulpes vulpes fulva</i>
050042		<a href="#">Mink, common</a>	<i>Neovison vison mink</i>
050017		<a href="#">Mole, eastern</a>	<i>Scalopus aquaticus aquaticus</i>
050019		<a href="#">Mole, star-nosed</a>	<i>Condylura cristata cristata</i>
050074		<a href="#">Mouse, common white-footed</a>	<i>Peromyscus leucopus leucopus</i>
050071		<a href="#">Mouse, eastern harvest</a>	<i>Reithrodontomys humulis virginianus</i>
050098		<a href="#">Mouse, house</a>	<i>Mus musculus musculus</i>
050099		<a href="#">Mouse, meadow jumping</a>	<i>Zapus hudsonius americanus</i>
050073		<a href="#">Mouse, northern white-footed</a>	<i>Peromyscus leucopus noveboracensis</i>
050093		<a href="#">Muskrat, large-toothed</a>	<i>Ondatra zibethicus macrodon</i>
050001		<a href="#">Opossum, Virginia</a>	<i>Didelphis virginiana virginiana</i>
050045		<a href="#">Otter, northern river</a>	<i>Lontra canadensis lataxina</i>
050038		<a href="#">Raccoon</a>	<i>Procyon lotor lotor</i>
050078		<a href="#">Rat, marsh rice</a>	<i>Oryzomys palustris palustris</i>
050095		<a href="#">Rat, Norway</a>	<i>Rattus norvegicus norvegicus</i>
050010		<a href="#">Shrew, American pygmy</a>	<i>Sorex hoyi</i>
050015		<a href="#">Shrew, least</a>	<i>Cryptotis parva</i>
050012		<a href="#">Shrew, northern short-tailed</a>	<i>Blarina brevicauda churchi</i>
050013		<a href="#">Shrew, northern short-tailed</a>	<i>Blarina brevicauda kirtlandi</i>
050007		<a href="#">Shrew, southeastern</a>	<i>Sorex longirostris longirostris</i>
050011		<a href="#">Shrew, southern short-tailed</a>	<i>Blarina carolinensis</i>
050047		<a href="#">Skunk, striped</a>	<i>Mephitis mephitis nigra</i>
050048		<a href="#">Skunk, striped</a>	<i>Mephitis mephitis mephitis</i>
050063		<a href="#">Squirrel, eastern fox</a>	<i>Sciurus niger vulpinus</i>
050057		<a href="#">Squirrel, eastern gray</a>	<i>Sciurus carolinensis carolinensis</i>
050058		<a href="#">Squirrel, northern gray</a>	<i>Sciurus carolinensis pennsylvanicus</i>
050065		<a href="#">Squirrel, southern flying</a>	<i>Glaucomys volans volans</i>
050059		<a href="#">Squirrel, talkative red</a>	<i>Tamiasciurus hudsonicus loquax</i>
050082		<a href="#">Vole, meadow</a>	<i>Microtus pennsylvanicus pennsylvanicus</i>
050091		<a href="#">Vole, pine</a>	<i>Microtus pinetorum scalopsoides</i>
050041		<a href="#">Weasel, long-tailed</a>	<i>Mustela frenata noveboracensis</i>
050054		<a href="#">Woodchuck</a>	<i>Marmota monax monax</i>
060016		<a href="#">Campeloma, pointed</a>	<i>Campeloma decisum</i>
060177		<a href="#">Clam, Asian</a>	<i>Corbicula fluminea</i>
060227		<a href="#">Clam, Unknown Fingernail - Genus = Musculium</a>	<i>Musculium sp.</i>
060226		<a href="#">Clam, Unknown Pea - Genus = Pisidium</a>	<i>Pisidium sp.</i>
060229		<a href="#">Limpet, Unknown - Genus = Ferrissia</a>	<i>Ferrissia sp.</i>
060025		<a href="#">Mussel, eastern elliptio</a>	<i>Elliptio complanata</i>
060228		<a href="#">Physa, Unknown - Genus = Physella</a>	<i>Physella sp.</i>
060095		<a href="#">Snail, European physa</a>	<i>Physella acuta</i>
060203		<a href="#">Snail, Fossaria</a>	<i>Fossaria exigua</i>

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060061		<a href="#">Snail, Piedmont elimia</a>	<i>Elimia virginica</i>
060116		<a href="#">Snail, slender walker</a>	<i>Pomatiopsis lapidaria</i>
070099		<a href="#">Crayfish</a>	<i>Fallicambarus uhleri</i>
070095		<a href="#">Crayfish, devil</a>	<i>Cambarus diogenes diogenes</i>
070126		<a href="#">Crayfish, Digger</a>	<i>Fallicambarus fodiens</i>
070094		<a href="#">Crayfish, no common name</a>	<i>Cambarus acuminatus</i>
070098		<a href="#">Crayfish, spiny cheek</a>	<i>Faxonius limosus</i>
070120		<a href="#">Crayfish, White River</a>	<i>Procambarus acutus</i>
090101		<a href="#">Worm, tubificid</a>	<i>Enchytraeid</i> spp. A
100043		<a href="#">Armyworm</a>	<i>Pseudaletia unipuncta</i>
100041		<a href="#">Borer, European corn</a>	<i>Ostrinia nubilalis</i>
100181		<a href="#">Butterfly, Aaron's skipper</a>	<i>Poanes aaroni</i>
100262		<a href="#">Butterfly, American lady</a>	<i>Vanessa virginiensis</i>
100245		<a href="#">Butterfly, American snout</a>	<i>Libytheana carinenta</i>
100092		<a href="#">Butterfly, black swallowtail</a>	<i>Papilio polyxenes asterius</i>
100179		<a href="#">Butterfly, broad-winged skipper</a>	<i>Poanes viator</i>
100205		<a href="#">Butterfly, cabbage white</a>	<i>Pieris rapae</i>
100167		<a href="#">Butterfly, carus skipper</a>	<i>Polites carus</i>
100206		<a href="#">Butterfly, checkered white</a>	<i>Pontia protodice</i>
100159		<a href="#">Butterfly, clouded skipper</a>	<i>Lerema accius</i>
100094		<a href="#">Butterfly, clouded sulphur</a>	<i>Colias philodice</i>
100157		<a href="#">Butterfly, common sootywing</a>	<i>Pholisora catullus</i>
100277		<a href="#">Butterfly, common wood-nymph</a>	<i>Cercyonis pegala</i>
100144		<a href="#">Butterfly, confused cloudywing</a>	<i>Thorybes confusus</i>
100238		<a href="#">Butterfly, eastern tailed-blue</a>	<i>Everes comyntas</i>
100093		<a href="#">Butterfly, eastern tiger swallowtail</a>	<i>Papilio glaucus</i>
100209		<a href="#">Butterfly, falcate orangetip</a>	<i>Anthocharis midea</i>
100249		<a href="#">Butterfly, great spangled fritillary</a>	<i>Speyeria cybele</i>
100270		<a href="#">Butterfly, hackberry emperor</a>	<i>Asterocampa celtis</i>
100145		<a href="#">Butterfly, Hayhurst's scallopwing</a>	<i>Staphylus hayhurstii</i>
100224		<a href="#">Butterfly, Henry's elfin</a>	<i>Callophrys henrici</i>
100141		<a href="#">Butterfly, hoary edge</a>	<i>Achalarus lyciades</i>
100148		<a href="#">Butterfly, Juvenal's duskywing</a>	<i>Brynnis juvenalis</i>
100160		<a href="#">Butterfly, least skipper</a>	<i>Ancyloxypha numitor</i>
100175		<a href="#">Butterfly, little glassywing</a>	<i>Pompeius verna</i>
100090		<a href="#">Butterfly, mourning cloak</a>	<i>Nymphalis antiopa</i>
100143		<a href="#">Butterfly, northern cloudywing</a>	<i>Thorybes pylades</i>
100236		<a href="#">Butterfly, olive juniper hairstreak</a>	<i>Callophrys gryneus gryneus</i>
100211		<a href="#">Butterfly, orange sulphur</a>	<i>Colias eurytheme</i>
100257		<a href="#">Butterfly, pearl crescent</a>	<i>Phyciodes tharos</i>
100359		<a href="#">Butterfly, Peck's skipper</a>	<i>Polites peckius</i>
100235		<a href="#">Butterfly, red-banded hairstreak</a>	<i>Calycopis cecrops</i>
100268		<a href="#">Butterfly, red-spotted purple</a>	<i>Limenitis arthemis astyanax</i>
100174		<a href="#">Butterfly, sachein</a>	<i>Atalopedes campestris</i>
100198		<a href="#">Butterfly, salt marsh skipper</a>	<i>Panoquina panoquin</i>
100082		<a href="#">Butterfly, silver-spotted skipper</a>	<i>Epargyreus clarus</i>
100142		<a href="#">Butterfly, southern cloudywing</a>	<i>Thorybes bathyllus</i>
100202		<a href="#">Butterfly, spicebush swallowtail</a>	<i>Papilio troilus</i>
100158		<a href="#">Butterfly, swarthy skipper</a>	<i>Nastra therminier</i>

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100169		<a href="#">Butterfly, tawny-edged skipper</a>	Polites themistocles
100247		<a href="#">Butterfly, variegated fritillary</a>	Euptoieta claudia
100266		<a href="#">Butterfly, viceroy</a>	Limenitis archippus
100180		<a href="#">Butterfly, Zabulon skipper</a>	Poanes zabulon
100204		<a href="#">Butterfly, zebra swallowtail</a>	Eurytides marcellus
100026		<a href="#">Deerfly</a>	Chrysops vittatus vittatus
100042		<a href="#">Earworm, corn</a>	Heliathis zea
100016		<a href="#">Gnat</a>	Culicoides stellifer
100040		<a href="#">Moth, codling</a>	Cydia pomonella
100047		<a href="#">Moth, gypsy</a>	Lymantria dispar
100302		<a href="#">Moth, Plebeian sphinx</a>	Paratreia plebeja
110230		<a href="#">Tick, American dog</a>	Dermacentor variabilis
110232		<a href="#">Tick, brown dog</a>	Rhipicephalus sanguineus
110228		<a href="#">Tick, lone star</a>	Amblyomma americanum
110231		<a href="#">Tick, rabbit</a>	Haemaphysalis leporispalustris
110229		<a href="#">Tick, winter</a>	Dermacentor albipictus

\*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed;  
 FC=Federal Candidate; CC=Collection Concern

\*\*I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;

II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;

III=VA Wildlife Action Plan - Tier III - High Conservation Need;

IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Virginia Wildlife Action Plan Conservation Opportunity Ranking:

a - On the ground management strategies/actions exist and can be feasibly implemented.;

b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;

c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

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audit no. 1069536 12/23/2020 9:58:30 AM Virginia Fish and Wildlife Information Service

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**Appendix 2B**  
**Fish with Designated Essential Fish Habitat at or**  
**Near Naval Support Facility Dahlgren**

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title

<https://www.habitat.noaa.gov/protection/efh/efhmapper/>

### NSFDL NOAA EFH Mapper Report

**EFH Data Notice:** Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office  
 Atlantic Highly Migratory Species Management Division

### Query Results

Degrees, Minutes, Seconds: Latitude = 38°18'56" N, Longitude = 78°58'49" W  
 Decimal Degrees: Latitude = 38.32, Longitude = -77.02

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

### \*\*\* WARNING \*\*\*

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

### EFH

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Little Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
			Atlantic Herring	Juvenile Adult	New England	Amendment 3 to the Atlantic Herring FMP
			Red Hake	Adult Eggs/Larvae /Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Winter Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP

title

<https://www.habitat.noaa.gov/protection/efh/efhmapper/>

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
			Windowpane Flounder	Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish
			Summer Flounder	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

**HAPCs**

Show	Link	Data Caveats	HAPC Name	Management Council
			Summer Flounder	MAFMC

**EFH Areas Protected from Fishing**

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

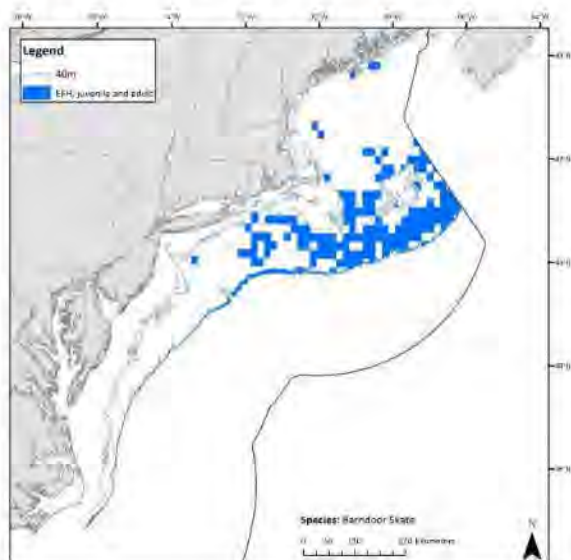
**Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.**

**\*\*For links to all EFH text descriptions see the complete data inventory: [open data inventory -->](#)**

**Mid-Atlantic Council HAPCs,**

No spatial data for summer flounder SAV HAPC.

Map 89 – Barndoor skate juvenile and adult EFH.



#### 2.2.4.4 Little skate

The proposed EFH maps for juvenile and adult little skate are based on the distribution of depths and bottom temperatures that are associated with high catch rates of juveniles or adults in the 1963-2003 spring and fall NMFS trawl surveys. Depth and bottom temperature information from the EFH Source Document was used to supplement survey information as needed. The proposed new maps are also based on average catch per tow data for juveniles and adults, respectively, in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75<sup>th</sup> percentile of catch level, and they include inshore areas where juvenile or adult little skate were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys and ELMR information. The ELMR information for the Mid-Atlantic area was re-interpreted to add EFH for juvenile little skate to five inshore areas south of Raritan Bay, including Delaware Bay, and to eliminate the no action designations for juveniles and adults in Chesapeake Bay (see Appendix A). Some of the estuaries and embayments north of Cape Cod that were not originally designated as EFH were also added to the new maps.<sup>34</sup> These juvenile and adult designations were referred to as 3C alternatives in the Phase 1 DEIS.

<sup>34</sup> For some reason, none of the original EFH designations for any of the skate species (NMFS 2002) included the ELMR areas north of Cape Cod, even though the abundance of “skates” (unidentified to species) were evaluated in the North and Mid-Atlantic regions (see Jury et al. 1994 and Stone et al. 1994). This was an oversight since four of the skate species managed by the New England Fishery Management Council – including little skate – are common in the Gulf of Maine (see Appendix A).

The proposed EFH map for juvenile little skate extends over most of the continental shelf from Delaware Bay to Georges Bank (to a maximum depth of 80 meters) and includes considerably more coastal waters in the Gulf of Maine than the original EFH map. The no action map – because it was based on 100% of the NMFS survey data – extends all the way to the shelf break. The no action and proposed new EFH maps for adult little skate are more similar than the juvenile maps, but there are some differences. As proposed, EFH would include more coastal waters in New Jersey and the Gulf of Maine. Chesapeake Bay would no longer be designated as EFH for little skate (juveniles or adults) if the proposed designations are approved and the high salinity zones of nearly all the ELMR areas north of Cape Cod would be added to the designations. The level 2 EFH depth information provided for both life stages in the no action text descriptions is the same, and is very restricted (73-91 m), as opposed to the broader depth ranges identified in the proposed descriptions, which would extend EFH more explicitly into nearshore waters with maximum depths of 80 (juveniles) and 100 (adults) meters. The substrate information in the no action and proposed new designations is the same.

As modified, the proposed map for juvenile little skates extends into deeper water (80 vs. 70 meters) and thus includes more of the continental shelf than the map that was approved in June 2007; it also excludes Chesapeake Bay. The modified adult map is very similar to the original approved map since the maximum depth did not change. The only noticeable changes are the addition of shallow water on Georges Bank (the minimum depth on the shelf was reduced from 30 to 20 meters) and the elimination of Chesapeake Bay.

**Text descriptions:**

For little skate (*Leucoraja erinacea*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 28 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

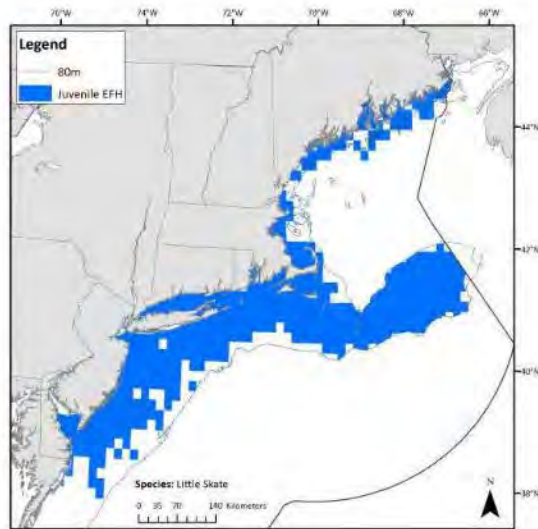
**Juveniles:** Intertidal and sub-tidal benthic habitats in coastal waters of the Gulf of Maine and in the Mid-Atlantic region as far south as Delaware Bay, and on Georges Bank, extending to a maximum depth of 80 meters, as shown on Map 90, and including high salinity zones in the bays and estuaries listed in Table 28. Essential fish habitat for juvenile little skates occurs on sand and gravel substrates, but they are also found on mud.

**Adults:** Intertidal and sub-tidal benthic habitats in coastal waters of the Gulf of Maine and in the Mid-Atlantic region as far south as Delaware Bay, and on Georges Bank, extending to a maximum depth of 100 meters, as shown on Map 91, and including high salinity zones in the bays and estuaries listed in Table 28. Essential fish habitat for adult little skates occurs on sand and gravel substrates, but they are also found on mud.

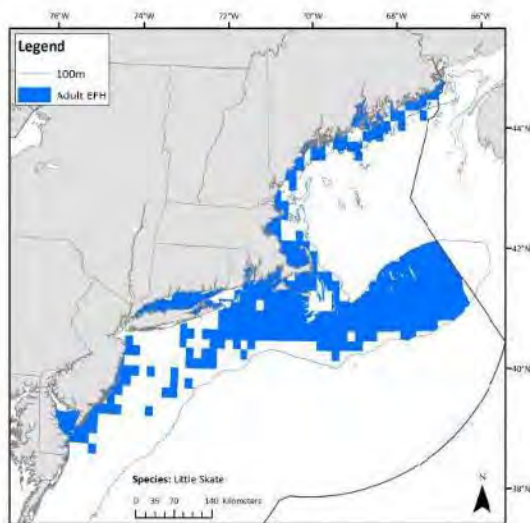
OHA2 FEIS – Volume 2

Preferred EFH Designations

Map 90 – Little skate juvenile EFH.



Map 91 – Little skate adult EFH.



Updated December 8, 2016

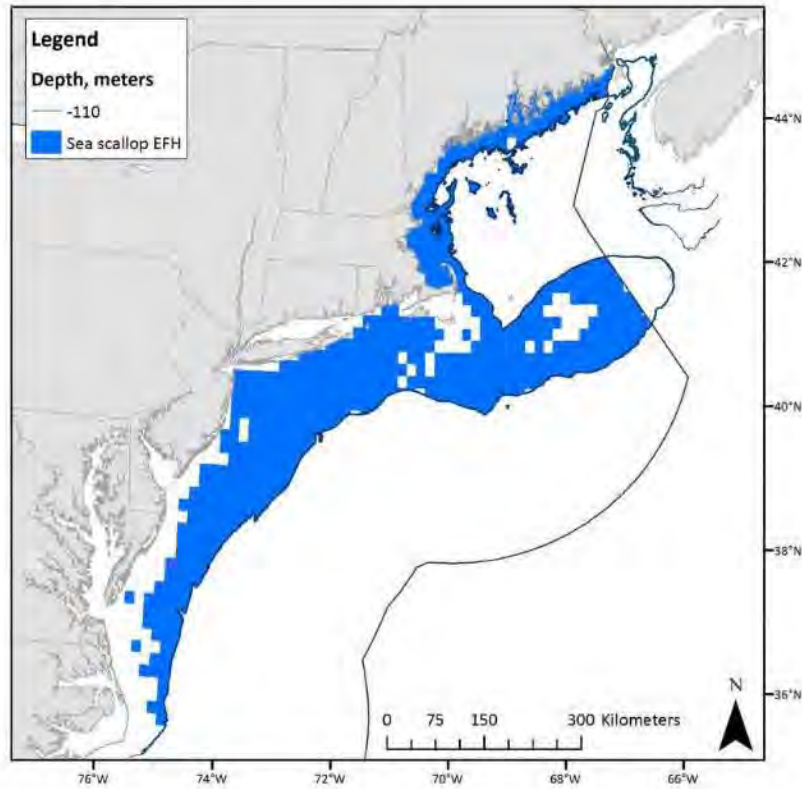
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Estuaries and Embayments	Eggs	Larvae	Juvenile	Adults
Massachusetts Bay	S	S	S	S
Cape Cod Bay	S	S	S	S

S = The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M = The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

Map 97 – Atlantic sea scallop EFH, all life stages.



### 2.2.6 Atlantic herring

Although herring are a pelagic species, their eggs are deposited in mats on the seafloor. The proposed Atlantic herring egg EFH designation includes two sources of information:



- (1) Ten minute squares where larvae  $\leq$  10mm were found in various ichthyoplankton surveys conducted between 1971 and 2013<sup>37</sup>. Mapped squares encompass the top 50% of larval abundance. Herring larvae hatch at between 4 and 10 mm total length (Fahay 2007), so larvae that are 10 mm or smaller in size are expected to be close to the location where their eggs were incubated.
- (2) Observations of herring eggs on seafloor, identified based on a review of all available information on current and historical observations (see Appendix B).

The proposed EFH map for larval Atlantic herring is based on the relative abundance of larvae during 1978-1987 in the MARMAP ichthyoplankton surveys at the 90<sup>th</sup> percentile area level and ELMR bays and estuaries where herring larvae were identified as being "common" or abundant.<sup>37</sup> More recent larval survey data used in the EFH map for eggs were not used in the larval map. The larval map is the same map used in the No Action alternative, but without any filled in squares.

The proposed EFH designation map differs from the no action map in that it includes additional areas where small larvae were found, and eliminates "filled in" ten minute squares. The map proposed in 2007 focused on the egg bed locations and ELMR embayments and did not include a comprehensive analysis of current larval data. The herring egg EFH domain is bounded at 40° N and 71° 30' W. Herring are not known to spawn south or west of Nantucket Shoals.

The proposed EFH designations for juvenile and adult Atlantic herring are based upon average catch per tow at the 75<sup>th</sup> percentile of area level in ten minute squares of latitude and longitude in the 1968-2005 fall and spring NMFS trawl survey data, plus several squares that either were not surveyed, or that the Council's Habitat Committee determined were not well represented in the survey data.<sup>38</sup> The proposed new EFH maps also include ten minute squares in inshore areas where juvenile or adult Atlantic herring were caught in state trawl surveys in more than 10% of the tows, as well as those bays and estuaries identified by the NOAA ELMR program where they were "common" or "abundant." A few more ten minute squares on the coasts of Maine, Connecticut, and Rhode Island that were either unsurveyed (fewer than four tows) or identified by fishing industry members of the Habitat Committee were also added to both maps. These designations were referred to as Juvenile/Adult Alternative 2E in the Phase 1 DEIS.

The proposed EFH designation map for Atlantic herring eggs covers much more seafloor than the no action map, extending more broadly into the Great South Channel and on Nantucket Shoals and Georges Bank. The depth range was slightly expanded from 20-80 meters to 5-90 meters.<sup>39</sup> The proposed EFH maps for juveniles and adults extend over the same geographic area as the no action maps, but include more ten minute squares. The most significant changes are in the proposed EFH descriptions, both of which define a much broader depth range (0 to 300

<sup>37</sup> ICNAF 1971-1978, MARMAP 1977-1994, GLOBEC 1995-1999, and EcoMon 1992-present (data through May 2013)

<sup>38</sup> Because Atlantic herring are pelagic, like eggs and larvae of other managed species, this is the only species for which percent area instead of percent catch was used to map EFH for juveniles and adults (see explanation in Appendix A).

<sup>39</sup> As with all the proposed EFH text descriptions, the depth ranges are now a required component of the EFH designation and are no longer "generally" applicable.

m and, for the juveniles, include the intertidal zone). Also, the juvenile EFH description includes some temperature and salinity information specific to young-of-the-year juveniles.

**Text descriptions:**

Essential fish habitat for Atlantic herring (*Clupea harengus*) is designated anywhere within the geographic areas that are listed in Table 30 and the following maps which exhibit the environmental conditions defined in the text descriptions.

**Eggs:** Inshore and offshore benthic habitats in the Gulf of Maine and on Georges Bank and Nantucket Shoals in depths of 5 – 90 meters on coarse sand, pebbles, cobbles, and boulders and/or macroalgae at the locations shown in Map 98. Eggs adhere to the bottom, often in areas with strong bottom currents, forming egg “beds” that may be many layers deep.

**Larvae:** Inshore and offshore pelagic habitats in the Gulf of Maine, on Georges Bank, and in the upper Mid-Atlantic Bight, as shown on Map 99, and in the bays and estuaries listed in Table 30. Atlantic herring have a very long larval stage, lasting 4-8 months, and are transported long distances to inshore and estuarine waters where they metamorphose into early stage juveniles (“brit”) in the spring.

**Juveniles:** Intertidal and sub-tidal pelagic habitats to 300 meters throughout the region, as shown on Map 100, including the bays and estuaries listed in Table 30. One and two-year old juveniles form large schools and make limited seasonal inshore-offshore migrations. Older juveniles are usually found in water temperatures of 3 to 15°C in the northern part of their range and as high as 22°C in the Mid-Atlantic. Young-of-the-year juveniles can tolerate low salinities, but older juveniles avoid brackish water.

**Adults:** Sub-tidal pelagic habitats with maximum depths of 300 meters throughout the region, as shown on Map 100, including the bays and estuaries listed in Table 30. Adults make extensive seasonal migrations between summer and fall spawning grounds on Georges Bank and the Gulf of Maine and overwintering areas in southern New England and the Mid-Atlantic region. They seldom migrate beyond a depth of about 100 meters and – unless they are preparing to spawn – usually remain near the surface. They generally avoid water temperatures above 10°C and low salinities. Spawning takes place on the bottom, generally in depths of 5 – 90 meters on a variety of substrates (see eggs).

Table 30 – Atlantic herring EFH designation for estuaries and embayments.

Estuaries and Embayments	Larvae	Juveniles	Adults
Passamaquoddy Bay	S,M	S,M	S,M
Englishman/Machias Bay	S,M	S,M	S,M
Narraguagus Bay	S,M	S,M	S,M
Blue Hill Bay	S,M	S,M	S,M
Penobscot Bay	S,M	S,M	S,M
Muscongus Bay	S,M	S,M	S,M

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Estuaries and Embayments	Larvae	Juveniles	Adults
Damariscotta River	S,M	S,M	S,M
Sheepscot River	S,M	S,M	S,M
Kennebec / Androscoggin	S,M	S,M	S,M
Casco Bay	S,M	S,M	S
Saco Bay	S,M	S,M	S
Wells Harbor	S,M	S,M	S
Great Bay	S,M	S,M	S
Hampton Harbor*	S,M	S,M	S
Merrimack River	M	M	
Plum Island Sound*	S,M	S,M	S
Massachusetts Bay	S	S	S
Boston Harbor	S	S,M	S,M
Cape Cod Bay	S	S,M	S,M
Buzzards Bay		S,M	S,M
Narragansett Bay	S	S,M	S,M
Long Island Sound		S,M	S,M
Gardiners Bay		S	S
Great South Bay		S	S
Hudson River / Raritan Bay	S,M	S,M	S,M
Barneгат Bay		S,M	S,M
New Jersey Inland Bays		S,M	S,M
Delaware Bay		S,M	S
Chesapeake Bay			S

S = The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M = The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

\* = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the no action EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.

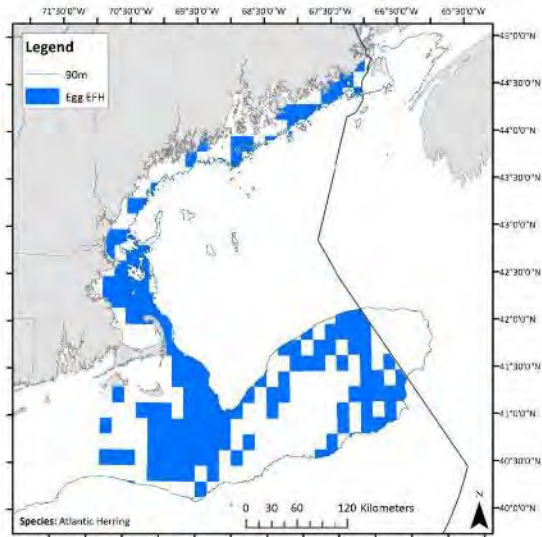
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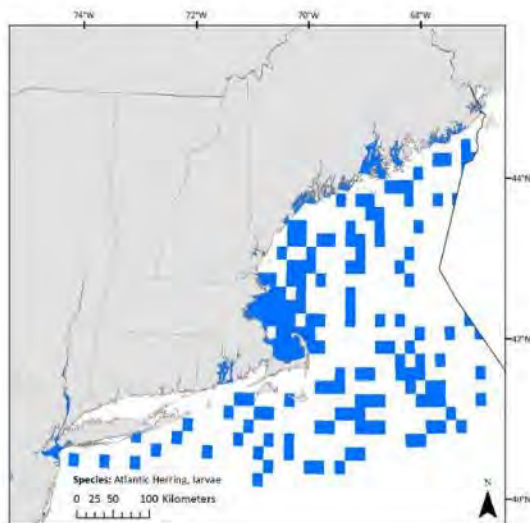
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**Map 98 – Atlantic herring egg EFH.**



**Map 99 – Atlantic herring larval EFH.**



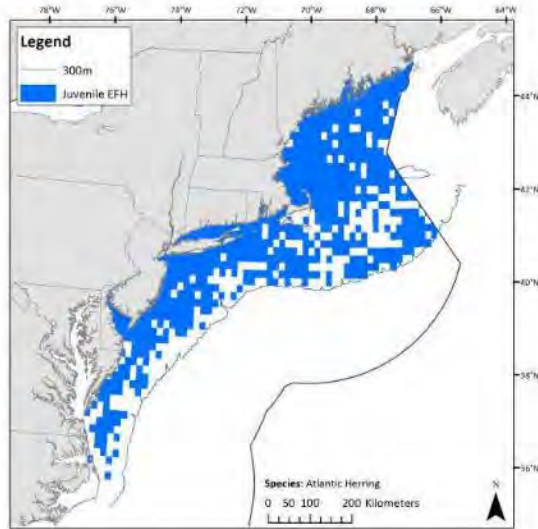
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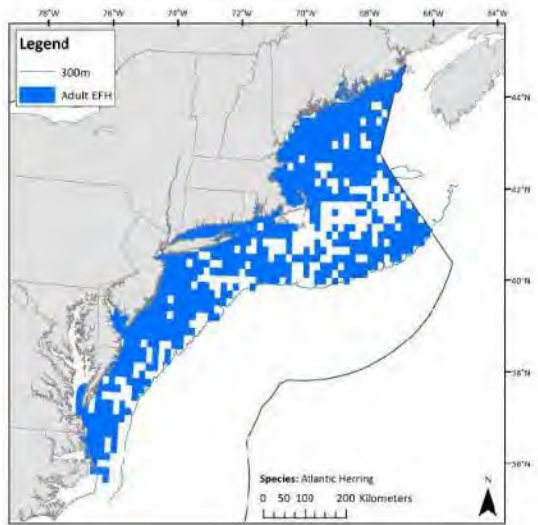
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Map 100 – Atlantic herring juvenile EFH.



Map 101 – Atlantic herring adult EFH.



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### 2.2.2.2 Red hake

The proposed EFH map for red hake eggs, larvae, and juveniles is based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles in the 1963-2003 spring and fall NMFS trawl surveys.<sup>30</sup> This designation is also based on average catch rates of juveniles in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75<sup>th</sup> percentile of catch level, includes inshore areas where juvenile red hake were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys and ELMR areas for eggs, larvae, and juveniles. This was Alternative 3C in the Phase 1 DEIS.

The proposed EFH map for adults was created in the same way, except that the 1968-2005 trawl survey data were mapped at the 90<sup>th</sup> percentile and the map includes the continental slope down to 750 meters, the reported maximum depth for adult red hake in the Northeast region (Alternative 3D in the Phase 1 DEIS).

Compared to the no action EFH descriptions, the proposed juvenile text description refers to estuarine and coastal marine benthic habitats, including the intertidal zone, not just the continental shelf, and to a much wider variety of substrates for young-of-the-year and older juveniles than the no action description. The proposed adult EFH designation defines a much broader depth range than the no action designation and extends EFH on to the continental slope to a depth of 750 meters.

The proposed EFH map for red hake eggs, larvae, and juveniles covers roughly the same geographic area as the individual no action maps for these three life stages, but with some added detail – notably a considerable amount of non-EFH area at intermediate depths and in deep water (>80 m) on the continental shelf, in shallow water on Georges Bank, and in the outer Gulf of Maine. The proposed EFH map for adults is very similar to the no action map. As is true for other species, EFH would be defined more realistically in the proposed designations because of the use of level 2 depth information (50-300 meters for adults) on the shelf, rather than only relying on survey data binned into ten minute squares.

When the designations that were approved in 2007 were modified by the Habitat Committee in 2011, annual depth ranges replaced seasonal depth ranges for this species. This caused the gap between 30 m (the maximum depth in the spring) and 40 m (the maximum depth in the fall) to be filled in. In the modified adult map, the gap between 300 m (the maximum annual depth as defined by Level 2 survey data on the shelf) and 400 m (the minimum annual depth of the Level 1 continental slope spatial area) was filled in.

#### *Text descriptions:*

<sup>30</sup> Red hake eggs and larvae were not differentiated from eggs and larvae of white, spotted and longfin hake in all of the 1978-1987 MARMAP survey collections. In the original (status quo) designations, the egg and larval maps were based on egg survey data for all four species plus juvenile trawl survey data and ELMR data. When the proposed new EFH maps were developed, no MARMAP data for either life stage were used.

Essential fish habitat for red hake (*Urophycis chuss*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 27 and meets the conditions described below.

**Eggs and Larvae:** Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, as shown on Map 77, and in the bays and estuaries listed in Table 27.

**Juveniles:** Intertidal and sub-tidal benthic habitats throughout the region on mud and sand substrates, to a maximum depth of 80 meters, as shown on Map 77, including the bays and estuaries listed in Table 27. Bottom habitats providing shelter are essential for juvenile red hake, including: mud substrates with biogenic depressions, substrates providing biogenic complexity (e.g., eelgrass, macroalgae, shells, anemone and polychaete tubes), and artificial reefs. Newly settled juveniles occur in depressions on the open seabed. Older juveniles are commonly associated with shelter or structure and often inside live bivalves.

**Adults:** Benthic habitats in the Gulf of Maine and the outer continental shelf and slope in depths of 50 – 750 meters (see Map 78) and as shallow as 20 meters in a number of inshore estuaries and embayments (see Table 27) as far south as Chesapeake Bay. Shell beds, soft sediments (mud and sand), and artificial reefs provide essential habitats for adult red hake. They are usually found in depressions in softer sediments or in shell beds and not on open sandy bottom. In the Gulf of Maine, they are much less common on gravel or hard bottom, but they are reported to be abundant on hard bottoms in temperate reef areas of Maryland and northern Virginia.

Table 27 – Red hake EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay			S,M	S,M
Englishman/Machias Bay			S	S
Narraguagus Bay			S	S
Blue Hill Bay			S	S
Penobscot Bay			S,M	S,M
Muscongus Bay			S,M	S,M
Damariscotta River			S,M	S
Sheepscot River			S,M	S,M
Kennebec / Androscoggin			S,M	S,M
Casco Bay			S	S
Saco Bay			S	S
Great Bay		S	S	S
Hampton Harbor*			S	S
Merrimack River	M			
Plum Island Sound*			S	S
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S,M	S,M
Cape Cod Bay		S	S,M	S,M
Buzzards Bay	S	S	S,M	S,M

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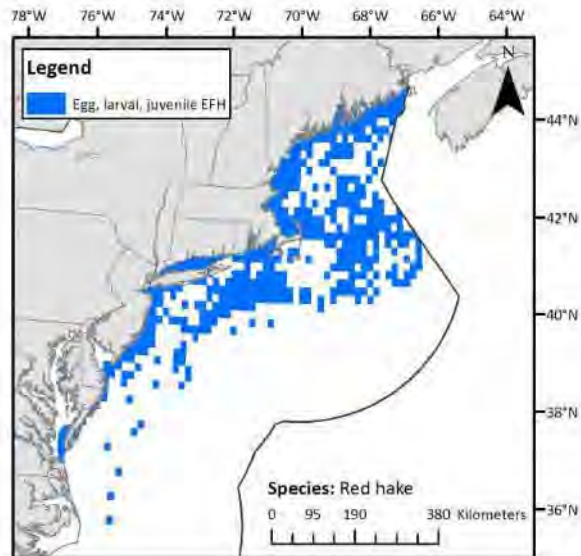
Narragansett Bay	S	S	S	S
Long Island Sound			S,M	S,M
Connecticut River			M	M
Hudson River / Raritan Bay		S,M	S,M	S,M
Delaware Bay				S
Chesapeake Bay			S	S

S = The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M = The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

\* = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the no action EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.

Map 77 – Red hake egg, larval and juvenile EFH.

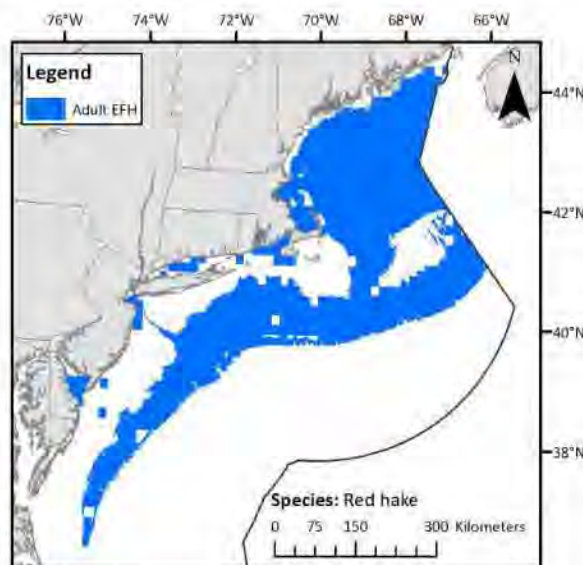


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Map 78 – Red hake adult EFH.



### 2.2.2.3 Offshore hake

As in the original EFH designations, the proposed egg and larval EFH maps are based on the 75<sup>th</sup> percentile of the observed range of the MARMAP survey data. The continental slope was added to the proposed EFH text descriptions.

There is a single proposed EFH map for juvenile and adult offshore hake which is based on the distributions of depths and bottom temperatures that were associated with high catch rates of juveniles and adults in the 1963-2003 spring and fall NMFS trawl surveys and on the abundance of juveniles in the 1968-2005 spring and fall NMFS trawl surveys at the 90<sup>th</sup> percentile of catch level, but excludes a couple of ten minute squares in the Gulf of Maine.<sup>31</sup> It also includes continental slope habitats that were defined using known maximum depth and geographic range information (see Table A-10). The range of this species extends to Florida and into the Gulf of Mexico in deep water, but EFH was not designated south of Cape Fear, North Carolina, because no survey data are available. The combined juvenile and adult designation was referred to as Alternative 5 (juvenile 3E and adult 3D) in the Phase 1 DEIS.

The proposed new map for juvenile and adult offshore hake defines EFH as a depth range along the outer continental shelf and slope rather than discrete ten minute squares. It also eliminates the few scattered ten minute squares in the Gulf of Maine that are in the no action map for

<sup>31</sup> Catch rates of adults in the spring and fall surveys during 1968-2005 were very low, so only the juvenile catch data were used in the map.

#### 2.2.4.5 Winter skate

The proposed EFH maps for juvenile and adult winter skate are based on the distributions of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. The proposed maps are also based on average catch per tow data in ten minute squares of latitude and longitude for juveniles and adults, respectively, in the 1968-2005 spring and fall NMFS trawl surveys at the 90<sup>th</sup> percentile of catch, and they include inshore areas where juvenile or adult white hake were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys as well as coastal bays and estuaries identified in the ELMR reports. The ELMR information for the Mid-Atlantic area was re-interpreted to add EFH for juvenile winter skate to five inshore areas south of Raritan Bay, including Delaware Bay, and to eliminate the no action designations for juveniles and adults in Chesapeake Bay (see Appendix A). Some of the ELMR estuaries and embayments north of Cape Cod that were not originally designated as EFH were also added to the new maps (see footnote for little skates). A few unsurveyed ten minute squares were filled in along the Rhode Island and Connecticut coasts and southeast of Nantucket Island. The designations are 3E alternatives in the Phase 1 DEIS.

The proposed designations would limit EFH to a maximum depth of 90 meters for juvenile winter skates and 80 meters for the adults. The depth ranges given in the no action designations are much less specific (shoreline to 400 or 371 meters, more abundant less than 111 meters). The proposed EFH map for juvenile winter skate includes more considerably more area in the Mid-Atlantic Bight compared to the no action map. The no action adult map is almost completely limited to Georges Bank and the waters directly south of Cape Cod; the proposed new map extends EFH for adult winter skate to continental shelf waters south of Delaware Bay and adds more of the southwestern Gulf of Maine.

Modification of the juvenile EFH designation to include shelf waters out to 90 meters instead of 80 meters caused most of Georges Bank to “fill in” and extended EFH westwards without interruption into the Mid-Atlantic and farther out on the shelf. The other significant change was the elimination of EFH in Chesapeake Bay. Maximum depth for the adults increased by 20 meters (from 60 to 80) and had a similar effect on the proposed map: EFH now extends across the Great South Channel (except for the shoal water east of Nantucket) and Chesapeake Bay has been removed. The rest of the new map looks very much like the map that was approved in 2007.

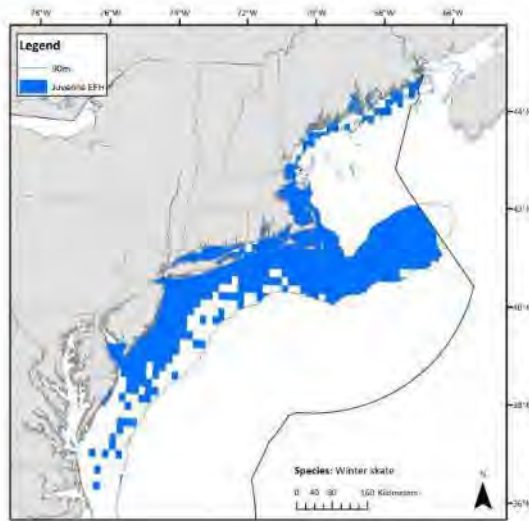
#### *Text descriptions:*

For winter skate (*Leucoraja ocellata*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 28 and meets the conditions described below.

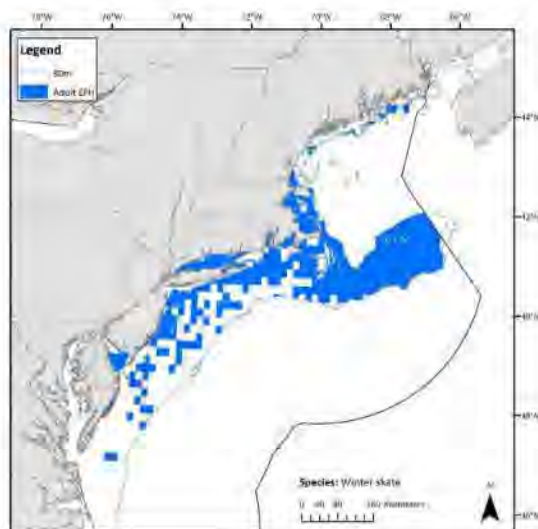
**Juveniles:** Sub-tidal benthic habitats in coastal waters from eastern Maine to Delaware Bay and on the continental shelf in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 90 meters, as shown on Map 92, including the high salinity zones of the bays and estuaries listed in Table 28. Essential fish habitat for juvenile winter skates occurs on sand and gravel substrates, but they are also found on mud.

**Adults:** Sub-tidal benthic habitats in coastal waters in the southwestern Gulf of Maine, in coastal and continental shelf waters in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 80 meters, as shown on Map 93, including the high salinity zones of the bays and estuaries listed in Table 28. Essential fish habitat for adult winter skates occurs on sand and gravel substrates, but they are also found on mud.

**Map 92 – Winter skate juvenile EFH.**



Map 93 – Winter skate adult EFH.



#### 2.2.4.6 Rosette skate

Because very few adults are caught in the NMFS bottom trawl survey, the proposed EFH map for juvenile and adult rosette skate is based on the distribution of depths and bottom temperatures that were either associated with high catch rates of juveniles in the 1963-2003 spring and fall NMFS trawl surveys. The map is also based on average catch per tow data for juveniles in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75<sup>th</sup> percentile of catch level. It was referred to as Alternative 3C in the Phase 1 DEIS.

The proposed text description is very similar to the no action descriptions, which were developed separately, but are identical. The no action map for juvenile rosette skates includes the same portion of the outer continental shelf (Hudson Canyon to Cape Hatteras) as the proposed juvenile/adult map, from approximately 40°N to Cape Hatteras.<sup>35</sup> As modified, the proposed designation covers a broader depth range than what was approved in the DEIS (80-400 vs 70-300 meters), but the two maps look the same. The range of this species extends to the Dry Tortugas in Florida in deep water, but in the absence of any survey data upon which to base a map, the EFH designation does not extend south of Cape Hatteras.

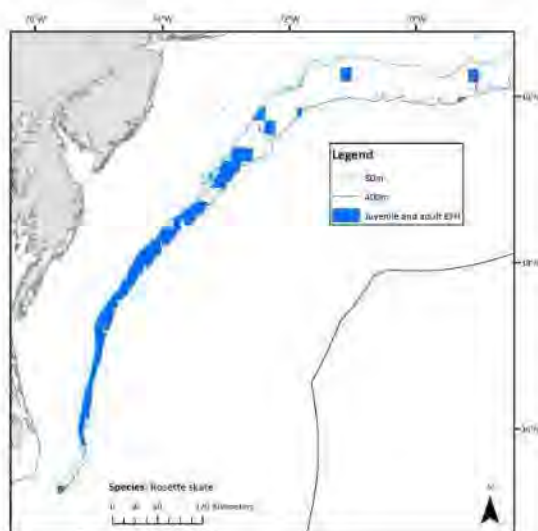
#### Text descriptions:

<sup>35</sup> There are two status quo EFH maps, one for juvenile rosette skates and one for adults. There are only seven ten minute squares in the adult map; they are located southeast of Long Island on the outer shelf at the northern end of the juvenile distribution.

For rosette skate (*Leucoraja garmani*), essential fish habitat is designated anywhere within the geographic areas that are shown on Map 94 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

**Juveniles and Adults:** Benthic habitats with mud and sand substrates on the outer continental shelf in depths of 80 – 400 meters from approximately 40°N latitude to Cape Hatteras, North Carolina, as shown on Map 94.

Map 94 – Rosette skate juvenile and adult EFH.



#### 2.2.4.7 Clearnose skate

The proposed EFH maps for juvenile and adult clearnose skate within the NMFS trawl survey area were developed using a GIS depiction of preferred depth and bottom temperature ranges for each life stage that were determined from graphical 1963-2003 spring and fall NMFS trawl survey data in Packer et al. (2003b). The maps are also based on average catch per tow data for juveniles and adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75<sup>th</sup> percentile of catch level, and include inshore areas between New Jersey and Florida where juveniles or adults were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys and eight embayments between Raritan Bay and Chesapeake Bay, including Delaware Bay. These juvenile and adult designations were referred to as 3C alternatives in the Phase 1 DEIS.

The proposed new EFH designation for adult clearnose skates extends over the same geographic area as the no action map – continental shelf waters from Raritan Bay, New Jersey, to Cape Fear,

North Carolina.<sup>36</sup> The new maps exclude portions of survey-defined ten minute squares that are deeper than the maximum depths defined in the text descriptions (30 m for juveniles and 40 m for adults) and, therefore, limit EFH to the inner portion of the continental shelf. These maximum depths are much lower than what was included in the no action descriptions (“most abundant less than 111 meters”) and match what is mapped much more explicitly. The other change relative to the no action designations was the addition of gravel and rocky bottom to the proposed new text descriptions: the original descriptions only defined EFH as occurring on “soft bottom” (interpreted to mean mud and sand).

Four modifications were made to the proposed EFH maps that were approved in the 2007 DEIS: 1) The maximum depth for adults was changed from 30 to 40 meters; 2) the mixed salinity zones in the Mid-Atlantic were removed from the adult designation (see salinity data in Appendix B); 3) EFH designations for the juveniles and adults now include fully saline waters in several coastal bays in the Mid-Atlantic that were not designated at all originally, or were only designated for adults; and 4) inshore trawl survey data (SEAMAP survey) collected south of Cape Hatteras were analyzed for the new juvenile map, extending EFH all the way to northern Florida. In addition, intertidal habitat was removed from the approved text descriptions in the DEIS for lack of evidence.

**Text descriptions:**

For clearnose skate (*Raja eglanteria*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 28 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

**Juveniles:** Sub-tidal benthic habitats in coastal and inner continental shelf waters from New Jersey to the St. Johns River in Florida as shown on Table 28, including the high salinity zones of Chesapeake Bay, Delaware Bay, and the other bays and estuaries listed in Table 28. Essential fish habitat for juvenile clearnose skates occurs from the shoreline to 30 meters, primarily on mud and sand, but also on gravelly and rocky bottom.

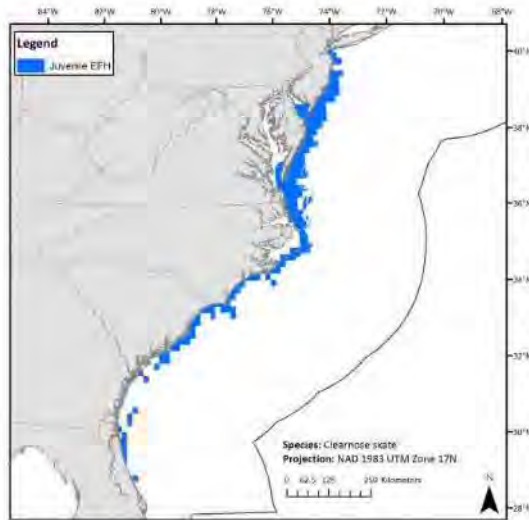
**Adults:** Sub-tidal benthic habitats in coastal and inner continental shelf waters from New Jersey to Cape Hatteras as shown on Map 96, including the high salinity zones of Chesapeake Bay, Delaware Bay, and the other bays and estuaries listed in Table 28. Essential fish habitat for adult clearnose skates occurs from the shoreline to 40 meters, primarily on mud and sand, but also on gravelly and rocky bottom.

<sup>36</sup> The original EFH maps for all the skates do not show the coastal ELMR areas that were included in the designations – they were listed in tables only. Thus, Chesapeake Bay was designated for juvenile and adult clearnose skates, but is not shown on the maps.

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Map 95 – Clearnose skate juvenile EFH.

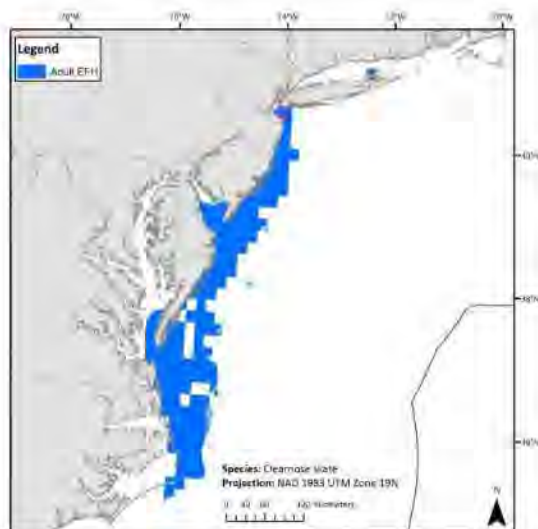


Note that this map is in a different projection than the other EFH maps because it extends so far to the south.

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Map 96 – Clearnose skate adult EFH.



### 2.2.5 Atlantic sea scallop

The EFH map for all life stages of Atlantic sea scallops includes all the ten minute squares where scallops of any size were caught during the following surveys: 1968-2011 NMFS trawl (fall and spring), 1981-2012 NMFS summer scallop dredge, 2000-2013 Maine/NH trawl, and 2005-2013 Maine scallop dredge. For each survey, scallop EFH was only identified if at least three tows were conducted in a particular ten minute square. Thus, some ten minute squares with very low sampling rates could not be designated EFH on the basis of some surveys, despite having positive catches of scallops. In addition, the map includes bays and estuaries identified by the NOAA ELMR program where juvenile or adult Atlantic sea scallops were "common" or "abundant."

#### *Text descriptions:*

Essential fish habitat for Atlantic sea scallops (*Placopecten magellanicus*) is designated anywhere within the geographic areas that are shown on Map 97 and listed in Table 29 which exhibit the environmental conditions defined in the following text descriptions.

**Eggs:** Benthic habitats in inshore areas and on the continental shelf as shown on Map 97, in the vicinity of adult scallops. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage.



### 2.2.1.10 Windowpane flounder

As in the original EFH designations, the proposed egg and larval EFH maps are based on the 90<sup>th</sup> percentile of the observed range of the MARMAP survey data. These designations also include those bays and estuaries identified by the ELMR program as supporting windowpane flounder eggs or larvae at the "common" or "abundant" level.

The proposed EFH maps for juvenile and adult windowpane flounder are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch per tow data in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90<sup>th</sup> percentile of catch level, and they include inshore areas where juvenile or adult windowpane were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys and ELMR information. Inshore survey data used in the proposed map of juvenile EFH includes SEAMAP survey data between Cape Hatteras and northern Florida.<sup>25</sup> These designations were 3E alternatives in the Phase 1 DEIS.<sup>26</sup>

The new designation for juvenile windowpane flounder would limit EFH to a maximum depth of 60 meters, not 100 meters as defined in the no action designation. The maximum depth for adult EFH would only change from 75 to 70 meters. Under the proposed designations, EFH for the juveniles and adults would explicitly include the intertidal zone. The preferred sediment types (mud and sand) are the same in the proposed and no action EFH descriptions for both life stages.

The proposed and the no action EFH maps for the juveniles and adults include coastal areas throughout the entire Northeast region, plus the shallower portion of Georges Bank. The addition of trawl survey data from the Gulf of Maine caused more ten minute squares along the Maine coast to be designated, especially for juveniles. The primary difference between the no action and the proposed designations is the addition of coastal waters south of Cape Hatteras to the juvenile EFH map. The approved 3D alternative for juveniles in the DEIS did not include the SEAMAP survey data. Modification of the approved maps for juvenile and adult windowpane flounder resulted in the removal of a few isolated ten minute squares on the outer continental shelf that met the 90<sup>th</sup> percentile catch criterion, but were deeper than the defined maximum depths of 60 and 70 meters.

#### *Text descriptions:*

Essential fish habitat for windowpane flounder (*Scophthalmus aquosus*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 23 and meets the conditions described below.

<sup>25</sup> SEAMAP is an acronym for the Southeast Area Monitoring and Assessment Program. This trawl survey of coastal waters between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, began in 1986 and is conducted by the South Carolina Department of Natural Resources. According to SCDNR staff, the great majority of windowpane flounder caught in this survey are juveniles (no length data are collected).

<sup>26</sup> The preferred alternatives in the DEIS were called 3E alternatives because a few unsurveyed ten minute squares were added to the 3D maps.

**Eggs and Larvae:** Pelagic habitats on the continental shelf from Georges Bank to Cape Hatteras and in mixed and high salinity zones of coastal bays and estuaries throughout the region (see Map 59, Map 60, and Table 23).

**Juveniles:** Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to northern Florida, as shown on Map 61, including mixed and high salinity zones in the bays and estuaries listed in Table 23. Essential fish habitat for juvenile windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 60 meters. Young-of-the-year juveniles prefer sand over mud.

**Adults:** Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to Cape Hatteras, as shown on Map 62, including mixed and high salinity zones in the bays and estuaries listed in Table 23. Essential fish habitat for adult windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 70 meters.

Table 23 – Windowpane flounder EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay	S,M	S,M	S,M	S,M
Englishman/Machias Bay	S,M	S,M	S,M	S,M
Narraguagus Bay	S,M	S,M	S,M	S,M
Blue Hill Bay	S,M	S,M	S,M	S,M
Penobscot Bay	S,M	S,M	S,M	S,M
Muscongus Bay	S,M	S,M	S,M	S,M
Damariscotta River	S,M	S,M	S,M	S,M
Sheepscot River	S,M	S,M	S,M	S,M
Kennebec / Androscoggin	S,M	S,M	S,M	S,M
Casco Bay	S,M	S,M	S,M	S,M
Saco Bay	S,M	S,M	S,M	S,M
Wells Harbor	S,M	S,M	S,M	S,M
Great Bay	S	S	S	S
Hampton Harbor*	S,M	S,M	S,M	S,M
Plum Island Sound*	S,M	S,M	S,M	S,M
Massachusetts Bay	S	S	S	S
Boston Harbor	S,M	S,M	S,M	S,M
Cape Cod Bay	S,M	S,M	S,M	S,M
Waquoit Bay	S,M	S,M	S,M	S,M
Buzzards Bay	S,M	S,M	S,M	S,M
Narragansett Bay	S,M	S,M	S,M	S,M
Long Island Sound	S,M	S,M	S,M	S,M
Connecticut River	M	M	M	M
Gardiners Bay	S,M	S,M	S,M	S,M
Great South Bay	S,M	S,M	S,M	S,M
Hudson River / Raritan Bay	S	S,M	S,M	S,M
Barnegat Bay	S,M	S,M	S,M	S,M
New Jersey Inland Bays	S,M	S,M	S,M	S,M
Delaware Bay			S,M	S,M
Delaware Inland Bays*	S,M	S,M	S,M	S,M
Maryland Inland Bays*	S,M	S,M	S,M	S,M
Chincoteague Bay			S	S
Chesapeake Bay			S,M	S,M
Tanger/Pocomoke Sound			M	M

S = The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

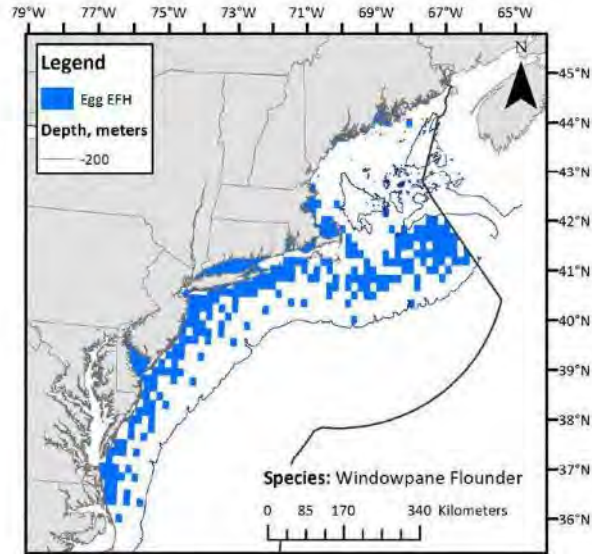
M = The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

\* = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the no action EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.

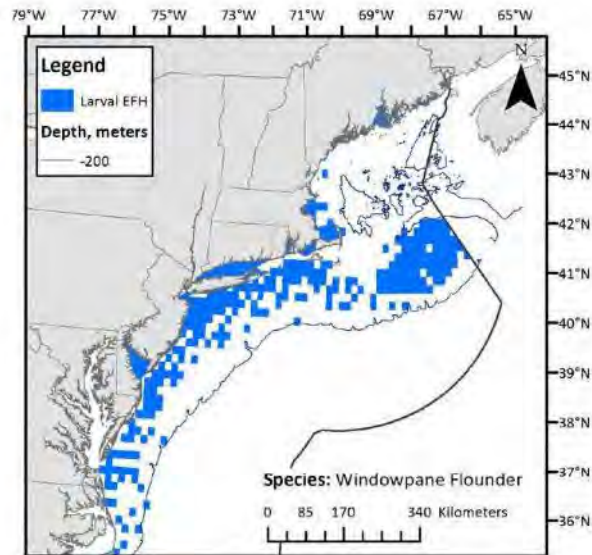
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Preferred EFH Designations

Map 59 – Windowpane flounder egg EFH.



Map 60 – Windowpane flounder larval EFH.



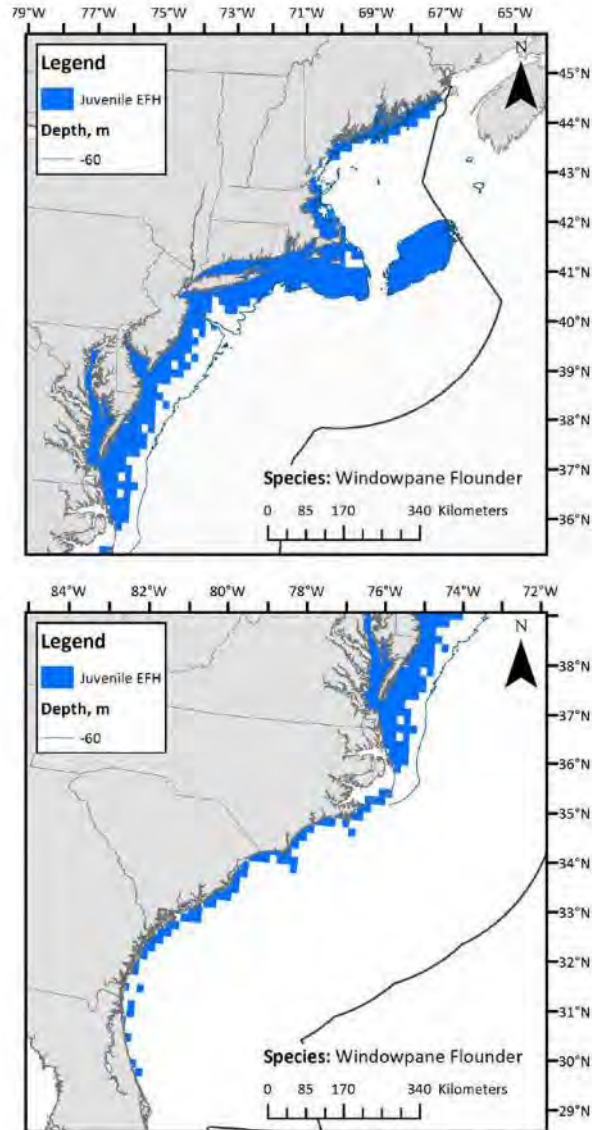
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Preferred EFH Designations

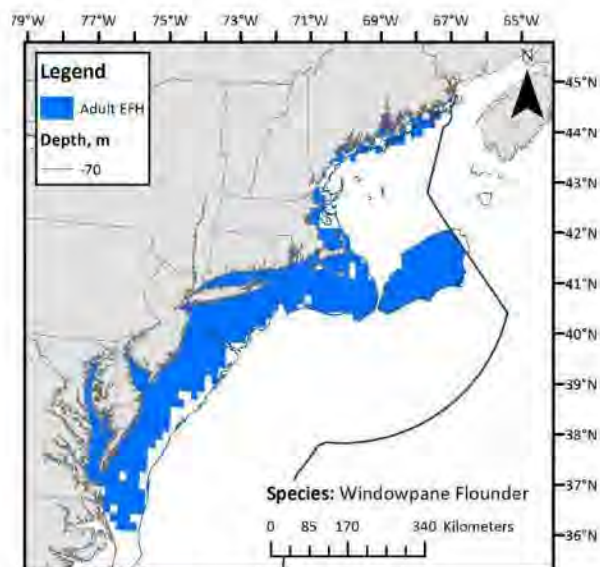
Map 61 – Windowpane flounder juvenile EFH. Upper panel shows northern portion of range; lower panel shows southern portion of range.



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Map 62 – Windowpane flounder adult EFH.



**2.2.1.11 Winter flounder**

The preferred designation for winter flounder eggs defines EFH as sub-tidal coastal waters from the shoreline to a maximum depth of 5 meters<sup>27</sup> from Cape Cod to Absecon Inlet, New Jersey, and from the shoreline to a maximum depth of 70 meters in the Gulf of Maine and on Georges Bank, and includes bays and estuaries within this geographic range where eggs were identified as “common” or “abundant” by the ELMR program. Depth is relative to mean low water. In coastal waters, the geographic extent of EFH for the eggs is based on the geographic range of the adults and, south of Cape Cod, the maximum depth where eggs have been observed on the bottom, and on Georges Bank and in the Gulf of Maine, the reported maximum depth for spawning adults on Georges Bank. Survey data in support of the southern limit of EFH are provided in Appendix I.

The 5 meter depth area begins at the tip of Cape Cod at Provincetown, Massachusetts, and includes waters along the eastern and southern sides of the Cape, south to New Jersey. The maximum egg depth in southern New England and the Mid-Atlantic is the same as in the no action designation for the entire coast. It was not changed because data collected during a series of benthic winter flounder egg surveys by the U.S. Army Corps of Engineers in the New York Harbor area in recent years indicate that many more eggs are deposited on the bottom in shallow water areas, not in the deeper shipping channels (Wilber et al. 2013). Based on this information, the Council concluded that the shoal water areas in New York harbor were the primary habitat

<sup>27</sup> Note that 20 meters is actually shown on the map due to the difficulty of depicting a 5 meter depth contour on a regional scale map. However, only areas where the depth is 5 meters or less are actually part of the designation.

**EFH Text Descriptions for Bluefish (*Pomatomus saltatrix*)**

Eggs: 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) at mid-shelf depths, from Montauk Point, NY south to Cape Hatteras in the highest 90% of the area where bluefish eggs were collected in the MARMAP surveys; and 2) South of Cape Hatteras, 100% of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida at mid-shelf depths. Bluefish eggs are generally not collected in estuarine waters and thus there is no EFH designation inshore. Generally, bluefish eggs are collected between April through August in temperatures greater than 64°F (18 °C) and normal shelf salinities (> 31 ppt).

Larvae: 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) most commonly above 49 ft (15 m), from Montauk Point, New York south to Cape Hatteras, in the highest 90% of the area where bluefish larvae were collected during the MARMAP surveys; 2) South of Cape Hatteras, 100% of the pelagic waters greater than 15 meters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N. Bluefish larvae are not generally collected inshore, so there is no EFH designation inshore for larvae. Generally, bluefish larvae are collected April through September in temperatures greater than 64 °F (18 °C) in normal shelf salinities (> 30 ppt).

Juveniles (<35 cm TL): 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts south to Cape Hatteras, in the highest 90% of the area where juvenile bluefish are collected in the NEFSC trawl survey; 2) South of Cape Hatteras, 100% of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; 3) the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N; and 4) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally juvenile bluefish occur in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones. Distribution of juveniles by temperature, salinity, and depth over the continental shelf is undescribed.

Adults (≥35 cm TL): 1) North of Cape Hatteras, over the continental shelf (from the coast out to the limits of the EEZ), from Cape Cod Bay, Massachusetts south to Cape Hatteras, in the highest 90% of the area where adult bluefish were collected in the NEFSC trawl survey; 2) South of Cape Hatteras, 100% of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January in the "mixing" and "seawater" zones. Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish are generally found in normal shelf salinities (> 25 ppt).

Source: Amendment 1 to the Bluefish Fishery Management Plan, Mid-Atlantic Fishery Management Council, 1998.

**EFH Text Descriptions for Summer Flounder (*Paralichthys dentatus*)**

Eggs: 1) North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90% of the all the ranked ten-minute squares for the area where summer flounder eggs are collected in the MARMAP survey. 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ), from Cape Hatteras, North Carolina to Cape Canaveral, Florida, to depths of 360 ft. In general, summer flounder eggs are found between October and May, being most abundant between Cape Cod and Cape Hatteras, with the heaviest concentrations within 9 miles of shore off New Jersey and New York. Eggs are most commonly collected at depths of 30 to 360 ft.

Larvae: 1) North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90% of all the ranked ten-minute squares for the area where summer flounder larvae are collected in the MARMAP survey. 2) South of Cape Hatteras, EFH is the nearshore waters of the continental shelf (from the coast out to the limits of the EEZ), from Cape Hatteras, North Carolina to Cape Canaveral Florida, in nearshore waters out to 50 miles from shore. 3) Inshore, EFH is all the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database, in the "mixing" (defined in ELMR as 0.5 to 25.0 ppt) and "seawater" (defined in ELMR as greater than 25 ppt) salinity zones. In general, summer flounder larvae are most abundant nearshore (12-50 miles from shore) at depths between 30 to 230 ft. They are most frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May.

Juveniles (<28 cm TL): 1) North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90% of all the ranked ten-minute squares for the area where juvenile summer flounder are collected in the NEFSC trawl survey. 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ) to depths of 500 ft, from Cape Hatteras, North Carolina to Cape Canaveral, Florida. 3) Inshore, EFH is all of the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database for the "mixing" and "seawater" salinity zones. In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37 °F and salinities from 10 to 30 ppt range.

Adults (≥28 cm TL): 1) North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90% of all the ranked ten-minute squares for the area where adult summer flounder are collected in the NEFSC trawl survey. 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ) to depths of



500 ft, from Cape Hatteras, North Carolina to Cape Canaveral, Florida. 3) Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. Generally, summer flounder inhabit shallow coastal and estuarine waters during warmer months and move offshore on the outer continental shelf at depths of 500 ft in colder months.

Source: Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan, Mid-Atlantic Fishery Management Council, 1998.

**NOAA Fisheries Greater Atlantic Regional Fisheries Office  
Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination  
Act (FWCA) Worksheet**

This worksheet is your essential fish habitat (EFH) assessment. It provides us with the information necessary to assess the effects of your action on EFH under the Magnuson Stevens Fishery Conservation and Management Act and on NOAA trust resources under the Fish and Wildlife Coordination Act (FWCA). Consultation is not required if:

1. there is no adverse effect on EFH or NOAA trust resources (see page 10 for more info).
2. no EFH is designated and no trust resources may be present at the project site.

**Instructions**

Federal agencies or their non-federal designated lead agency should email the completed worksheet and necessary attachments to [umfs.gar.efh.consultation@noaa.gov](mailto:umfs.gar.efh.consultation@noaa.gov). Include the public notice (if applicable) or project application and project plans showing:

- location map of the project site with area of impact.
- existing and proposed conditions.
- all waters of the U.S. on the project site with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked.
- sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom or natural rocky habitat areas, and shellfish beds.
- site photographs, if available.

We will provide our EFH conservation recommendations and recommendations under the FWCA, as appropriate, within 30 days of receipt of a complete EFH assessment (60 days if an expanded consultation is necessary). Please submit complete information to minimize delays in completing the consultation.

This worksheet provides us with the information required<sup>1</sup> in an EFH assessment:

1. A description of the proposed action.
2. An analysis of the potential adverse effects on EFH and the federally managed species.
3. The federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable.

Your analysis **should focus on impacts that reduce the quality and/or quantity of the habitat or result in conversion to a different habitat type** for all life stages of species with designated EFH within the action area.

Use the information on the [HCD website](#) and [NOAA's EFH Mapper](#) to complete this worksheet. If you have questions, please contact the appropriate [HCD staff member](#) to assist you.

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<sup>1</sup> The EFH consultation process is guided by the requirements of our EFH regulation at 50 CFR 600.905.

**EFH ASSESSMENT WORKSHEET**

**General Project Information**

Date Submitted:

Project/Application Number:

Project Name:

Project Sponsor/Applicant:

Federal Action Agency (if state agency acting as delegated):

Fast-41 or One Federal Decision Project:  Yes  No

Action Agency Contact Name:

Contact Phone:

Contact Email:

Latitude:

Longitude:

Address, City/Town, State:

Body of Water:

Project Purpose:

Project Description:

Anticipated Duration of In-Water Work or Start/End Dates:

**Habitat Description**

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH<sup>2</sup>?  Yes  No

Is the project in designated HAPC<sup>2</sup>?  Yes  No

Is this coordination under FWCA only?  Yes  No

Total area of impact to EFH (indicate sq ft or acres):

Total area of impact to HAPC (indicate sq ft or acres):

Current water depths:                      Salinity:                      Water temperature range:

Sediment characteristics<sup>3</sup>:

*What habitat types are in or adjacent to the project area and will they be permanently impacted?*  
 Select all that apply. Indicate if impacts will be temporary, if site will be restored, or if permanent conversion of habitat will occur. A project may occur in overlapping habitat types.

	Habitat Type	Total impact (sq ft/acres)	Impacts are temporary	Restored to pre-existing conditions	Permanent conversion of all or part of habitat
<input type="checkbox"/>	Marine				
<input type="checkbox"/>	Estuarine				
<input type="checkbox"/>	Riverine (tidal)				
<input type="checkbox"/>	Riverine (non-tidal)				
<input type="checkbox"/>	Intertidal				
<input type="checkbox"/>	Subtidal				
<input type="checkbox"/>	Water column				
<input type="checkbox"/>	Salt marsh/ Wetland (tidal)				
<input type="checkbox"/>	Wetland (non-tidal)				

<sup>2</sup> Use the tables on pages 7-9 to list species with designated EFH or the type of designated HAPC present.

<sup>3</sup> The level of detail is dependent on your project – e.g., a grain size analysis may be necessary for dredging.

	Habitat Type	Total impact (sq ft/acres)	Impacts are temporary	Restored to pre-existing conditions	Permanent conversion of all or part of habitat
<input type="checkbox"/>	Rocky/hard bottom <sup>4</sup> :				
<input type="checkbox"/>	Sand				
<input type="checkbox"/>	Shellfish beds or oyster reefs				
<input type="checkbox"/>	Mudflats				
<input type="checkbox"/>	Submerged aquatic vegetation (SAV) <sup>5</sup> , macroalgae, epifauna				
<input type="checkbox"/>	Diadromous fish (migratory or spawning habitat)				

Indicate type(s) of rocky/hard bottom habitat (pebble, cobble, boulder, bedrock outcrop/ledge) and species of SAV:

**Project Effects**

Select all that apply	Project Type/Category
<input type="checkbox"/>	Hatchery or Aquaculture
<input type="checkbox"/>	Agriculture
<input type="checkbox"/>	Forestry
<input type="checkbox"/>	Military (e.g., acoustic testing, training exercises)
<input type="checkbox"/>	Mining (e.g., sand, gravel)
<input type="checkbox"/>	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, beach renourishment, mitigation bank/ILF creation)

<sup>4</sup> Indicate type(s). The type(s) of rocky habitat will help you determine if the area is cod HAPC.

<sup>5</sup> Indicate species. Provide a copy of the SAV report and survey conducted at the site, if applicable.

Select all that apply	Project Type/Category
<input type="checkbox"/>	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port)
<input type="checkbox"/>	Energy development/use
<input type="checkbox"/>	Water quality (e.g., TMDL, wastewater, sediment remediation)
<input type="checkbox"/>	Dredging/excavation and disposal
<input type="checkbox"/>	Piers, ramps, floats, and other structures
<input type="checkbox"/>	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
<input type="checkbox"/>	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
<input type="checkbox"/>	Other

Select all that apply	Potential Stressors Caused by the Activity	Select all that apply and if temporary or permanent		Habitat alterations caused by the activity
		Temp	Perm	
<input type="checkbox"/>	Underwater noise			
<input type="checkbox"/>	Water quality/turbidity/contaminant release	<input type="checkbox"/>	<input type="checkbox"/>	Water depth change
<input type="checkbox"/>	Vessel traffic/barge grounding	<input type="checkbox"/>	<input type="checkbox"/>	Tidal flow change
<input type="checkbox"/>	Impingement/entrainment <sup>6</sup>	<input type="checkbox"/>	<input type="checkbox"/>	Fill
<input type="checkbox"/>	Prevent fish passage/spawning	<input type="checkbox"/>	<input type="checkbox"/>	Habitat type conversion
<input type="checkbox"/>	Benthic community disturbance	<input type="checkbox"/>	<input type="checkbox"/>	Other:
<input type="checkbox"/>	Impacts to prey species	<input type="checkbox"/>	<input type="checkbox"/>	Other:

<sup>6</sup> Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

*Details: project impacts and mitigation*

The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

Describe how the project would impact each of the habitat types selected above. Include temporary and permanent impact descriptions and direct and indirect impacts.

What specific measures will be used to avoid impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided, why not?

What specific measures will be used to minimize impacts?

Is compensatory mitigation proposed?  Yes  No

If no, why not? If yes, describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation and monitoring plan, if applicable.

Federal Action Agency's EFH determination (select one)	
<input type="checkbox"/>	There is no adverse effect <sup>7</sup> on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA-only request.
<input type="checkbox"/>	The adverse effect <sup>7</sup> on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations.  This is a request for an abbreviated EFH consultation.
<input type="checkbox"/>	The adverse effect <sup>7</sup> on EFH is substantial.  This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA document, if applicable.

**EFH and HAPC designations<sup>8</sup>**

Use the [EFH mapper](#) to determine if EFH may be present in the project area and enter all species and lifestages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present. We recommend this for larger projects to help you determine what your impacts are.

Species	EFH is designated/mapped for:				Habitat present based on text description (optional)
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/spawning adults	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<sup>7</sup> An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

<sup>8</sup> Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries.





**HAPCs**

Select all that are in your action area.

<input type="checkbox"/>	Summer flounder: SAV <sup>9</sup>	<input type="checkbox"/>	Alvin & Atlantis Canyons
<input type="checkbox"/>	Sandbar shark	<input type="checkbox"/>	Baltimore Canyon
<input type="checkbox"/>	Sand Tiger Shark (Delaware Bay)	<input type="checkbox"/>	Bear Seamount
<input type="checkbox"/>	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	<input type="checkbox"/>	Heezen Canyon
<input type="checkbox"/>	Inshore 20m Juvenile Cod	<input type="checkbox"/>	Hudson Canyon
<input type="checkbox"/>	Great South Channel Juvenile Cod	<input type="checkbox"/>	Hydrographer Canyon
<input type="checkbox"/>	Northern Edge Juvenile Cod	<input type="checkbox"/>	Jeffreys & Stellwagen
<input type="checkbox"/>	Lydonia Canyon	<input type="checkbox"/>	Lydonia, Gilbert & Oceanographer Canyons
<input type="checkbox"/>	Norfolk Canyon (Mid-Atlantic)	<input type="checkbox"/>	Norfolk Canyon (New England)
<input type="checkbox"/>	Oceanographer Canyon	<input type="checkbox"/>	Retriever Seamount
<input type="checkbox"/>	Veatch Canyon (Mid-Atlantic)	<input type="checkbox"/>	Toms, Middle Toms & Hendrickson Canyons
<input type="checkbox"/>	Veatch Canyon (New England)	<input type="checkbox"/>	Washington Canyon
<input type="checkbox"/>	Cashes Ledge	<input type="checkbox"/>	Wilmington Canyon

<sup>9</sup> Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

### More information

The [Magnuson-Stevens Fishery Conservation and Management Act \(MSA\)](#) mandates that federal agencies conduct an [essential fish habitat \(EFH\) consultation](#) with NOAA Fisheries on any actions they authorize, fund, or undertake that may adversely affect EFH. An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

We designed this worksheet to help you to prepare EFH assessments. It is important to remember that an adverse effect determination is a trigger to consult with us. It does not mean that a project cannot proceed as proposed, or that project modifications are necessary. It means that the effects of the proposed action on EFH must be evaluated to determine if there are ways to avoid, minimize, or offset adverse effects.

This worksheet should be used as your EFH assessment or as a guide to develop your EFH assessment. At a minimum, you should include all the information required to complete this worksheet in your EFH assessment. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. If your answers in the worksheet and supplemental information you attach do not fully evaluate the adverse effects to EFH, we may request additional information to complete the consultation.

You may need to prepare an expanded EFH assessment for more complex projects to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH assessment worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, you should include an analysis as outlined in this worksheet for an expanded EFH assessment, along with any additional necessary information. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects.
- the views of recognized experts on the habitat or the species that may be affected.
- a review of pertinent literature and related information.
- an analysis of alternatives that could avoid or minimize the adverse effects on EFH.

Please contact our Greater Atlantic Regional Fisheries Office, [Protected Resources Division](#) regarding potential impacts to marine mammals or threatened and endangered species.

### **Useful Links**

[National Wetland Inventory Maps](https://www.fws.gov/wetlands/)

<https://www.fws.gov/wetlands/>

[EPA's National Estuary Program \(NEP\)](https://www.epa.gov/nep/)

<https://www.epa.gov/nep/local-estuary-programs>

[Northeast Regional Ocean Council \(NROC\) Data Portal](https://www.northeastoceandata.org/)

<https://www.northeastoceandata.org/>

[Mid-Atlantic Regional Council on the Ocean \(MARCO\) Data Portal](http://portal.midatlanticocean.org/)

<http://portal.midatlanticocean.org/>

### **Resources by State**

#### Maine

[Maine Office of GIS Data Catalog](https://geolibrary-maine.opendata.arcgis.com/datasets#data)

<https://geolibrary-maine.opendata.arcgis.com/datasets#data>

[Town shellfish information including shellfish conservation area maps](https://www.maine.gov/dmr/shellfish-sanitation-management/programs/municipal/ordinances/towninfo.html)

<https://www.maine.gov/dmr/shellfish-sanitation-management/programs/municipal/ordinances/towninfo.html>

[State of Maine Shellfish Sanitation and Management](https://www.maine.gov/dmr/shellfish-sanitation-management/index.html)

<https://www.maine.gov/dmr/shellfish-sanitation-management/index.html>

[Eelgrass maps](https://www.maine.gov/dmr/science-research/species/eelgrass/index.html)

<https://www.maine.gov/dmr/science-research/species/eelgrass/index.html>

[Casco Bay Estuary Partnership](https://www.cascobayestuary.org/)

<https://www.cascobayestuary.org/>

[Maine GIS Stream Habitat Viewer](https://www.arcgis.com/home/item.html?id=5869c2d20f0b4c3a9742bdd8abef42cb)

<https://www.arcgis.com/home/item.html?id=5869c2d20f0b4c3a9742bdd8abef42cb>

#### New Hampshire

[NH's Statewide GIS Clearinghouse, NH GRANIT](http://www.granit.unh.edu/)

<http://www.granit.unh.edu/>

[NH Coastal Viewer](http://www.granit.unh.edu/nhcoastalviewer/)

<http://www.granit.unh.edu/nhcoastalviewer/>

[State of NH Shellfish Program](https://www.des.nh.gov/organization/divisions/water/wmb/shellfish/)

<https://www.des.nh.gov/organization/divisions/water/wmb/shellfish/>

#### Massachusetts

[MA Shellfish Sanitation and Management Program](https://www.mass.gov/shellfish-sanitation-and-management)

<https://www.mass.gov/shellfish-sanitation-and-management>

[MassGIS Data, Including Eelgrass Maps](http://maps.massgis.state.ma.us/map_ol/oliver.php)

[http://maps.massgis.state.ma.us/map\\_ol/oliver.php](http://maps.massgis.state.ma.us/map_ol/oliver.php)

[MA DMF Recommended TOY Restrictions Document](https://www.mass.gov/files/documents/2016/08/ry/tr-47.pdf)

<https://www.mass.gov/files/documents/2016/08/ry/tr-47.pdf>

[Massachusetts Bays National Estuary Program](https://www.mass.gov/orgs/massachusetts-bays-national-estuary-program)

<https://www.mass.gov/orgs/massachusetts-bays-national-estuary-program>

[Buzzards Bay National Estuary Program](http://buzzardsbay.org/)

<http://buzzardsbay.org/>

[Massachusetts Division of Marine Fisheries](http://buzzardsbay.org/)

<https://www.mass.gov/orgs/division-of-marine-fisheries>  
[Massachusetts Office of Coastal Zone Management](#)  
<https://www.mass.gov/orgs/massachusetts-office-of-coastal-zone-management>

Rhode Island

[RI Shellfish and Aquaculture](#)  
<http://www.dem.ri.gov/programs/fish-wildlife/marine-fisheries/shellfish-aquaculture.php>  
[RI Shellfish Management Plan](#)  
<http://www.shellfishri.com/>  
Eelgrass Maps  
[http://edc.maps.arcgis.com/apps/View/index.html?appid\\_db52bb689c1e44259c06e11fd24895f8](http://edc.maps.arcgis.com/apps/View/index.html?appid_db52bb689c1e44259c06e11fd24895f8)  
[RI GIS Data](#)  
<http://ridemgis.maps.arcgis.com/apps/webappviewer/index.html?id=87e104c8adb449eb9f905e5f18020de5>  
[Narragansett Bay Estuary Program](#)  
<http://nbep.org/>  
[Rhode Island Division of Marine Fisheries](#)  
<http://www.dem.ri.gov/programs/fish-wildlife/marine-fisheries/index.php>  
[Rhode Island Coastal Resources Management Council](#)  
<http://www.crmc.ri.gov/>

Connecticut

[CT Bureau of Aquaculture](#)  
<https://www.ct.gov/doag/cwp/view.asp?a=3768&q=451508&doagNav=>  
[CT GIS Resources](#)  
[https://www.ct.gov/deep/cwp/view.asp?a=2698&q=323342&deepNav\\_GID=1707](https://www.ct.gov/deep/cwp/view.asp?a=2698&q=323342&deepNav_GID=1707)  
[Natural Shellfish Beds in CT](#)  
<https://cteco.uconn.edu/viewer/index.html?viewer=aquaculture>  
[Eelgrass Maps](#)  
[https://www.fws.gov/northeast/ecologicalservices/pdf/wetlands/2012\\_CT\\_Eelgrass\\_Final\\_Report\\_11\\_26\\_2013.pdf](https://www.fws.gov/northeast/ecologicalservices/pdf/wetlands/2012_CT_Eelgrass_Final_Report_11_26_2013.pdf)  
[Long Island Sound Study](#)  
<http://longislandsoundstudy.net/>  
[CT GIS Resources](#)  
<http://cteco.maps.arcgis.com/home/index.html>  
[CT DEEP Office of Long Island Sound Programs and Fisheries](#)  
<https://www.ct.gov/deep/site/default.asp>  
[CT River Watershed Council](#)  
<https://www.ctriver.org/>

New York

[Eelgrass Report](#)  
[http://www.dec.ny.gov/docs/fish\\_marine\\_pdf/finalseagrassreport.pdf](http://www.dec.ny.gov/docs/fish_marine_pdf/finalseagrassreport.pdf)  
[Peconic Estuary Program](#)  
<https://www.peconicestuary.org/>  
[NY/NJ Harbor Estuary](#)  
<https://www.hudsonriver.org/estuary-program>

New York GIS Clearinghouse

<https://gis.ny.gov/>

New Jersey

Submerged Aquatic Vegetation Mapping

<http://www.crssa.rutgers.edu/projects/sav/>

Barnegat Bay Partnership

<https://www.barnegatbaypartnership.org/>

NJ GeoWeb

<https://www.nj.gov/dep/gis/gcoweb splash.htm>

NJ DEP Shellfish Maps

<https://www.nj.gov/dep/landuse/shellfish.html>

Pennsylvania

Delaware River Management Plan

[https://www.fishandboat.com/Fish/Fisheries/DelawareRiver/Documents/delaware\\_river\\_plan\\_exec\\_draft.pdf](https://www.fishandboat.com/Fish/Fisheries/DelawareRiver/Documents/delaware_river_plan_exec_draft.pdf)

PA DEP Coastal Resources Management Program

<https://www.dep.pa.gov/Business/Water/Compacts%20and%20Commissions/Coastal%20Resources%20Management%20Program/Pages/default.aspx>

PA DEP GIS Mapping Tools

<https://www.dep.pa.gov/DataandTools/Pages/GIS.aspx>

Delaware

Partnership for the Delaware Estuary

<http://www.delawareestuary.org/>

Center for Delaware Inland Bays

<http://www.inlandbays.org/>

Delaware FirstMap

<http://delaware.maps.arcgis.com/home/index.html>

Maryland

Submerged Aquatic Vegetation Mapping

<http://web.vims.edu/bio/sav/>

MERLIN

<http://dnrweb.dnr.state.md.us/MERLIN/>

Maryland Coastal Bays Program

<https://mdcoastalbays.org/>

Virginia

Submerged Aquatic Vegetation mapping

[http://www.mrc.virginia.gov/regulations/Guidance\\_for\\_SAV\\_beds\\_and\\_restoration\\_final\\_approved\\_by\\_Commission\\_7-22-17.pdf](http://www.mrc.virginia.gov/regulations/Guidance_for_SAV_beds_and_restoration_final_approved_by_Commission_7-22-17.pdf)

VDGIF Time of Year Restrictions (TOYR) and Other Guidance

<https://www.dgif.virginia.gov/wp-content/uploads/VDGIF-Time-of-Year-Restrictions-Table.pdf>

**Appendix 2C**  
**Avian Species Observed at Naval Support Facility**  
**Dahlgren**

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Avian Species Observed at NSFDL

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<b>Order Ciconiiformes</b>						
<i>Botaurus lentiginosus</i>	American Bittern	G4	S1BS2N	-	-	II
<i>Ardea herodias</i>	Great Blue Heron	G5	S3BS5N	-	-	-
<i>Ardeas alba</i>	Great Egret	-	-	-	-	-
<i>Butorides striatus</i>	Green Heron	-	-	-	-	IV
<i>Egretta thula</i>	Snowy Egret	G5	S2BS3N	-	-	-
<b>Order Anseriformes</b>						
<i>Anas rubripes</i>	Black Duck	-	-	-	-	II
<i>Anas discors</i>	Blue-winged Teal	G5	S1BS2N	-	-	II
<i>Bucephala albeola</i>	Bufflehead	-	-	-	-	-
<i>Branta canadensis</i>	Canada Goose	-	-	-	-	-
<i>Aythya valisineria</i>	Canvasback	-	-	-	-	-
<i>Bucephala clangula</i>	Common Goldeneye	-	-	-	-	-
<i>Aythya affinia</i>	Lesser Scaup	-	-	-	-	-
<i>Anas platyrhynchos</i>	Mallard	-	-	-	-	-
<i>Mergus serrator</i>	Red-breasted Merganser	-	-	-	-	-
<i>Aythya americana</i>	Redhead	-	-	-	-	III
<i>Aythya collaris</i>	Ring-necked Duck	-	-	-	-	-
<i>Oxyura jamaicensis</i>	Ruddy Duck	-	-	-	-	-
<i>Cygnus columbianus</i>	Tundra Swan	-	-	-	-	-
<i>Aix sponsa</i>	Wood Duck	-	-	-	-	-
<b>Order Galliformes</b>						
<i>Colinus virginianus</i>	Northern Bobwhite	-	-	-	-	IV
<i>Meleagris gallopava</i>	Turkey	-	-	-	-	-
<i>Phasianus colchicus</i>	Ring-necked Pheasant	-	-	-	-	-
<b>Order Gruiformes</b>						
<i>Fulica americana</i>	American coot	G5	S1BS5N	-	-	-

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<b>Order Falconiformes</b>						
<i>Falco sparverius</i>	American Kestrel	-	-	-	-	-
<i>Pandion haliaetus</i>	America Osprey	-	-	-	-	-
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S2BS3N	-	ST	II
<i>Accipiter cooperii</i>	Cooper's Hawk	-	-	-	-	-
<i>Circus cyaneus</i>	Northern Harrier	G5	S1S2BS3N	-	SC	III
<i>Buteo lineatus</i>	Red-shouldered Hawk	-	-	-	-	-
<i>Buteo jamaicensis</i>	Red-tailed Hawk	-	-	-	-	-
<i>Accipiter striatus</i>	Sharp-shinned Hawk	-	-	-	-	-
<i>Cathartes aura</i>	Turkey Vulture	-	-	-	-	-
<b>Order Charadriiformes</b>						
<i>Scolopax minor</i>	American Woodcock	-	-	-	-	-
<i>Chilidonias niger</i>	Black Tern	-	-	-	-	-
<i>Gallinago gallinago</i>	Common Snipe	-	-	-	-	-
<i>Sterna hirundo</i>	Common Tern	-	-	-	-	III
<i>Larus marinus</i>	Great Black-backed Gull	-	-	-	-	-
<i>Tringa melanoleuca</i>	Greater Yellowlegs	-	-	-	-	-
<i>Larus argentatus</i>	Herring Gull	-	-	-	-	-
<i>Charadrius vociferous</i>	Killdeer	-	-	-	-	-
<i>Tringa flavipes</i>	Lesser Yellowlegs	-	-	-	-	-
<i>Tringa solitaria</i>	Solitary Sandpiper	-	-	-	-	-
<i>Actitis macularia</i>	Spotted Sandpiper	G5	S2B	-	-	-
<b>Order Phalacrocoracidae</b>						
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	-	-	-	-	-
<b>Order Podicipediformes</b>						
<i>Podiceps auritus</i>	Horned Grebe	-	-	-	-	IV
<i>Podilymbus podiceps</i>	Pied-billed Grebe	G5	S1S2BS3N	-	-	-
<b>Order Columbiformes</b>						

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<i>Zenaida macroura</i>	Mourning Dove	-	-	-	-	-
<b>Order Cuculiformes</b>						
<i>Strix varia</i>	Barred Owl	-	-	-	-	-
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	-	-	-	-	-
<i>Otus asio</i>	Eastern Screech Owl	-	-	-	-	-
<i>Bubo virginianus</i>	Great Horned Owl	-	-	-	-	-
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	-	-	-	-	IV
<b>Order Apodiformes</b>						
<i>Chaetura pelagica</i>	Chimney Swift	-	-	-	-	-
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	-	-	-	-	-
<b>Order Caprimulgiformes</b>						
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow	-	-	-	-	IV
<i>Caprimulgus vociferous</i>	Whip-poor-will	-	-	-	-	IV
<b>Order Coraciiformes</b>						
<i>Ceryle alcyon</i>	Belted Kingfisher	-	-	-	-	-
<b>Order Piciformes</b>						
<i>Colaptes auratus</i>	Northern Flicker	-	-	-	-	-
<i>Picoides pubescens</i>	Downy Woodpecker	-	-	-	-	-
<i>Picoides villosus</i>	Hairy Woodpecker	-	-	-	-	-
<i>Dryocopus pileatus</i>	Pileated Woodpecker	-	-	-	-	-
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	-	-	-	-	-
<i>Sphyrapicus vicus</i>	Yellow-bellied Sapsucker	G5	S1BS4N	-	SC	I
<b>Order Passeriformes</b>						
<i>Empidonax vireescens</i>	Acadian Flycatcher	-	-	-	-	-
<i>Corvus brachyrhynchos</i>	American Crow	-	-	-	-	-
<i>Carduelis tristis</i>	American Goldfinch	-	-	-	-	-
<i>Setophaga ruticilla</i>	American Redstart	-	-	-	-	-
<i>Turdus migratorius</i>	American Robin	-	-	-	-	-

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<i>Riparia riparia</i>	Bank Swallow	-	-	-	-	-
<i>Hirundo rustica</i>	Barn Swallow	-	-	-	-	-
<i>Dendroica castanea</i>	Bay-breasted Warbler	-	-	-	-	-
<i>Mniotilta varia</i>	Black and White Warbler	-	-	-	-	IV
<i>Dendroica fusca</i>	Blackburnian Warbler	G5	S2B	-	-	-
<i>Dendroica striata</i>	Blackpoll Warbler	-	-	-	-	-
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	-	-	-	-	-
<i>Dendroica virens</i>	Black-throated Green Warbler	-	-	-	-	I
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	-	-	-	-	-
<i>Guiraca caerulea</i>	Blue Grosbeak	-	-	-	-	-
<i>Cyanocitta cristata</i>	Blue Jay	-	-	-	-	-
<i>Certhia familiaris</i>	Brown Creeper	-	-	-	-	-
<i>Toxostoma rufum</i>	Brown Thrasher	-	-	-	-	IV
<i>Molothrus ater</i>	Brown-headed Cowbird	-	-	-	-	-
<i>Wilsonia canadensis</i>	Canada Warbler	-	-	-	-	-
<i>Dendroica tigrina</i>	Cape May Warbler	-	-	-	-	-
<i>Poecile carolinensis</i>	Carolina Chickadee	-	-	-	-	-
<i>Thryothorus ludovicianus</i>	Carolina Wren	-	-	-	-	-
<i>Bombycilla cedrorum</i>	Cedar Waxwing	-	-	-	-	-
<i>Spizella passerina</i>	Chipping Sparrow	-	-	-	-	-
<i>Quiscalus quiscula</i>	Common Grackle	-	-	-	-	-
<i>Geothlypis trichas</i>	Common Yellowthroat	-	-	-	-	-
<i>Junco hyemalis</i>	Dark-eyed Junco	-	-	-	-	-
<i>Sialis sialis</i>	Eastern Bluebird	-	-	-	-	-
<i>Tyrannus tyrannus</i>	Eastern Kingbird	-	-	-	-	-
<i>Sturnella magna</i>	Eastern Meadowlark	-	-	-	-	IV
<i>Sayornis phoebe</i>	Eastern Phoebe	-	-	-	-	-
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	-	-	-	-	IV

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<i>Contopus virens</i>	Eastern Wood-pewee	-	-	-	-	IV
<i>Spizella pusilla</i>	Field Sparrow	-	-	-	-	IV
<i>Corvus ossifragus</i>	Fish Crow	-	-	-	-	-
<i>Regulus satrapa</i>	Golden-crowned Kinglet	G5	S2BS5N	-	SS	-
<i>Regulus calendula</i>	Ruby-crowned Kinglet	-	-	-	-	-
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	-	-	-	-	IV
<i>Dumetella carolinensis</i>	Gray Catbird	-	-	-	-	IV
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	-	-	-	-	-
<i>Wilsonia citrinia</i>	Hooded Warbler	-	-	-	-	-
<i>Eremophila alpestris</i>	Horned Lark	-	-	-	-	-
<i>Passer domesticus</i>	House Sparrow	-	-	-	-	-
<i>Troglodytes aedon</i>	House Wren	-	-	-	-	-
<i>Passerina cyanea</i>	Indigo Bunting	-	-	-	-	-
<i>Empidonax minimus</i>	Least Flycatcher	-	-	-	-	-
<i>Lanius ludovicianus</i>	Loggerhead Shrike	G4	S2BS3N	-	ST	I
<i>Seiurus aurocapillus</i>	Louisiana Waterthrush	-	-	-	-	IV
<i>Cistothorus palustris</i>	Marsh Wren	-	-	-	-	IV
<i>Dendroica magnolia</i>	Magnolia Warbler	G5	S2B	-	SS	-
<i>Cardinalis cardinalis</i>	Northern Cardinal	-	-	-	-	-
<i>Mimus polyglottos</i>	Northern Mockingbird	-	-	-	-	-
<i>Parula americana</i>	Northern Parula	-	-	-	-	IV
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	-	-	-	-	IV
<i>Icterus spurius</i>	Orchard Oriole	-	-	-	-	-
<i>Seiurus aurocapillus</i>	Ovenbird	-	-	-	-	-
<i>Dendroica palmarum</i>	Palm Warbler	-	-	-	-	-
<i>Dendroica pinus</i>	Pine Warbler	-	-	-	-	-
<i>Dendroica discolor</i>	Prairie Warbler	-	-	-	-	IV

Order & Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	SWAP Tier
<i>Carpodacus purpureus</i>	Purple Finch	G5	S1BS5N		SS	-
<i>Progne subis</i>	Purple Martin	-	-	-	-	-
<i>Vireo olivaceus</i>	Red-eyed Vireo	-	-	-	-	-
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	-	-	-	-	-
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	-	-	-	-	IV
<i>Euphagus carolinus</i>	Rusty Blackbird	-	-	-	-	IV
<i>Passerculus sandwichensis</i>	Savannah Sparrow	-	-	-	-	-
<i>Piranga olivacea</i>	Scarlet Tanager	-	-	-	-	IV
<i>Piranga rubra</i>	Summer Tanager	-	-	-	-	-
<i>Cistothorus platensis</i>	Sedge Wren	G5	S1BS1S2N	-	SC	
<i>Vireo solitarius</i>	Solitary Vireo	-	-	-	-	-
<i>Melospiza melodia</i>	Song Sparrow	-	-	-	-	-
<i>Sturnus vulgaris</i>	Starling	-	-	-	-	-
<i>Catharus ustulatus</i>	Swainson's Thrush	G5	S1B	-	-	-
<i>Melospiza georgiana</i>	Swamp Sparrow	G5	S1BS4S5N	-	-	-
<i>Vermivora peregrina</i>	Tennessee Warbler	-	-	-	-	-
<i>Spizella arborea</i>	Tree Sparrow	-	-	-	-	-
<i>Tachycineta bicolor</i>	Tree Swallow	-	-	-	-	-
<i>Parus bicolor</i>	Tufted Titmouse	-	-	-	-	-
<i>Catharus fuscescens</i>	Veery	-	-	-	-	-
<i>Sitta carolinensis</i>	White-breasted Nuthatch	-	-	-	-	-
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	-	-	-	-	-
<i>Vireo griseus</i>	White-eyed Vireo	-	-	-	-	-
<i>Zonotrichia albicollis</i>	White-throated Sparrow	-	-	-	-	-
<i>Troglodytes troglodytes</i>	Winter Wren	G5	S2BS4N	-	SS	II
<i>Hylocichla mustelina</i>	Wood Thrush	-	-	-	-	IV
<i>Helmitheros vermivorus</i>	Worm-eating Warbler	-	-	-	-	IV
<i>Icteria virens</i>	Yellow-breasted Chat	-	-	-	-	IV

<b>Order &amp; Scientific Name</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal Status</b>	<b>State Status</b>	<b>SWAP Tier</b>
<i>Dendroica coronate</i>	Yellow-rumped Warbler	-	-	-	-	-
<i>Vireo flavifrons</i>	Yellow-throated Vireo	-	-	-	-	IV

Sources: USN 2001b, Roble 2006, Appendix 2A, NSFDL (1987-2020)

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**Appendix 2D**  
**Fish Species Observed at Naval Support Facility**  
**Dahlgren**

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**Fish Species Observed at NSFDL**

<b>Species</b>	<b>Common Name</b>
<i>Alosa sp.</i>	Herring
<i>Anchoa mitchilli</i>	Bay anchovy
<i>Ameiurus nebulosus</i>	Brown bullhead
<i>Anguilla rostrata</i>	American eel
<i>Brevoortia tyrannus</i>	Atlantic menhaden
<i>Cyprinus carpio</i>	Carp
<i>Dorosoma cepedianum</i>	Gizzard shad
<i>Esox americanus</i>	Redfin pickerel
<i>Esox niger</i>	Chain pickerel
<i>Etheostoma olmstedii</i>	Tesselated darter
<i>Fundulus diaphanus</i>	Banded killifish
<i>Fundulus heteroclitus</i>	Mummichog
<i>Fundulus majalis</i>	Striped killifish
<i>Gambusia holbrooki</i>	Eastern mosquitofish
<i>Ictalurus punctatus</i>	Channel catfish
<i>Lepomis gibbosus</i>	Pumpkinseed
<i>Lepomis gulosus</i>	Warmouth
<i>Lepomis macrochirus</i>	Bluegill
<i>Lieostomus xanthurus</i>	Spot
<i>Menidia menidia</i>	Atlantic silverside
<i>Menidia beryllina</i>	Tidewater silverside
<i>Micropterus salmoides</i>	Largemouth bass
<i>Morone americana</i>	White perch
<i>Morone saxatilis</i>	Striped bass
<i>Notemigonus crysoleucas</i>	Golden shiner
<i>Perca flavescens</i>	Yellow perch
<i>Pimephales notatus</i>	Bluntnose minnow
<i>Pimphales promelas</i>	Fathead minnow
<i>Strongylura marina</i>	Atlantic needlefish
<i>Syngnathus fuscus</i>	Northern pipefish
<i>Umbra pygmaea</i>	Eastern mudminnow

Source: Alliance for the Chesapeake Bay N.D., USN 2001b, Roble 2006, Appendix 2A, NSFDL (1987-2020).

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**Appendix 2E  
Herpetofauna Observed at Naval Support Facility  
Dahlgren**

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**Presence Status of Amphibian and Reptile Species on Naval Support Facility Dahlgren**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Presence at NSFDL</b>
<b><u>Class: Amphibia</u></b>		
<b>Order: Anura</b>		
<i>Acris crepitans</i>	Eastern Cricket Frog	Confirmed
<i>Anaxyrus americanus</i>	American Toad	Confirmed
<i>Anaxyrus fowleri</i>	Fowler's Toad	Confirmed
<i>Gastrophryne carolinensis</i>	Eastern Narrow-mouthed Toad	Potential
<i>Hyla chrysoscelis</i>	Cope's Gray Treefrog	Confirmed
<i>Hyla cinerea</i>	Green Treefrog	Confirmed
<i>Hyla versicolor</i>	Gray Treefrog	Potential
<i>Lithobates catesbeianus</i>	American Bullfrog	Confirmed
<i>Lithobates clamitans</i>	Green Frog	Confirmed
<i>Lithobates palustris</i>	Pickerel Frog	Confirmed
<i>Lithobates sphenoccephalus utricularius</i>	Coastal Plains Leopard Frog	Confirmed
<i>Lithobates sylvaticus</i>	Wood Frog	Confirmed
<i>Pseudacris crucifer crucifer</i>	Spring Peeper	Confirmed
<i>Pseudacris feriarum</i>	Upland Chorus Frog	Confirmed
<i>Scaphiopus holbrookii</i> *	Eastern Spadefoot	Potential
<b>Order: Caudata</b>		
<i>Ambystoma maculatum</i>	Spotted Salamander	Confirmed
<i>Ambystoma opacum</i>	Marbled Salamander	Confirmed
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Potential
<i>Eurycea cirrigera</i>	Southern Two-lined Salamander	Potential
<i>Eurycea guttolineata</i>	Three-lined Salamander	Potential
<i>Hemidactylium scutatum</i>	Four-toed Salamander	Confirmed
<i>Notophthalmus viridescens</i>	Eastern Newt	Confirmed
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Confirmed
<i>Plethodon cylindraceus</i>	White-spotted Slimy Salamander	Confirmed
<i>Pseudotriton montanus montanus</i> *	Eastern Mud Salamander	Potential
<i>Pseudotriton ruber ruber</i>	Northern Red Salamander	Potential
<i>Siren lacertina</i> *	Greater Siren	Potential
<b><u>Class: Reptilia</u></b>		
<b>Order: Testudines</b>		
<i>Chelydra serpentina</i> *	Snapping Turtle	Confirmed
<i>Chrysemys picta picta</i>	Eastern Painted Turtle	Confirmed
<i>Clemmys guttata</i> *	Spotted Turtle	Confirmed
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Confirmed

<i>Malaclemys terrapin terrapin</i> *	Northern Diamond-backed Terrapin	Confirmed
<i>Pseudemys concinna concinna</i>	Eastern River Cooter	Potential
<i>Pseudemys rubriventris</i>	Northern Red-bellied Cooter	Confirmed
<i>Sternotherus odoratus</i>	Eastern Musk Turtle	Potential
<i>Trachemys scripta</i>	Pond Slider	Confirmed
<i>Terrapene carolina</i> *	Eastern Box Turtle	Confirmed

**Order: Squamata**

**Suborder: Sauria**

<i>Aspidoscelis sexlineata sexlineata</i>	Eastern Six-lined Racerunner	Confirmed
<i>Plestiodon fasciatus</i>	Common Five-lined Skink	Confirmed
<i>Plestiodon laticeps</i>	Broad-headed Skink	Confirmed
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	Confirmed
<i>Scincella lateralis</i>	Little Brown Skink	Confirmed

**Suborder: Serpentes**

<i>Agkistrodon contortrix mokasen</i>	Northern Copperhead	Confirmed
<i>Carphophis amoenus amoenus</i>	Eastern Wormsnake	Confirmed
<i>Coluber constrictor</i>	North American Racer	Confirmed
<i>Diadophis punctatus edwardsii</i>	Northern Ring-necked Snake	Potential
<i>Heterodon platirhinos</i> *	Eastern Hog-nosed Snake	Potential
<i>Lampropeltis calligaster rhombomaculata</i>	Mole Kingsnake	Potential
<i>Lampropeltis getula</i> *	Eastern Kingsnake	Confirmed
<i>Lampropeltis triangulum triangulum</i>	Eastern Milksnake	Potential
<i>Nerodia sipedon sipedon</i>	Northern Watersnake	Confirmed
<i>Opheodrys aestivus aestivus</i>	Northern Rough Greensnake	Confirmed
<i>Pantherophis alleganiensis</i>	Eastern Ratsnake	Confirmed
<i>Pantherophis guttatus</i>	Red Cornsnake	Potential
<i>Regina septemvittata</i> *	Queen Snake	Potential
<i>Storeria dekayi dekayi</i>	Dekay's Brownsnake	Confirmed
<i>Storeria occipitomaculata occipitomaculata</i>	Northern Red-bellied Snake	Potential
<i>Thamnophis sauritus</i> *	Eastern Ribbonsnake	Confirmed
<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake	Confirmed
<i>Virginia valeriae valeriae</i>	Eastern Smooth Earthsnake	Confirmed

Source: DoN 2014a, NSF DL (2014-2021), VDGIF 2015

Note: \* = Species of Greatest Conservation Need (SGCN) identified in the 2015 SWAP



**Appendix 2F**  
**Mammalian Species Observed at Naval Support**  
**Facility Dahlgren**

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**Mammalian Species Observed at NSFDL**

<b>Scientific Name</b>	<b>Common Name</b>
<b>Marsupials</b>	
<i>Didelphis virginiana</i>	opossum
<b>Insectivores</b>	
<i>Blarina carolinensis</i>	short-tailed shrew
<b>Rodents</b>	
<i>Castor canadensis</i>	beaver
<i>Glaucomys volans</i>	southern flying squirrel
<i>Lontra canadensis</i>	river otter
<i>Marmota monax</i>	Woodchuck (groundhog)
<i>Microtus pennsylvanicus</i>	meadow vole
<i>Microtus pinetorum</i>	pine vole
<i>Mus musculus</i>	house mouse
<i>Napaeozapus insignis</i>	woodland jumping mouse
<i>Ondatra zibethicus</i>	muskrat
<i>Peromyscus leucopus</i>	white-footed mouse
<i>Sciurus carolinensis</i>	eastern gray squirrel
<b>Lagomorphs</b>	
<i>Sylvilagus floridanus</i>	eastern cottontail rabbit
<b>Chiroptera</b>	
<i>Eptesicus fuscus</i>	big brown bat
<i>Lasiurus noctivagans</i>	silver-haired bat
<i>Lasiurus borealis</i>	eastern red bat
<i>Lasiurus cinereus</i>	hoary bat
<i>Myotis lucifugus</i>	little brown bat
<i>Nycticeius humeralis</i>	evening bat
<i>Perimyotis subflavus</i>	tri-colored bat
<b>Carnivores</b>	
<i>Canis familiaris</i>	domestic dog
<i>Canis latrans</i>	coyote
<i>Felis catus</i>	domestic cat
<i>Mephitis mephitis</i>	striped skunk
<i>Procyon lotor</i>	raccoon
<i>Urocyon cinereoargenteus</i>	gray fox
<i>Vulpes vulpes</i>	red fox
<b>Ungulates</b>	
<i>Odocoileus virginiana</i>	white-tailed deer

Source: USN 2001b, Appendix 2A, NSFDL (1987-2020)

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**Appendix 2G  
Plant Species Observed at Naval Support Facility  
Dahlgren**

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Plant Species by Area for Dahlgren.

<i>Scientific Name</i>	Common Name	Origin <sup>1</sup>	HF <sup>2</sup>	BL <sup>3</sup>	PF <sup>4</sup>	ES <sup>5</sup>	FM <sup>6</sup>	CT <sup>7</sup>	DR <sup>8</sup>
<b>Trees</b>									
<i>Acer palmatum</i>	Japanese maple	I							X
<i>Acer platanoides</i>	Norway maple	I							X
<i>Acer rubrum</i>	red maple	N	X	X	X	X	X		X
<i>Acer saccharum</i>	sugar maple	N	X						
<i>Ailanthus altissima</i>	tree-of-heaven	N	X			X		X	
<i>Alnus rugosa</i>	speckled alder	N	X						
<i>Alnus serrulata</i>	common alder	N		X					
<i>Amelanchier sp.</i>	serviceberry	N	X		X				
<i>Betula nigra</i>	river birch	N			X				
<i>Carpinus caroliniana</i>	American hornbeam	N	X						X
<i>Carya cordiformis</i>	bitternut hickory	N	X		X				
<i>Carya ovata</i>	shagbark hickory	N	X		X				
<i>Carya sp.</i>	hickory	N	X		X				
<i>Carya tomentosa</i>	mockernut hickory	N	X		X				
<i>Castanea dentata</i>	American chestnut	N	X						
<i>Catalpa bignonioides</i>	common catalpa	N							X
<i>Celtis occidentalis</i>	hackberry	N	X						
<i>Cercis canadensis</i>	redbud	N	X						
<i>Cornus florida</i>	flowering dogwood	N	X		X				
<i>Diospyros virginiana</i>	persimmon	N	X	X	X	X	X	X	
<i>Fagus grandifolia</i>	American beech	N	X		X				
<i>Fraxinus pennsylvanica</i>	green ash	N		X					
<i>Gleditsia triacanthos</i>	honey locust	N						X	
<i>Ilex opaca</i>	American holly	N	X		X	X			
<i>Juglans cinerea</i>	butternut	N	X						
<i>Juniperus virginiana</i>	eastern red cedar	N	X		X	X		X	

<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<i>Liquidambar styraciflua</i>	sweet gum	N	X	X	X	X			X
<i>Liriodendron tulipifera</i>	yellow poplar	N	X	X	X				
<i>Magnolia acuminata</i>	cucumber tree	N	X						
<i>Magnolia virginiana</i>	sweet bay	N	X		X				
<i>Magnolis spp.</i>	magnolia	I/N	X	X	X				
<i>Morus spp.</i>	mulberry	I/N					X		
<i>Nyssa sylvatica</i>	black gum	N	X	X	X				
<i>Picea abies</i>	Norway spruce	I							X
<i>Pinus strobus</i>	white pine	N			X				
<i>Pinus taeda</i>	loblolly pine	N	X		X	X			
<i>Pinus virginiana</i>	Virginia pine	N	X		X	X			X
<i>Platanus occidentalis</i>	American sycamore	N	X			X			X
<i>Populus grandidentata</i>	big-toothed aspen	N	X						
<i>Prunus avium</i>	sweet cherry	I			X				
<i>Prunus serotina</i>	black cherry	N	X	X	X	X		X	
<i>Quercus alba</i>	white oak	N	X		X	X			
<i>Quercus falcata</i>	Southern red oak	N	X		X				
<i>Quercus marilandica</i>	black jack oak	N	X						
<i>Quercus phellos</i>	willow oak	N	X		X	X			X
<i>Quercus prinus</i>	chestnut oak	N	X						
<i>Quercus rubra</i>	northern red oak	N	X						
<i>Quercus spp.</i>	oaks	I/N	X		X	X			
<i>Quercus stellata</i>	post oak	N			X				
<i>Quercus velutina</i>	black oak	N	X		X				X
<i>Robinia pseudoacacia</i>	black locust	N	X		X	X		X	
<i>Salix sp.</i>	willow	I/N					X	X	
<i>Tilia americana</i>	basswood	N	X						
<i>Ulmus americana</i>	American elm	N							X
<i>Ulmus pumila</i>	Chinese elm	I							X



<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<b>Shrubs</b>									
<i>Amorpha fruticosa</i>	false indigo	N				X		X	
<i>Aralia nudicaulis</i>	wild sarasparilla	N	X						
<i>Aralia spinosa</i>	hercules' club	N	X		X				
<i>Cephalanthus occidentalis</i>	button-bush	N				X			
<i>Clethra alnifolia</i>	sweet pepper-bush	N		X					
<i>Cornus amomum</i>	silky dogwood	N				X			
<i>Eleagnus umbellata</i>	autumn olive	I	X						
<i>Euonymus americanus</i>	strawberry bush	N	X	X	X				
<i>Gaylussacia baccata</i>	black huckleberry	N	X		X				
<i>Gaylussacia frondosa</i>	dangleberry	N			X				
<i>Hibiscus moscheutos</i>	swamp rosemallow	N		X			X		
<i>Hypericum punctatum</i>	St. John's wort	N			X	X			
<i>Hypericum virginicum</i>	marsh St. John's wort	N					X		
<i>Ilex verticillata</i>	winterberry	N		X					
<i>Ludwigia decurrens</i>	primrose-willow	N					X		
<i>Kalmia latifolia</i>	mountain laurel	N	X		X				
<i>Kosteletzkya virginica</i>	seashore mallow	N					X		
<i>Leucothoe racemosa</i>	fetter-bush	N	X	X					
<i>Ligustrum spp.</i>	privet	I				X			
<i>Morella cerifera</i>	southern wax myrtle	N	X		X	X	X	X	
<i>Morella pensylvanica</i>	bayberry	N	X		X	X	X	X	
<i>Rhus copallina</i>	winged sumac	N	X		X	X		X	
<i>Rhus glabra</i>	smooth sumac	N			X	X			
<i>Rhus typhina</i>	staghorn sumac	N				X			
<i>Rhus vernix</i>	poison sumac	N		X					
<i>Ribes sp.</i>	currant	N	X						
<i>Rosa sp.</i>	rose	I/N		X		X	X		
<i>Rubus spp.</i>	blackberries, raspberries	I/N			X				

<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<i>Sambucus canadensis</i>	common elderberry	N		X		X			
<i>Vaccinium corymbosum</i>	highbush blueberry	N	X	X	X				
<i>Viburnum acerifolium</i>	mapleleaf viburnum	N	X						
<i>Viburnum dentatum</i>	arrowwood viburnum	N		X	X	X			
<i>Viburnum lentago</i>	nannyberry	N	X	X					
<i>Viburnum nudum</i>	swamp-haw	N		X					
<i>Viburnum prunifolium</i>	black-haw	N				X			
<b>Forbs/Herbs</b>									
<i>Achillea millefolium</i>	yarrow	I				X			X
<i>Acnida cannabina</i>	waterhemp	N	X			X	X	X	X
<i>Agrimonia pubescens</i>	agrimony	N	X						
<i>Alisma subcordatum</i>	water-plantain	N					X		
<i>Allium</i> sp.	onion	I/N	X		X	X	X		X
<i>Ambrosia artemisiifolia</i>	common ragweed	N			X	X			X
<i>Anagallis arvensis</i>	pimpernel	I				X			
<i>Antennaria neglecta</i>	pussy-toes	N							X
<i>Antennaria</i> spp.	everlasting	N				X			
<i>Apocynum</i> spp.	dogbane	N				X		X	
<i>Arabidopsis thaliana</i>	mouse-eared cress	I				X			
<i>Arisaema triphyllum</i>	jack-in-the pulpit	N	X	X					
<i>Asclepias incarnata</i>	swamp milkweed	N				X			
<i>Asclepias syriaca</i>	common milkweed	N				X			
<i>Asclepias tuberosa</i>	butterfly-weed	N				X			
<i>Asparagus officinalis</i>	asparagus	I				X			
<i>Asplenium platyneuron</i>	ebony spleenwort	N	X	X	X	X			
<i>Aster</i> spp.	asters	I/N			X	X	X	X	X
<i>Athyrium felix-femina</i>	lady-fern	N	X		X	X			
<i>Baccharis halimifolia</i>	sea-myrtle	N				X	X	X	
<i>Barbarea vulgaris</i>	common wintercress	I			X	X			

<i>Scientific Name</i>	Common Name	Origin <sup>1</sup>	HF <sup>2</sup>	BL <sup>3</sup>	PF <sup>4</sup>	ES <sup>5</sup>	FM <sup>6</sup>	CT <sup>7</sup>	DR <sup>8</sup>
<i>Bidens</i> spp.	bur-marigold	N		X	X	X		X	X
<i>Bochmeria cylindrica</i>	false nettle	N	X						
<i>Botrychium dissectum</i>	common grape fern	N	X						
<i>Botrychium virginianum</i>	grape fern	N	X						
<i>Cakile edentula</i>	sea rocket	N						X	
<i>Cardamine concatenata</i>	cutleaf toothwort	N	X						
<i>Cardamine hirsuta</i>	bittercress	I				X			
<i>Cassia fasciculata</i>	partridgepea	N				X	X		
<i>Cassia nictitans</i>	wild sensitive plant	N				X	X		
<i>Cenchrus</i> spp.	sandbur	N						X	
<i>Centaurea maculosa</i>	star thistle	I						X	
<i>Cerastium vulgatum</i>	mouse-ear chickweed	I				X			X
<i>Chenopodium</i> sp.	goosefoot	I					X		
<i>Chimaphila maculate</i>	spotted wintergreen	N	X		X				
<i>Chrysanthemum leucanthemum</i>	ox-eyed daisy	I				X			X
<i>Circaea quadrislcata</i>	enchanter's nightshade	N	X						
<i>Cirsium</i> spp.	thistle	I/N				X			X
<i>Conoclinium coelestinum</i>	Blue mist flower	N				X			
<i>Datura stramonium</i>	jimson weed	I						X	
<i>Daucus carota</i>	Queen Anne's lace	I				X			X
<i>Decodon verticillatus</i>	swamp loosestrife	N	X						
<i>Dennstaedtia punctilobula</i>	hay-scented fern	N	X						
<i>Desmodium</i> spp.	tick trefoil	N	X	X	X	X			
<i>Dryopteris spinulosa</i>	wood fern	N	X	X	X				
<i>Dryopteris thelypteris</i>	marsh fern	N			X		X		
<i>Epigea repens</i>	trailing arbutus	N	X		X				
<i>Equisetum hyemale</i>	scouring rush	N						X	
<i>Erigeron</i> spp.	fleabane	N							X

<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<i>Erigeron strigosus</i>	prairie fleabane	N				X			
<i>Eupatorium hyssopifolium</i>	hyssopleaf eupatorium	N			X	X			
<i>Eupatorium perfoliatum</i>	boneset	N				X			
<i>Eupatorium rugosum</i>	white snakeroot	N	X		X				
<i>Eupatorium rotundifolium</i>	roundleaf eupatorium	N			X			X	
<i>Euphorbia corollata</i>	flowering spurge	N		X	X	X			
<i>Euphorbia cyparissias</i>	cypress spurge	I						X	
<i>Fragaria virginiana</i>	wild strawberry	N				X			
<i>Galium circaezans</i>	wild licorice	N	X						
<i>Galium</i> spp.	bedstraw	N	X		X	X	X		
<i>Gerardia purpurea</i>	gerardia	N			X	X			
<i>Glechoma hederacea</i>	ground ivy	I							X
<i>Gnaphalium obtusifolium</i>	catfoot	N				X			
<i>Goodyera pubescens</i>	rattlesnake plantain	N	X		X				
<i>Habenaria lacera</i>	ragged orchis	N				X			
<i>Hieracium</i> spp.	hawkweed	N		X		X			X
<i>Houstonia caerulea</i>	bluet	N				X			
<i>Hydrocotyle</i> sp.	water pennywort	N					X		
<i>Impatiens capensis</i>	jewel-weed	N	X	X					
<i>Iva frutescens</i>	marsh-elder	N					X	X	
<i>Kummerowia striata</i>	Japanese clover	I				X			X
<i>Lactua</i> spp.	wild lettuce	I			X	X			
<i>Lemna</i> spp.	duckweed	N					X		
<i>Lespedeza cuneata</i>	bush clover	I				X			
<i>Lespedeza produmbens</i>	trailing bush clover	N				X			
<i>Liatris spicata</i>	dense blazing star	N				X			
<i>Linum medium</i>	Yellow flax	N				X			
<i>Lobelia cardinalis</i>	cardinal flower	N		X			X		
<i>Lobelia nuttallii</i>	Nuttall's lobelia	N			X				

<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<i>Ludwigia palustris</i>	marsh seedbox	N	X			X			
<i>Lycopodium complanatum</i>	fan-shaped ground pine	N	X		X				
<i>Lycopodium obscurum</i>	ground pine	N	X		X				
<i>Lycopus virginicus</i>	bugleweed	N	X	X					
<i>Lysimachia quadrifolia</i>	whorled loosestrife	N	X						
<i>Medeola virginiana</i>	Indian cucumber root	N		X					
<i>Melilotus alba</i>	sweet white clover	I				X			X
<i>Mitchella repens</i>	partridge berry	N	X	X	X				
<i>Monotropa hypopithys</i>	pine-sap	N			X				
<i>Monotropa uniflora</i>	Indian pipe	N	X		X				
<i>Muscari botryoides</i>	grape hyacinth	I				X			
<i>Myriophyllum</i> sp.	water milfoil	N					X		
<i>Nymphoides aquatica</i>	floating heart	N		X					
<i>Oenothera fruticosa</i>	evening primrose	N				X			
<i>Onoclea sensibilis</i>	sensitive fern	N			X	X			
<i>Osmunda cinnamomea</i>	cinnamon fern	N			X				
<i>Osmunda regalis</i>	royal fern	N			X				
<i>Oxalis stricta</i>	wood sorrel	N				X			X
<i>Oxypolis rigidior</i>	cow-bane	N		X					
<i>Peltandra virginica</i>	arrow-arum	N		X			X		
<i>Phlox</i> spp.	phlox	I/N						X	
<i>Phytolacca americana</i>	pokeweed	N	X	X	X	X		X	
<i>Pilea fontana</i>	clearweed	N	X				X		
<i>Plantago aristata</i>	bracted plantain	I							X
<i>Plantago lanceolata</i>	buckhorn plaintain	I				X			X
<i>Plantago major</i>	plantain	N							X
<i>Pluchea purpurascens</i>	stinkweed	N					X		
<i>Podophyllum peltatum</i>	May-apple	N	X	X					
<i>Polygala sanguinea</i>	milkwort	N			X	X	X		

<i>Scientific Name</i>	<b>Common Name</b>	<b>Origin<sup>1</sup></b>	<b>HF<sup>2</sup></b>	<b>BL<sup>3</sup></b>	<b>PF<sup>4</sup></b>	<b>ES<sup>5</sup></b>	<b>FM<sup>6</sup></b>	<b>CT<sup>7</sup></b>	<b>DR<sup>8</sup></b>
<i>Polygonatum</i> sp.	Solomon's seal	N	X						
<i>Polygonum atifolium</i>	halberd-leaved tearthumb	N		X					
<i>Polygonum aviculare</i>	knotweed	I				X			
<i>Polygonum hydropiperoides</i>	mild water-peper	N		X			X		
<i>Polygonum punctatum</i>	water smartweed	N					X		
<i>Polygonum sagittatum</i>	arrow-leaved tear-thumb	N		X			X		X
<i>Polystichum acrostichoides</i>	Christmas fern	N	X	X	X				
<i>Pontederia cordata</i>	pickerelweed	N					X		
<i>Potentilla</i> sp.	cinquefoil	N			X	X			X
<i>Prunella vulgaris</i>	heal-all	N				X			
<i>Pteridium aquilinum</i>	bracken fern	N			X	X	X		
<i>Ptilimnium capillaceum</i>	mock bishop's-weed	N					X		
<i>Pycnanthemum flexuosum</i>	mountainmint	N				X			
<i>Ranunculus</i> sp.	buttercup	I/N	X						
<i>Rudbeckia hirta</i>	black-eyed susan	N				X			X
<i>Rumex acetosella</i>	sheep sorrel	I	X		X	X			X
<i>Rumex crispus</i>	curly dock	I				X		X	
<i>Rumex verticillatus</i>	swamp dock	N					X		
<i>Sagittaria latifolia</i>	broadleaf arrowhead	N					X		
<i>Saururus cernuus</i>	lizard's tail	N		X			X		
<i>Saxifraga virginiana</i>	early saxifrage	N	X						
<i>Smilacina racemosa</i>	false Solomon's seal	N	X						
<i>Solanum carolinense</i>	horse nettle	N	X			X			X
<i>Solanum dulcamara</i>	deadly nightshade	I				X			
<i>Solidago</i> spp.	goldenrod	N	X		X	X		X	X
<i>Sparganium americanum</i>	bur-reed	N					X		
<i>Spiranthes</i> sp.	ladies tresses	N				X			
<i>Spiranthes vernalis</i>	ladies tresses	N				X			
<i>Stellaria pubera</i>	star chickweed	N				X			

<i>Scientific Name</i>	Common Name	Origin <sup>1</sup>	HF <sup>2</sup>	BL <sup>3</sup>	PF <sup>4</sup>	ES <sup>5</sup>	FM <sup>6</sup>	CT <sup>7</sup>	DR <sup>8</sup>
<i>Symphyotrichum tenuifolium</i>	perennial saltmarsh aster	N					X		
<i>Symplocarpus foetidus</i>	skunk cabbage	N		X					
<i>Taraxacum officinale</i>	dandelion	I				X			X
<i>Thalictrum</i> sp.	meadow rue	N		X					
<i>Thelypteris noveboracensis</i>	New York fern	N			X				
<i>Trifolium pratense</i>	red clover	I				X		X	
<i>Trifolium repens</i>	white clover	I				X		X	X
<i>Utricularia gibba</i>	bladderwort	N					X		
<i>Vallisneria americana</i>	tapegrass	N						X	
<i>Verbascum thapsus</i>	woolly mullein	I				X		X	
<i>Veronica</i> spp.	speedwell	N				X			
<i>Viola arvensis</i>	wild pansy	N				X			X
<i>Viola brittoniana</i>	coast violet	N			X				
<i>Viola canadensis</i>	Canada violet	N							X
<i>Viola pallens</i>	pale violet	N			X				
<i>Viola papilionaceae</i>	common blue violet	N	X	X					
<i>Viola sagittata</i>	arrow-leaved violet	N			X				X
<i>Woodwardia areolata</i>	chain fern	N			X				
<i>Xanthium strumarium</i>	cocklebur	N						X	
<b>Graminoids</b>									
<i>Agrostis alba</i>	redtop	I				X			
<i>Agrostis</i> sp.	bentgrass	I/N	X		X	X	X		X
<i>Andropogon scoparius</i>	broom-beard grass	N				X			
<i>Andropogon</i> sp.	beard grass	N	X		X	X			X
<i>Anthoxanthum odoratum</i>	sweet vernal grass	I/N				X			
<i>Carex</i> sp.	sedges	I/N	X	X	X	X	X	X	X
<i>Cynodon dactylon</i>	Bermuda grass	I						X	X
<i>Cyperis filicinus</i>	beach sedge	N					X		

<i>Scientific Name</i>	Common Name	Origin <sup>1</sup>	HF <sup>2</sup>	BL <sup>3</sup>	PF <sup>4</sup>	ES <sup>5</sup>	FM <sup>6</sup>	CT <sup>7</sup>	DR <sup>8</sup>
<i>Dactylis glomerata</i>	orchard grass	I				X			
<i>Danthonia spicata</i>	poverty grass	N	X	X					
<i>Danthonia</i> sp.	wild oat grass	I/N			X	X			
<i>Digitaria sanguinalis</i>	crabgrass	N						X	X
<i>Digitaria</i> sp.	finger grass	I/N						X	
<i>Distichlis spicata</i>	salt grass	N					X		
<i>Eleocharis ambigens</i>	spike rush	N					X		
<i>Eleocharis obtusa</i>	spike rush	NN					X		
<i>Eleocharis parvula</i>	spike rush	N					X		
<i>Holcus lanatus</i>	velvet-grass	I				X			X
<i>Leersia oryzoides</i>	cutgrass	N			X				
<i>Leersia</i> sp.	cutgrass	I/N					X		
<i>Juncus effusus</i>	soft rush	N			X	X	X		
<i>Juncus</i> sp.	rush	I/N	X		X	X	X		X
<i>Panicum anceps</i>	beaked panic grass	N	X						
<i>Panicum longifolium</i>	panic grass	N	X						
<i>Panicum</i> sp.	panic grass	N	X	X	X	X		X	X
<i>Panicum virgatum</i>	switchgrass	N					X	X	
<i>Paspalum floridanum</i>	Florida paspalum	N				X			
<i>Phragmites communis</i>	reedgrass	I/N					X		
<i>Poa</i> sp.	meadow grass	I/N			X	X			X
<i>Setaria</i> sp.	foxtail grass	I/N				X	X		X
<i>Schoenoplectus robustus</i>	sturdy bulrush	N					X		
<i>Scirpus americanus</i>	three-square bulrush	N					X		
<i>Scirpus cyperinus</i>	woolgrass	N				X	X		
<i>Scirpus</i> sp.	bulrush	N				X			
<i>Scirpus validus</i>	great bulrush	N					X		
<i>Spartina alternifolia</i>	salt-water cordgrass	N					X	X	
<i>Spartina cynosuroides</i>	big cordgrass	N					X		



<i>Scientific Name</i>	Common Name	Origin <sup>1</sup>	HF <sup>2</sup>	BL <sup>3</sup>	PF <sup>4</sup>	ES <sup>5</sup>	FM <sup>6</sup>	CT <sup>7</sup>	DR <sup>8</sup>
<i>Spartina patens</i>	salt-meadow grass	N					X		
<i>Tridens flavus</i>	purpletop tridens	N				X			
<i>Typha angustifolia</i>	narrow-leaved cattail	N					X		
<i>Typha latifolia</i>	common cattail	N					X		
<i>Tripsacum dactyloides</i>	gama grass	N						X	
<i>Zizania aquatica</i>	wild-rice	N					X		
<b>Vines</b>									
<i>Campsis radicans</i>	trumpet creeper	N	X		X	X		X	X
<i>Clitoria mariana</i>	butterfly pea	N				X			
<i>Convolvulus</i> spp.	bindweed	I					X		
<i>Cuscuta</i> spp.	dodder	I/N	X						
<i>Dioscorea villosa</i>	yam	N		X					
<i>Lonicera japonica</i>	Japanese honeysuckle	I	X		X	X		X	
<i>Mikania scandens</i>	climbing hempweed	N		X					
<i>Parthenocissus quinquefolia</i>	Virginia creeper	N	X	X	X	X	X	X	
<i>Rhus radicans</i>	poison ivy	N	X	X	X	X	X	X	
<i>Smilax glauca</i>	cat greenbrier	N	X		X	X			
<i>Smilax rotundifolia</i>	common greenbrier	N	X	X	X	X			
<i>Vitis</i> spp.	grape	I/N	X	X	X	X		X	

<sup>1</sup>N = Native to the region, I = Introduced to the region

<sup>2</sup>HF = Hardwood Forest

<sup>3</sup>BL = Bottomland

<sup>4</sup>PF = Pine Forest

<sup>5</sup>ES = Estuarine

<sup>6</sup>FM = Freshwater Marsh

<sup>7</sup>CT = Coastal/Tidal

<sup>8</sup>DR = Developed Residential

Sources: USN 2001b, Appendix 2A, NSF DL (1987-2020).

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**Appendix 3**  
**Naval Support Activity South Potomac Bird/Animal**  
**Aircraft Strike Hazard Plan**

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DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC  
6509 SAMPSON ROAD, SUITE 217  
DAHLGREN, VIRGINIA 22448-5108

NSASPINST 5090.5  
PRS4  
FEB 02 2016

NAVAL SUPPORT ACTIVITY SOUTH POTOMAC INSTRUCTION 5090.5

From: Commanding Officer, Naval Support Activity South Potomac

Subj: BIRD/ANIMAL STRIKE HAZARD REDUCTION PROGRAM

Ref: (a) OPNAVINST 3750.6s  
(b) CNIC Bird/Animal Strike Hazard Program Manual  
(c) CNICINST 3700  
(d) OPNAVINST 5090.1D

Encl: (1) Naval Support Activity South Potomac Area Description  
(2) Bird Hazard Working Group  
(3) Bird/Animal Strike Hazard Conditions Codes  
(4) Bird/Animal Strike Hazard Reduction Team  
(5) Bird/Animal Strike Reporting  
(6) Bird/Animal Strike Report Form  
(7) Wildlife Sighting Report  
(8) Land Management Procedures

1. Purpose. To reduce the wildlife strike hazard to aircraft aboard Naval Support Activity South Potomac (NSASP) per references (a) through (d). NSASP is comprised of Naval Support Facility Dahlgren, Dahlgren, VA (NSFDL) and Naval Support Facility Indian Head, Indian Head, MD (NSFIH), Stump Neck Annex, MD, and Pumpkin Neck Annex, VA.

2. Background. A wildlife aircraft strike hazard exists at NSASP [enclosure (1)] due to runway and helicopter landing areas near habitat suitable for deer and resident/migratory birds. In addition, daily and seasonal movements by these species have the potential to create hazardous conditions in the airfield environment. This instruction is designed to reduce the Bird/Deer Aircraft Strike Hazard (BASH) potential by promoting communication, increasing awareness, monitoring wildlife activity, controlling wildlife populations, as necessary, and promoting proper land management.

3. Scope. The BASH Program shall be implemented by the identified personnel as outlined below. All BASH Program personnel are required to view the training module entitled "BASH – Bird Aircraft Strike Hazard" at <http://www.cecosweb.com>.

a. The NSASP Air Operations Officer shall:

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(1) Be the BASH Program Manager responsible for execution and oversight of the NSASP BASH program. Serve as the central point of contact for BASH coordination and planning with other departments, supported and supporting commands, and the local community.

(2) Establish and chair the Bird Hazard Working Group (BHWG) to coordinate BASH issues and requirements across NSASP. The BHWG will be staffed by representatives assigned from the following offices: Air Operations, Security, Natural Resources, and Pest Management [enclosure (2)].

(3) Utilize the BASH condition codes [enclosure (3)] to report general bird activity levels within the airfield environment.

(4) Issue bird hazard warnings whenever bird activities are observed or reported within the airfield environment.

(5) Establish the BASH Reduction Team (BRT) to initiate bird/animal dispersal/abatement procedures when potentially hazardous bird activities are observed or reported on NSASP [enclosure (4)].

(6) Establish an account in the Naval Safety Center (NSC) Web Enabled Safety System (WESS) for the mandatory reporting of all BASH incidents.

(7) Coordinate with aircraft custodians on the proper reporting, via WESS, and remains collection procedures of all bird/animal strikes of known origin in accordance with references (a) through (d) and enclosures (5) and (6).

(8) Ensure bird/animal strikes of unknown origin (wildlife found on or near the runway) are reported, via WESS, to the NSC and that any remains are appropriately packaged and forwarded to the Smithsonian Institution for positive identification in accordance with references (b) and (c).

(9) Ensure all wildlife strike reporting and identification data are provided to the members of the BHWG and analyzed by the installation for development of future BASH reduction management strategies.

b. The NSASP Public Works Office designee shall:

(1) Participate in the local BHWG and in on-site technical reviews of the installation BASH program during periodic Naval Safety Center (NSC) surveys.

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(2) Provide facilities support services and maintenance (such as mowing, vegetation and landscape management, trash removal, facilities and sign maintenance, etc.) that correspond to mitigation procedures appropriate for hazards, in accordance with reference (b), in the local operational environment.

c. The NSASP Natural Resources Managers shall:

(1) Assist the Air Operations Officer in managing the BASH program.

(2) Serve as a member of the BHWG.

(3) Serve as a member of the BRT.

(4) Monitor wildlife activity levels and conduct regular surveys to maximize documentation of the airfield environment [enclosure (7)]. Maintain and update records of wildlife strike locations, species, and other pertinent data. Provide a wildlife activity analysis to the Air Operations Officer.

(5) Ensure the BASH instruction and program are in compliance with the Integrated Natural Resource Management Plan (INRMP) and all applicable state and federal natural resources laws and regulations including, but not limited to, the Endangered Species Act, Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and Sikes Act.

(6) Coordinate INRMP revisions and updates with the Air Operations Officer.

(7) Coordinate and manage all applicable natural resources consultations and permits necessary to support the BASH program including, but not limited to, Army Corps of Engineer Section 404 permits, U.S. Fish and Wildlife Service (USFWS) Migratory Bird Depredation permits, Bald and Golden Eagle Protection Act permits and Endangered Species Act Section 7 consultations.

(8) Ensure BASH program elements consider sustainable land management practices, adaptive management and scientifically sound monitoring techniques [enclosure (8)].

(9) Assist with strike identifications.

d. The Installation Pest Management Coordinator (IPMC) shall:

(1) Serve as a member of the BHWG.

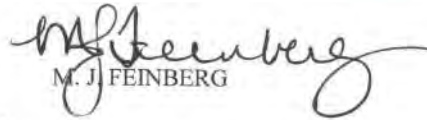
(2) Serve as a member of the BRT.

(3) Coordinate and conduct bird/animal dispersal/abatement activities.

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4. Action. The NSASP Air Operations Officer shall review this instruction annually to make changes, as necessary.

  
M. J. FEINBERG

Distribution: NSASPINST 5216.1 (All List)



NSASPINST 5090.5

FEB 0 2 2016

Naval Support Activity South Potomac Area Description

1. General Area Description

a. Naval Support Facility Dahlgren (NSFDL)

(1) NSFDL is located approximately 53 miles south of Washington, D.C., on the Potomac River. The nearest metropolitan area (Fredericksburg, VA) is located 28 miles to the west. The community of Dahlgren, VA has a population of 1,000; NSFDL resident population is approximately 500. Currently, over 7,600 civilian, military, and contractor personnel regularly work on the installation.

(2) NSFDL is divided by Upper Machodoc Creek into two separate areas known as Mainside and Pumpkin Neck. Mainside occupies 2,678 acres and is bounded by Upper Machodoc Creek to the south, Route 301 to the north, the Potomac River to the east, and the community of Dahlgren, VA to the west. The residence area, airfield, gun ranges, and most of the facilities are located on Mainside. In contrast, Pumpkin Neck is an isolated weapons testing area with few man-made structures. It occupies 1,641 acres and is bordered by Upper Machodoc Creek on the north and west and by the Potomac River on the east. Black Marsh, a 110-acre tidal wetland, partially defines Pumpkin Neck's southern boundary.

(3) The topography is generally flat over the entire facility, which lies 20-25 feet above sea level. Streams, marshes, and seasonally wet areas are common to NSFDL and its coastal plain environment. There are three significant water bodies other than the ones previously mentioned. Gambo Creek flows from north to south dividing Mainside into two sections, Hideaway Pond lies in the northeast quadrant, and Cooling Pond in the southern quadrant.

b. Naval Support Facility Indian Head (NSFIH)

(1) NSFIH is located approximately 30 miles south of Washington, D.C., in Charles County, MD. The base is adjacent to the town of Indian Head, MD and various state parks, wildlife management areas, and greenways. Currently, over 3,000 civilian, military, and contractor personnel regularly work on the installation.

(2) NSFIH occupies a 3,500-acre peninsula located at the confluence of the Potomac River and Mattawoman Creek. The base is divided into two main parcels of land, Cornwallis Neck (Mainside portion of the base) and Stump Neck. The remainder of the base comprises two small islands in the Mattawoman Creek (Marsh and Thoroughfare Islands) and an undeveloped parcel of land southeast of Cornwallis Neck (Bullitt Neck). The base consists of approximately 16.5 miles of shoreline bounded by the Potomac River and Mattawoman and Chicamuxen Creeks.

Enclosure (1)

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(3) NSFIH has a low-elevation profile, which is typical for the Coastal Plain region. The topography of NSFIH is best described as gently rolling terrain marked by many drainage swales, streams, and steep slopes along bordering rivers and creeks (most of these areas exhibit slopes in excess of 15%). Elevation decreases from north to south across Cornwallis and Stump Necks, with the highest elevations reaching 130 feet above mean sea level. Areas that are not developed are dominated by hardwood and pine-hardwood mixed forests, tidal and non-tidal wetlands, and forested riparian habitat.

## 2. Airfield Environment

### a. NSFDL

(1) Airfield clear and end zones (Figure 1) at NSFDL are comprised of a mixture of grass and herbaceous species. Pine and hardwood forests are located north and east of the airfield. Developed areas characterize the airfield's western and southern borders. A sewage treatment plant and the Cooling Pond lie directly south of runway #34.

(2) In 2006, the Dahlgren airfield was restricted to rotary blade aircraft with no fixed winged operations. Currently, the Dahlgren airfield records about 20 rotary blade aircraft trips per year. Recently, the airfield has been used for Unmanned Aerial Vehicle (UAV) testing programs. Significant work in the clear zones, end zones, and runway, and associated equipment repairs would be required to return this airfield to a Class A status.

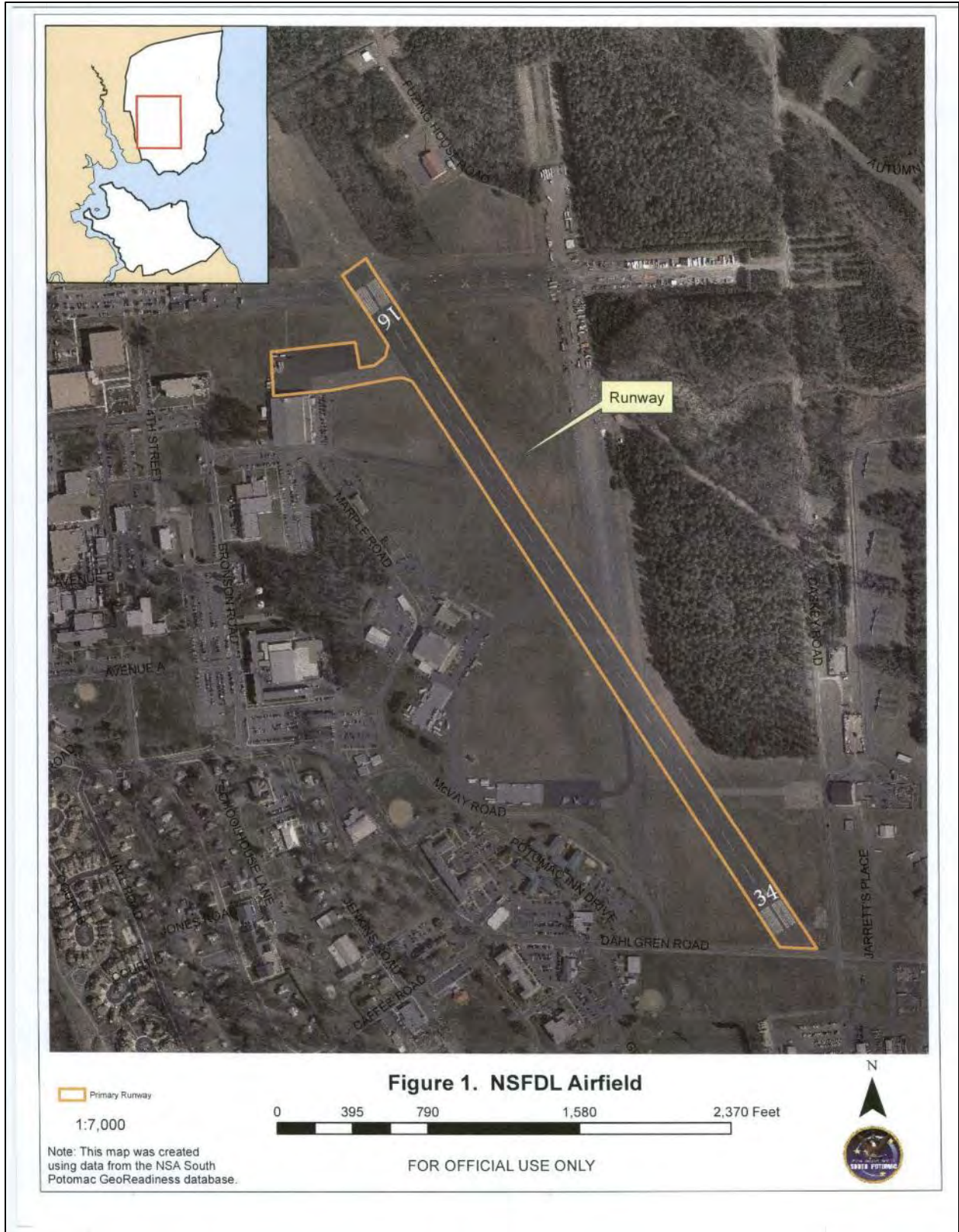
NOTE: While the NSFDL airfield is not currently operating at a Class A level, the Bird/Animal Strike Hazard (BASH) Program was developed at that level to accommodate a potential upgrade in the future.

### b. NSFIH

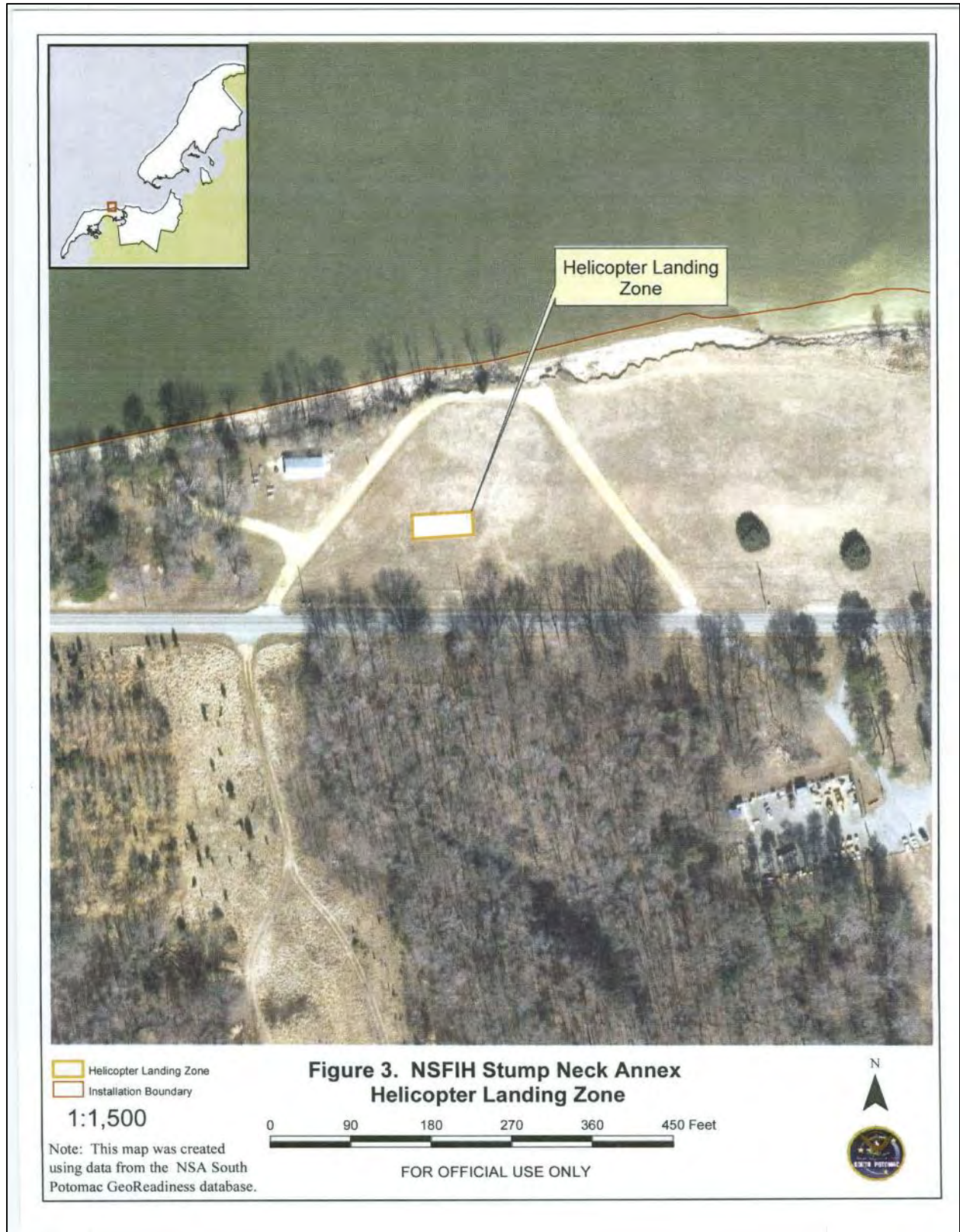
(1) NSFIH and Stump Neck Annex helicopter landing areas, (Figures 2 and 3), are comprised of a mixture of grasses that are maintained on a weekly basis. A hardwood remnant forest is located north of the NSFIH helicopter landing area with the Potomac River bordering the east side of the landing area (approximately 500 feet away). The Stump Neck helicopter landing area is bordered on the north by the confluence of the Potomac River and Mattawoman Creek and on the south by hardwood riparian buffers along the Chicamuxen Creek.

(2) Both helicopter landing areas are restricted to emergency evacuation and occasional training activities. Frequency of use during the calendar year is between 1-2 evacuations and 1 training activity. Both helicopter landing areas are in good condition and currently function as necessary.

Enclosure (1)







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Bird Hazard Working Group

1. Bird Hazard Working Group (BHWG). The BHWG is organized to implement and monitor the Naval Support Activity South Potomac (NSASP) Bird/Animal Strike Hazard (BASH) Program. It allows base personnel affected by bird problems the opportunity to meet and discuss possible solutions. The BHWG will meet quarterly or as often as necessary to stay current on bird hazards and to discuss solutions, results, and effectiveness of the program. The BHWG shall address problems as they develop before they create a serious hazard.

2. BHWG Function

- a. Execute and update the BASH Program.
- b. Collect, compile, and review data on all bird strikes.
- c. Identify and recommend actions to reduce bird hazards.
- d. Recommend changes in operational procedures.
- e. Prepare informational programs and safety briefings for appropriate personnel.

3. BHWG Contact Information

- a. Air Operations: 540-653-8638.
- b. Base Security: 540-653-6010.
- c. Fire Department: 540-653-6673 (Naval Support Facility Dahlgren (NSFDL)); 301-744-4281 (Naval Support Facility Indian Head (NSFIH)).
- d. Natural Resources Office (NRO): 540-653-4186 (NSFDL); 301-744-2273 (NSFIH).
- e. Installation Pest Management Coordinator (IPMC): 540-653-7508 (NSFDL); 301-744-1376 (NSFIH).
- f. United States Department of Agriculture-Animal and Plant Health Inspection Service-Wildlife Services (USDA-APHIS-WS): 804-739-7739 (Virginia); 410-349-8055 (Maryland).

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Bird/Animal Strike Hazard Conditions Codes

1. Bird/Animal Strike Hazard (BASH) Condition Codes

a. The following terminology can be used for rapid communication to disseminate bird activity information and implement unit operational procedures. Bird locations shall be given with the condition code. The Air Operations Officer is responsible for setting and down grading bird condition codes.

(1) Code Red: Heavy concentration of wildlife on or directly above the active runway or helicopter landing area, in the immediate vicinity of a low-level route or training area, or other locations that represent an immediate hazard to safe flying operations. Aircrews shall thoroughly evaluate mission need before operating in areas under Code Red. BASH Reduction Team (BRT) personnel shall be dispatched immediately to these areas.

(2) Code Yellow: Concentrations of wildlife are observable in locations that represent a probable hazard to safe flying operations, or conditions exist (such as weather or known flight/migration patterns) which are likely to result in the presence of dangerous concentrations of birds, and other wildlife on or around the airfield or helicopter landing area. This condition requires increased vigilance by all ground personnel and extreme caution by aircrews. BRT personnel shall monitor these areas closely and conduct dispersal activities as deemed necessary.

(3) Code Green: Normal wildlife activity with a low probability of hazard. All airfield personnel shall be alert for any change in the level of wildlife activity.

2. BASH Condition Reports

a. Air Operations personnel designated representatives ensure hazardous conditions are reported. Declaration of a bird hazard condition will be based on the following:

- (1) Visual observation of bird activity on or near the airfield or helicopter landing area.
- (2) Information relayed by airborne and taxiing aircraft.
- (3) Observations relayed to Air Operations by any onsite personnel.

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Bird/Animal Strike Hazard Reduction Team

I. Bird/Animal Strike Hazard (BASH) Reduction Team (BRT)

a. The primary responsibility for the BRT falls under the control of Air Operations. A trained BRT will be established to carry out detection and lethal/non-lethal dispersal activities. Training will be provided by Security. Dispersal by pyrotechnics and lethal dispersal activities will be carried out by the Installation Pest Management Coordinator (IPMC)/Natural Resources Office (NRO) under a migratory bird depredation permit issued by the U.S. Fish and Wildlife Service.

b. Assist in bird hazard condition reporting to Air Operations.

c. Report any changes in bird activity and provide records of bird dispersal/control activities to the IPMC/NRO.

d. The BRT will be active on the airfield as needed and will be on call 24 hours a day. The BRT will have immediate access to dispersal equipment approved for harassment.

e. Prior to initiation of dispersal actions a BRT member will coordinate the location and methods with Air Operations.

f. Horns, sirens, distress calls and propane sound cannons should be used to harass birds off the airfield or helicopter landing area. These methods can be used individually or in combination. Distress tapes must match the bird species being harassed to be effective.

g. Propane sound cannons can be placed around the airfield and moved periodically to prevent habituation.

h. When the target flock of problem birds is dispersed, Air Operations shall be notified so the bird hazard condition can be lowered.

2. BASH Dispersal Equipment

a. A variety of bird dispersal techniques could be used at the Naval Support Facility Dahlgren (NSFDL) airfield and the Naval Support Facility Indian Head (NSFIH) helicopter landing areas; including static deterrents, bioacoustics, and propane sound cannons. The BRT shall be specially trained in the use of this equipment with the exception of traps and registered toxicants.

(1) Static Deterrent Devices: Static deterrents include, but are not limited to: propane sound cannons, scarecrows, silhouettes, and effigies. They may be effective in bird deterrence for short periods of time on some species. Static devices are designed to augment the activities of

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the BRT. At no time should static deterrents be considered a replacement for the BRT. Static devices should be moved by the BRT 50-100 feet from their existing locations at least once daily. This activity will inhibit the decline in the deterrent effect that can occur as wildlife begins to become accustomed to the device.

(2) Propane Cannons: The BRT can position and operate propane sound cannons based on active runway, bird locations, and air traffic density. If propane sound cannons are used, locations should be changed daily to avoid habituation by the birds.

(3) Bioacoustics: Bioacoustics are audio taped distress calls of actual birds or predator calls. Special care must be taken to play the tape in short intervals to prevent habituation by birds. Tapes should be played for 20-30 seconds, then pause briefly, and repeat as required. Birds should respond by taking flight or becoming alert. These calls may be effective for gulls, blackbirds, starlings, and crows.

b. The BRT shall maintain records of bird dispersals. These records will document all bird dispersal operations to include species, location, methods, and number of birds dispersed. Monthly data will be summarized with the Bird Hazard Working Group (BHWG) and noted in the BHWG quarterly meetings. These records are utilized as documentation for annual migratory bird depredation permits.

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Bird/Animal Strike Reporting

1. Post Flight Follow-Up and Reporting

a. Post flight follow-up and reporting of bird strikes are an essential and important part of the Bird/Animal Strike Hazard (BASH) Program. The following procedures should be completed after a strike:

- (1) Inform Air Operations and complete emergency landing, if required.
- (2) Preserve any remains (however slight) and notify Air Operations. The NRO shall be contacted to collect remains, take pictures, and assist aircrews in completing a Bird/Animal Strike Report Form [enclosure (5)]. After-hours strike reports may be called into the respective Base Dispatcher (540-653-8291; Dahlgren) (301-744-4381; Indian Head).
- (3) Report strikes to the Navy Safety Center (NSC), via WESS, even if no bird remains are found on the aircraft. The BRT and Air Operations personnel may be able to retrieve the bird on the airfield. Information on reporting strikes is available on the WESS system.
- (4) Follow up local reporting by completing a Bird/Animal Strike Report per CNICINST 3700. Both damaging and non-damaging strikes are required to be reported. Forward a copy to the NRO, IPMC and Air Operations.

b. The BRT also encourages aircrews to report near-misses that involve evasive action or whenever the proximity of the miss is "too close for comfort." These may be called in to Air Operations and noted on strike forms, logs, and/or in the GPS tracking system.

2. Bird Identification

a. All strike data are entered into the NSC data base to help track and identify bird hazards. Therefore, it is necessary to know which species are causing bird strike problems so appropriate measures can be taken. Identification of bird remains is essential. If bird remains are found during Foreign Object Debris (FOD) sweeps or on aircraft, the following preservation procedures shall be followed:

- (1) During normal working hours, leave the remains on the aircraft and call Air Operations. They will send a representative to remove the pieces. Pieces will be retrieved and information completed on the report forms.
- (2) After hours or on weekends, notify the respective Base Dispatcher (540-653-8291; Dahlgren) (301-744-4381; Indian Head). If a BRT representative is unavailable, wear gloves, remove all remains from aircraft, place in a zip-lock plastic bag, and store in a refrigerator or freezer. All available remains should be saved for identification. It does not take much

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(remains) to identify the bird species. Even a small part, feather, or bloody smear with down can be identified by professionals through microscopic techniques. Complete as much information on the Bird/Animal Strike Report form at the time of the retrieval. Call the respective NRO (540-653-4186; Dahlgren) (301-744-2273; Indian Head) for remains pickup.

3. Local Bird Species of Concern. The following is a summary of birds within the airfield or helicopter landing area environment that present the greatest risk to flight operations. Each section discusses the reasons for concern and a brief description of how the risks may be managed. There are a number of effective techniques that can reduce the number of birds in the airfield or helicopter landing area environment. In general, the techniques fall into two categories: making the environment less attractive to birds and scaring the birds.

a. Naval Support Facility Dahlgren (NSFDL) Airfield and Naval Support Facility Indian Head (NSFIH) Helicopter Landing Area Avian Hazards

(1) Gulls: Gulls present a hazard to aircraft due to their body size and flocking behavior and are among the most commonly struck bird groups. Gulls were involved in 31% of all bird-civil aircraft strikes of known species reported in the United States from 1992-1996. Additionally, gulls caused 16% of damaging bird-aircraft strikes at civil airports.

Ring-billed gulls, herring gulls, laughing gulls, and greater black-backed gulls are the most likely species of gulls to be observed in the NSFDL airfield and NSFIH helicopter landing area environment. Gulls are commonly found on in these areas due to their feeding habits and preference for flat, open areas to rest. Gulls are more numerous during winter and large numbers are common during inclement weather.

Do not allow gulls to establish a habit of using the airfield or helicopter landing area to feed, breed, or loaf. Maintenance of grass height between 7-14 inches is critical in reduction of gull numbers because taller grass discourages feeding and loafing. Even with this in effect, gulls may inhabit the airfield or helicopter landing area, particularly during inclement weather. Persistent harassment using propane sound cannons and bioacoustics may be necessary to discourage these birds.

(2) Blackbirds and Starlings: European starlings and other closely related blackbirds (i.e. common grackles, brown-headed cowbirds, and red-winged blackbirds) pose a high risk to aircraft safety due to their flocking behavior and body density. Several methods can be used to control blackbird and starling numbers on the airfield or helicopter landing area. Maintenance of grass height between 7 and 14 inches is the best method of reducing airfield blackbird and starling numbers. In addition, blackbirds and starlings respond well to an intense frightening program using bioacoustics and propane sound cannons. Removing birds with registered toxicants or traps may also be considered.

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(3) Crows: Crows present a hazard at the airfield and helicopter landing area as they are commonly seen loafing and feeding on and adjacent to the runway and taxiways.

(4) Waterfowl: Ducks and geese comprise 12% of all bird-aircraft strikes and 16% of bird-aircraft strikes where civil aircraft were damaged. No other bird species cause as many damaging bird-aircraft strikes as waterfowl, except gulls.

Canada geese are one of the more dangerous bird species for aircraft to strike because of their large size (8-12 pounds) and because they travel in flocks of up to several hundred birds. Non-migratory (resident) Canada geese presence on and around the airfield or helicopter landing area creates a threat to aviation and human safety. Resident Canada geese have been involved in aircraft strikes at Dulles International Airport, Ronald Reagan National Airport, Norfolk International Airport, Roanoke Regional Airport, and Fort Belvoir in Virginia. Some of these Canada goose-aircraft strikes resulted in costly plane repairs and aborted take-offs and landings.

Military bases in Virginia have grave concern about Canada geese on airfields since a Canada goose-aircraft strike at Elmendorf Air Force Base in 1995 resulted in the death of 24 Air Force personnel because the plane ingested Canada geese into two engines and crashed on takeoff. Langley Air Force Base and NAS Norfolk have altered, delayed, aborted, and ceased flight operations because of Canada geese on their airfields.

Creeks, ponds, lakes, drainage ditches, etc., surrounding airfields are an attraction to waterfowl, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Avoid flying near these areas if possible. Removal of feral ducks and geese from surrounding bodies of water may reduce the attraction of these areas to passing resident/migratory waterfowl. In addition, temporary standing water on the airfield or helicopter landing area provides an attraction to waterfowl and other birds. When possible, dewater these temporary standing water areas and regrade these sites to prevent the standing water.

Aggressive harassment of waterfowl on the airfield and helicopter landing area is recommended. Propane sound cannons are a potential control technique. The local population of resident Canada geese that are common in proximity to the airfield and helicopter pads may be reduced and stabilized by removing resident Canada geese and addling/oiling eggs under a permit.

(5) Hawks and Kestrels: These birds are hazardous to aircraft due to their size and intense focus when hunting prey which makes them oblivious to aircraft operations. Even small birds can be dangerous to aircraft. Red-tailed hawks, Cooper's hawks, Northern harriers, and American kestrels are common species at NSFDL and NSFIIH. These birds become active during mid-morning and remain active until late afternoon.

Hawks and kestrels can be controlled by managing small mammal populations and removing dead trees and other perch sites on the airfield. Reducing tall grass and shrub areas may help reduce the abundance of small mammals (e.g. meadow voles) on the airfield. Attempts

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can be made to frighten hawks and kestrels from the airfield, however hawks and falcons are not easily discouraged by harassment. Hawks and kestrels can be captured and relocated under a migratory bird depredation permit.

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Bird/Animal Strike Report Form

From: \_\_\_\_\_ Date: \_\_\_\_\_

To: Air Operations Officer

This report is to be completed for all bird/deer strikes.

1. Date of Incident: \_\_\_\_\_ Local Time: \_\_\_\_\_

2. Light Conditions: Dawn/Haze/Bright/Dull/Dusk/Dark/Night (Circle one)

3. Type of Aircraft: \_\_\_\_\_ Aircraft Serial No.: \_\_\_\_\_

4. Phase of Flight: (Describe) \_\_\_\_\_  
\_\_\_\_\_

5. Landing light: On/Off (circle one) Beacon: On/Off (circle one)

6. Aircraft Speed: \_\_\_\_\_ Heading: \_\_\_\_\_ Altitude(MSL+): \_\_\_\_\_

7. Location of strike on the runway: (Be as specific as possible)  
\_\_\_\_\_

8. Impact point on the aircraft: \_\_\_\_\_  
\_\_\_\_\_

9. Extent of damage and estimated cost: \_\_\_\_\_  
\_\_\_\_\_

10. Evasive Action:

a. By pilot Yes/No: (Describe) \_\_\_\_\_

b. By bird/deer: (Describe) \_\_\_\_\_

11. Remarks: \_\_\_\_\_

\*Note: Collect feathers, carcasses and all other animal parts that are present and notify the respective Natural Resources Office for pick up (540-653-4186; Dahlgren) (301-744-2273; Indian Head).

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Wildlife Sighting Report

From:  
To: Natural Resources Office (NSFDL or NSFIIH)

Sighting	Date/Time	Wildlife Species & Quantity	Observed Activity	Scare Tactics Used
1.				
2.				
3.				
4.				
5.				
6.				

Reference for use above:

Common Bird Types: Gull, Starling, Blackbird, Other (Specify)

Common Activities: Flying (specify approximate altitude, direction, etc.), Soaring (circling),  
Loafing (resting or sitting), Feeding (identify food source)

Type of Scare Tactics: Pyrotechnics, Bioacoustics, Gas Cannons, Other (Specify), None

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Land Management Procedures

I. Land Management Procedures

a. One of the most effective and permanent methods of discouraging wildlife from using the airfield or helicopter landing area is the removal of attractive habitat features. Passive control methods include:

(1) Managing Grass Height

(a) Mow to maintain a uniform grass height between 7 and 14 inches (as directed by the BHWG). Long grass discourages flocking species because reduced visibility disrupts interflock communication and prevents predator detection. When grasses do not naturally achieve at least 10 inches in height they should be encouraged to do so. Grass heights in excess of 14 inches may attract rodents and will also result in the grass laying flat (lodging) thus reducing its deterrent effect to flocking species.

(b) Grass heights below 7 inches are of equal concern, as they are generally more attractive to birds which feed on the easily accessible worms, insects, and seeds. Begin mowing adjacent to runways and finish in the infield or outer-most grass areas. This will cause insects and other animals to move away from aircraft take-off and landing areas.

(c) Cut grass before it goes to seed to discourage seed eating birds.

(2) Controlling Broad-leaf Weeds. Keep broad-leaf weeds to a minimum on the airfield or helicopter landing area. Apply herbicides as necessary for control. Broad-leaf weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Obtain assistance in herbicide selection for weed control, appropriate grass seed selection, fertilization, and erosion control vegetation from BHWG recommendations, the Natural Resource Conservation Service, or the Cooperative Extension Service within the respective county.

(3) Planting Bare Areas. Eliminate bare areas on the airfield or helicopter landing area. When necessary, plant grass to maintain ground cover at 7-14 inches in height on the airfield or helicopter landing area.

(4) Fertilizing. Selectively stimulate grass growth to promote a uniform cover at 7-14 inches in height. Irrigation may be used to support turf growth if it is not found to attract birds.

(5) Remove Edge Effect. Maintain the airfield as uniformly as possible to reduce the transition zone between two distinct habitat types (e.g., brush to grassland).

(6) Leveling of Airfield or Helicopter Landing Area. Level or fill high or low spots to reduce attractiveness to birds and prevent standing water.

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(7) Removing Dead Vegetation. As soon as possible, remove dead vegetation such as snags, brush piles, grass clippings, etc., and the cover it affords.

(8) Removing Bird and Animal Carcasses from the Airfield. This is to avoid attracting scavengers that feed on them. Forward remains, which may have been caused by collision with aircraft, to the respective NRO for identification.

(9) Pest Control. Invertebrates and rodents are key food sources for many birds. Periodically survey and reduce these pests when required. Registered pesticides and traps can reduce pest populations. Only Environmental Protection Agency (EPA) approved pesticides are authorized for use and they must be used according to label instructions and the NSASP Installation Pest Management Plan. The IPMC shall be notified of all plans to apply pesticides to the airfield or helicopter landing area.

(10) Maintaining Drainage Ditches. Regularly inspect ditches to keep them clear. Maintain ditch sides as steeply as possible (minimum slope ratio of 5 to 1) to discourage wading birds and emergent vegetation. Improve drainage as necessary to inhibit temporary ponding or puddles. If necessary, cover ditches with netting/plastic fencing.

(11) Employing Erosion Control Vegetation. Use vegetation that is appropriate for the region and does not produce seeds at heights in excess of 14 inches.

(12) Eliminate Roosting Sites. Dense stands of trees on and around the airfield or helicopter landing area provide roosting cover for crows and other birds. Roost sites may be controlled by vegetation management. Remove or prune trees to reduce the number of available perches if necessary. Tree removal shall be reviewed/approved by the NRO.

(13) Bird Proof Buildings and Hangars. Birds should not be tolerated in any portion of the airfield or helicopter landing area. Birds that utilize buildings and hangers may use the aircraft movement areas to feed and loaf. Often, bird-proofing of buildings and hangars is required to exclude pigeons, sparrows, and swallows. Excluding birds from a structure they currently utilize will often displace them to an adjacent structure. Existing birds should be destroyed (in accordance with the depredation permit) prior to the exclusion effort whenever possible. Denying access by screening windows, closing doors, and blocking entry holes is most effective. The NRO and IPMC are available to provide technical assistance and direct control of wildlife damage. When necessary consider:

- (a) Netting: Install under superstructure to exclude birds from roosting areas.
- (b) Registered toxicants.
- (c) Trapping.

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(d) Design features: If designing a new building, consider locating supports appropriately based on BASH concerns.

(e) Door coverings: Use netting or plastic strips suspended over the doors to exclude birds. Ensure no tears or holes are present that allow birds access to the hangar.

(f) Sharp Projections: Use in limited areas such as ledges and overhangs, or small places where birds cannot be allowed. This method is prohibitively expensive for large areas.

The Navy cannot control off-base land use, however, when a proposed land use may increase or alter bird populations and habits (i.e., landfills, etc.), the Navy's concerns should be addressed at public hearings and zoning meetings. The Navy's concerns may also be addressed by contacting a city official or project manager. The NRO and Asset Management within the Public Works Department shall monitor off-base land use and report findings to the BHWG.

**Appendix 4**  
**Naval Support Facility Dahlgren Wildland Fire**  
**Management Plan**

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# **WILDLAND FIRE MANAGEMENT PLAN**



## **NAVAL SUPPORT FACILITY DAHLGREN**

**Final  
July 2013**



# NAVAL SUPPORT FACILITY DAHLGREN



## WILDLAND FIRE MANAGEMENT PLAN

Submitted to:  
Naval Facilities Engineering Command  
Washington, DC

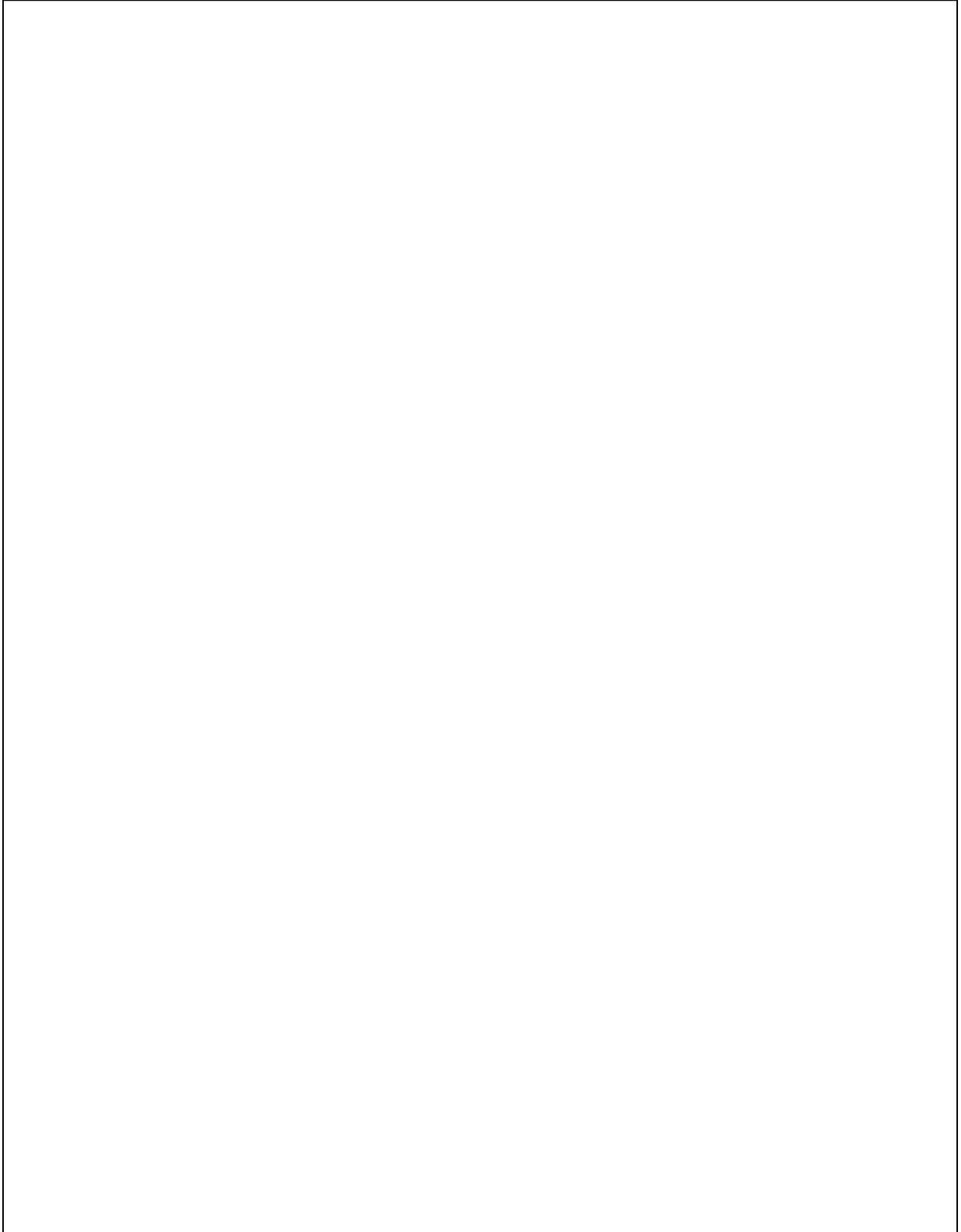


By:  
Geo-Marine, Inc.  
Hampton, Virginia



Document not cleared for public release

Final  
July 2013





*Wildland Fire Management Plan  
Naval Support Facility Dahlgren*

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- Appendix D Standard Operating Procedure XSM-OM-002-06: Procedures for Prescribed Burning Program (inactive)
- Appendix E County Mutual Aid Agreements
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Naval Support Facility Dahlgren*

**LIST OF ACRONYMS AND ABBREVIATIONS**

BAER	Burned Area Emergency Response
BAR	Burned Area Rehabilitation
CWAP	Comprehensive Work Approval Planning
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoI	Department of the Interior
DoN	Department of the Navy
EACC	Eastern Area Coordination Center
EEA	Explosive Experimental Area
ER	Environmental Restoration
ESR	Explosive Safety Requirements
F&EMS	Fire and Emergency Medical Services
FBFM	Fire Behavior Fuel Model
FDRA	Fire Danger Rating Area
FIDS	forest interior dwelling species
FMU	Fire Management Unit
GIS	Geographical Information System
ICS	Incident Command System
INRMP	Integrated Natural Resources Management Plan
MAIFFPC	Mid-Atlantic Interstate Forest Fire Protection Compact
NAVSEA	Naval Sea Systems Command
NDW	Naval District Washington
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NFPORS	National Fire Plan Operations and Reporting System
NIFC	National Interagency Fire Center
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NSASP	Naval Support Activity South Potomac
NSF	Naval Support Facility
NSFDL	Naval Support Facility Dahlgren
NWCG	National Wildfire Coordinating Group
NWS	National Weather Service
NWSG	native warm-season grass
PARC	Partners in Amphibian and Reptile Conservation
PMS	Publication Management System
PZ	protection zones
RT&E	rare, threatened, and endangered
SOP	standard operating procedure
SSA	smoke sensitive areas
USDHS	U.S. Department of Homeland Security
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance

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**LIST OF ACRONYMS AND ABBREVIATIONS (cont'd)**

VAC	Virginia Code
VDEQ	Virginia Department of Environmental Quality
VDOF	Virginia Department of Forestry
WIMS	Weather Information Management System
WFDSS	Wildland Fire Decision Support System
WFMP	Wildland Fire Management Plan

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## **1.0 INTRODUCTION**

The term “wildland fire” describes both prescribed fire and wildfire. Prescribed fire is wildland fire which is the result of planned and controlled application of fire to natural systems for natural resources management purposes. A “wildfire” is a free burning and unplanned wildland fire requiring suppression action. The purpose of the Naval Support Facility (NSF) Dahlgren (NSFDL) Wildland Fire Management Plan (WFMP) is to ensure that appropriate measures are taken to protect the installation community, infrastructure, and natural and cultural resources in the event of a wildfire incident and to provide guidance for the safe implementation of prescribed fire. The WFMP is a tool that describes the structure of a fire management program and the activities and methods that will be utilized by natural resources managers at NSFDL to achieve habitat and land management objectives through the use of fire. It integrates applicable regulatory requirements with ecosystem management strategies. This WFMP directly supports the military mission and is consistent with Department of Defense Instruction (DoDI) 6055.06 (Fire and Emergency Services Program, December 21, 2006) (Appendix A), the 2001 Federal Wildland Fire Management Policy (NWCG 2001a), and installation fire management directives (Appendix B).

### **1.1 DESCRIPTION OF NSFDL**

NSFDL is located on approximately 4,320 acres in the Northern Neck area of Virginia along the western shoreline of the Potomac River (Figure 1-1). The base is in King George County approximately 23 miles east of Fredericksburg, Virginia, 53 miles south of Washington, DC, and 65 miles northeast of Richmond, Virginia. NSFDL hosts a range of scientific and technological research, development, testing, and evaluation of surface ship combat systems, ordnance, strategic and strike systems, and theater warfare. The installation also supports the major testing area for naval gun ballistics and has nine ranges and test areas for accomplishing this mission.

NSFDL is comprised of two land masses separated by the Upper Machodoc Creek. The NSFDL Mainside is located north of Upper Machodoc Creek, whereas Pumpkin Neck is located south of the creek. Mainside encompasses 2,678 acres and is used for operational and support activities and military housing. Development is concentrated on the southern half and northeast corner of the base and supports administrative, operations, residential housing, and a 4,191-foot airfield. The eastern portion of Mainside supports the Potomac River Test Range complex, which includes a 715-acre land area and a 169-square-nautical-mile water area that stretches along the lower 51 miles of the Potomac River (NAVSEA 2008). Pumpkin Neck, also known as the Explosive Experimental Area (EEA), is comprised of 1,641 acres that support ordnance testing and ordnance facilities. The entire EEA is considered a research, development, testing, and evaluation range that consists of cleared areas, forests, wetlands, and streams.

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Figure 1-1. General Location of Naval Support Facility Dahlgren



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**1.2 NATURAL RESOURCES AT NSFDL**

NSFDL is located on the Mid-Atlantic Coastal Plain, a predominately flat region comprised of a mosaic of forest, wetlands, and agriculture, which also has significant urban development. NSFDL supports 4 terrestrial communities and 6 wetland communities (DoN 2007a). Terrestrial ecological communities cover approximately 3,711 acres; these areas are divided into forested uplands and developed/maintained areas. The upland forests consist of pine, pine-hardwood, and hardwood forests. The developed/maintained areas consist of early successional fields, grasslands, and roadsides. There are approximately 608 acres of wetlands at NSFDL. The wetland systems consist of palustrine emergent, palustrine shrub, palustrine forested, palustrine unconsolidated bottom, estuarine subtidal, and estuarine intertidal wetlands (DoN 2007a).

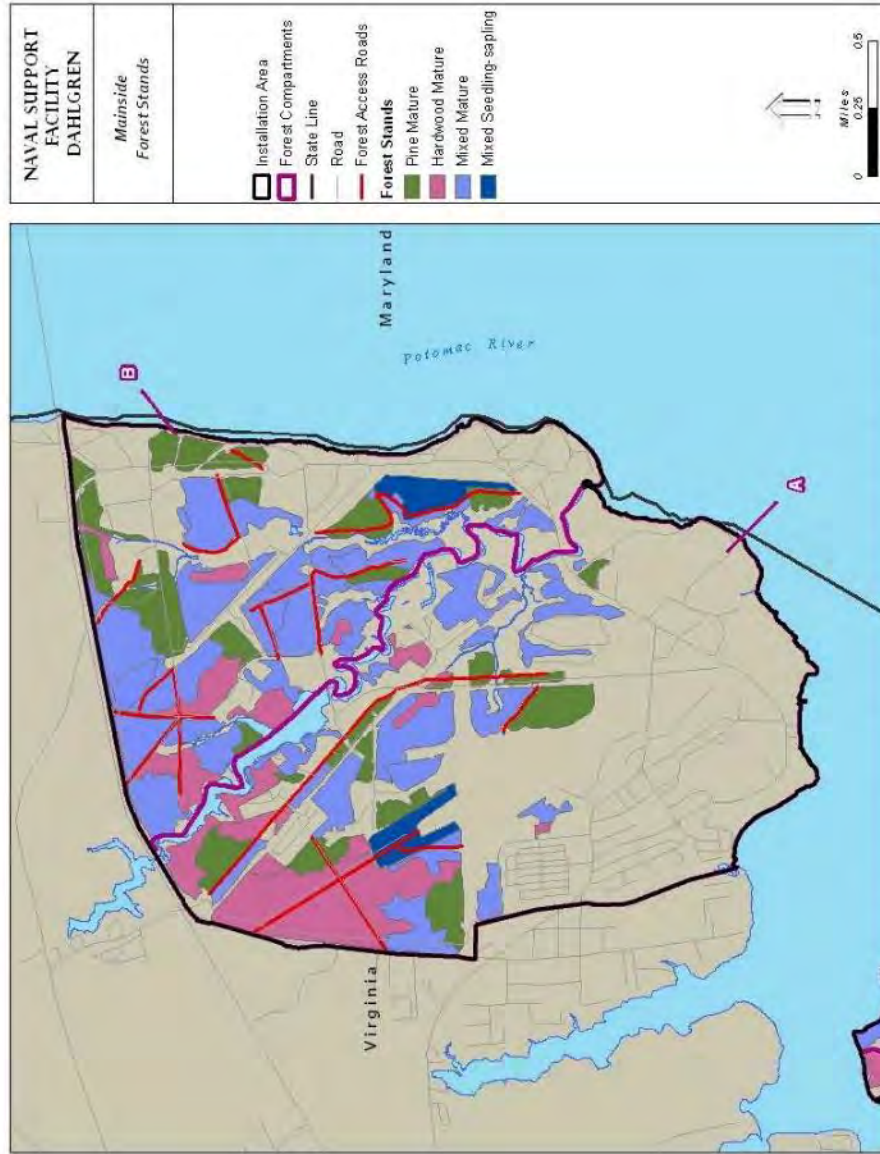
**1.2.1 Natural Resources Management**

Natural resources activities that take place on the installation include terrestrial habitat and wetland surveying and protection, invasive species control, outdoor recreation management, and the management of fauna and flora including rare, threatened, and endangered (RT&E) species and migratory birds. These management activities have varied goals and objectives that support the military mission, protect and enhance natural resources, and ensure compliance with existing federal and state regulations. Under the integrated management approach most of the management activities address goals of several Natural Resources Program areas.

Forestry management encompasses commercial, non-commercial, and urban forests at NSFDL and focuses on the conservation of biological integrity with timber harvests used as a management tool rather than a primary goal. The most recent timber harvests were conducted in 2012 (approximately 42 acres) and 2013 (approximately 23 acres), which were non-commercial thinning operations primarily for forest stand improvement. Other stand improvement activities, including pre-commercial thinning, seed tree cuts, clearcuts, salvage cuts, removal of Virginia pines, and the harvest of large pines and seed trees are conducted as necessary to improve the growing condition and quality of forest stock. The forested areas at NSFDL are divided into 123 stands in 7 compartments. Forest Compartments A and B are located on Mainside and Compartments C, D, E, F, and G are located on Pumpkin Neck. A network of forest roads are found throughout the installation to provide access to stands and to create firebreaks during wildfire incidents (Figures 1-2 and 1-3). A summary of the forest inventories conducted in 1979, 1993, and 2000 can be found in Section D (3) of the Integrated Natural Resources Management Plan (INRMP; DoN 2007a).

There are about 250 acres of grassland on the installation that are composed of various native warm-season grasses (NWSGs). There are also about 1,237 acres of developed/maintained areas such as roadsides, lawns, and fields mowed with various frequencies.

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**Figure 1-2. Forest Compartments, Forest Stands, and Forest Roads on Mainside**

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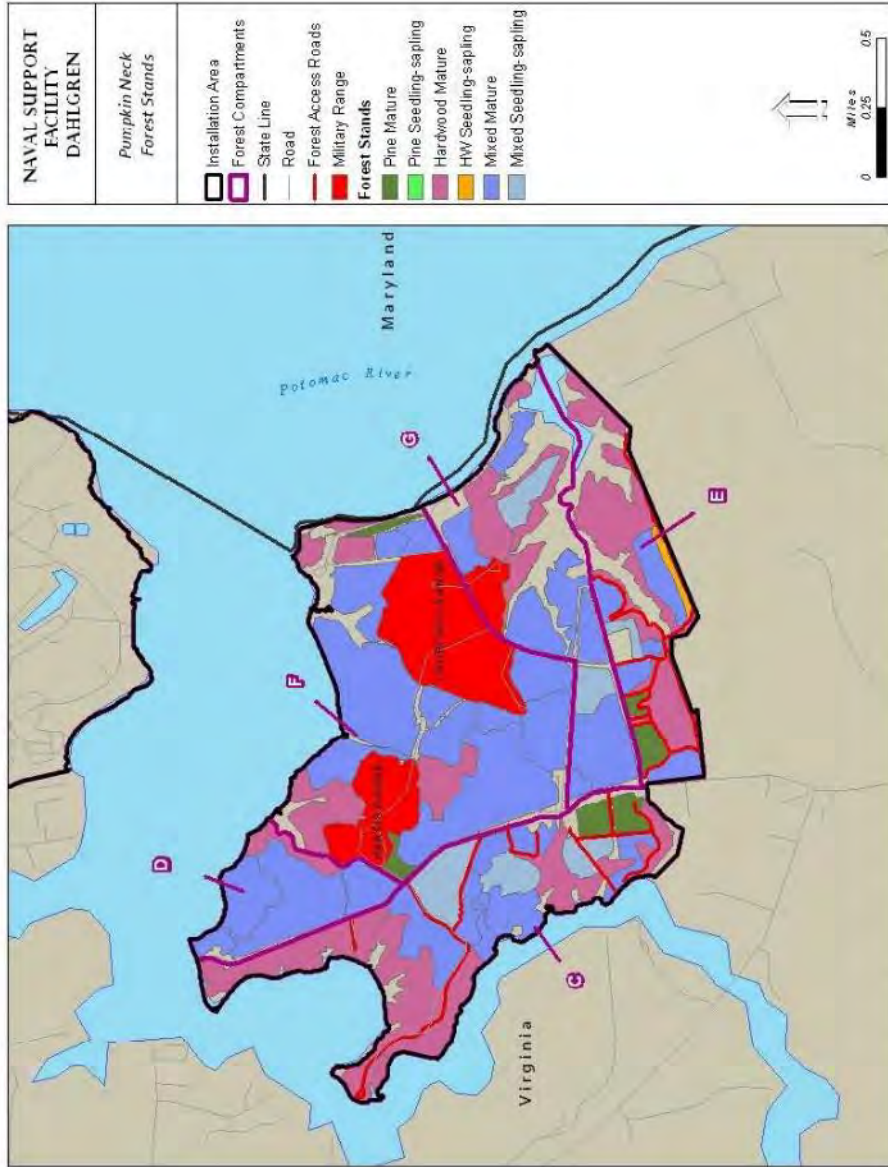


Figure 1-3. Forest Compartments, Forest Stands, and Forest Roads on Pumpkin Neck

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Fish and wildlife management activities include both game and non-game species. Appendix 3 of the NSFDL INRMP (DoN 2007a) summarizes the many different survey efforts to document species presence. The list consists of 157 species of birds, 20 mammal species, 32 fish species, 16 species of amphibians and 16 species of reptiles.

**1.2.1.1 Rare, Threatened, and Endangered Species and Species in Need of Conservation**

To ensure compliance with applicable state and federal regulations, and to protect and enhance rare species populations and their habitats, NSFDL conducts rare wildlife species. RT&E species include all federal and state listed threatened, endangered, or candidate species and rare or sensitive species with global or state heritage ranks of G1–G3 or S1–S3. During the 1991/92 survey, the bald eagle (*Haliaeetus leucocephalus*) and a funnel-web spider, (*Agelenopsis kastoni*), were the only protected species identified. The bald eagle was subsequently removed from the federal threatened and endangered species list, but is still listed as threatened by the state of Virginia. The funnel-web spider was also removed from the state's list of rare species. Another spider, Coyle's purse-web spider (*Sphodros coylei*), was documented during the rare species survey and was added to the state watchlist species (DoN 2007a). During the 2004 plant survey, no RT&E plant species were found on NSFDL (DoN 2004). There is currently no federally designated critical habitat for endangered or threatened species on NSFDL.

RT&E species are given high management priority in the NSFDL INRMP. Protecting the habitat of these species that are not well-adapted to fire from damage in fire management operations may be a constraint faced by NSFDL. However, many fire-adapted species have become rare because of fire suppression and could benefit from periodic prescribed burns. The specific fire effects for each RT&E species should be understood in the fire management planning process. The locations of RT&E species' habitat should be incorporated into prescribed burn plans and in preparedness planning for wildfires and noted as either benefitting from or requiring protection from the burn (Figures 1-4 and 1-5). If warranted, prior to conducting prescribed burns in known habitat of fire-sensitive species, fuels within a given radius of the perimeter of the RT&E population can be cleared and wetted with water or foam. If burn unit goals can still be accomplished with low fire intensity, burn plans can mandate weather prescriptions that produce relatively high fuel moisture conditions to further protect areas with significant resources. In higher risk situations, a Burn Boss may choose to avoid burning near the population completely. Detailed population monitoring data can also be collected before and after prescribed burns to track population trends and adjust management strategies, if necessary.

**1.2.1.2 Bald Eagle**

Thirteen bald eagle nest sites are documented on NSFDL including 5 active, 3 inactive, and 5 historical nests. Active and inactive bald eagle nests have two protection zones (PZ) established around them: PZ1 extends from the nest tree to a radius of 750 feet; and PZ2 extends from 750

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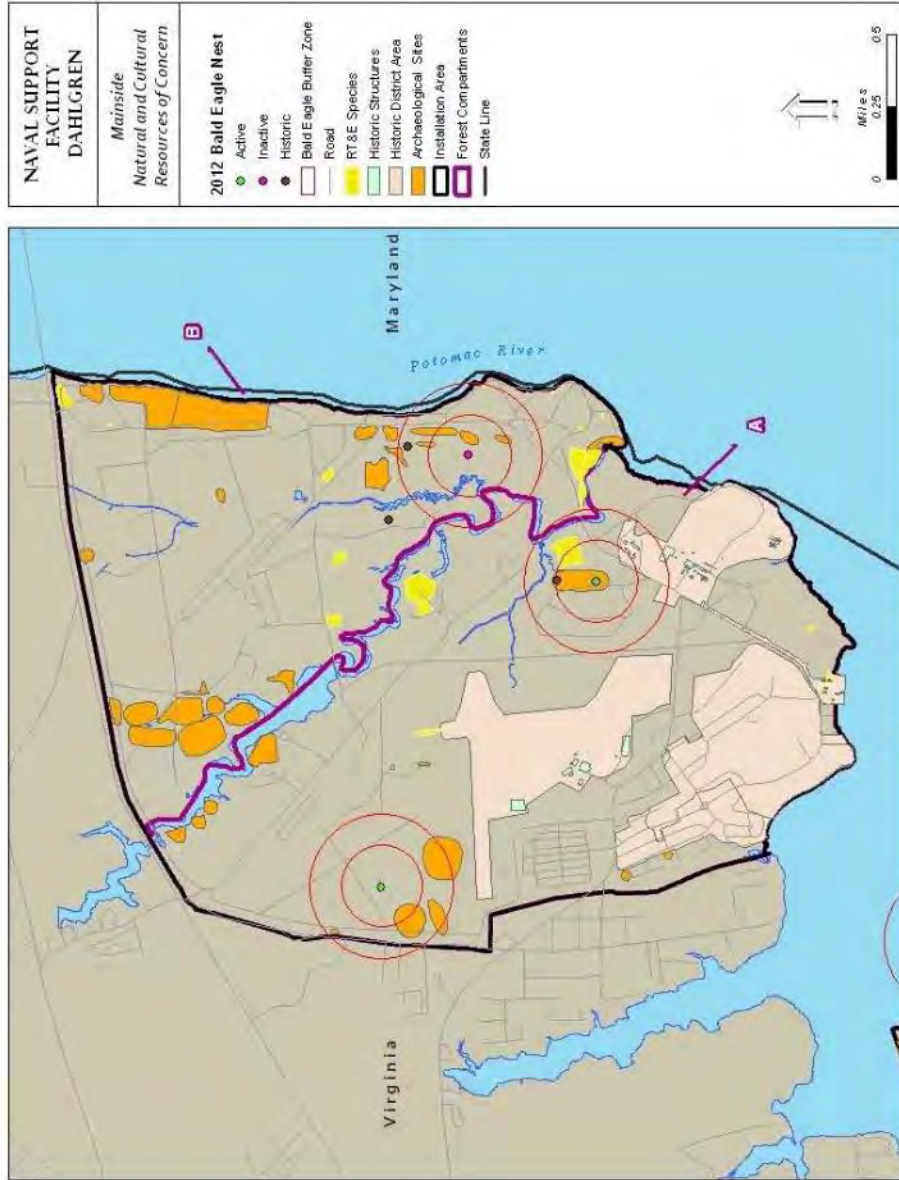
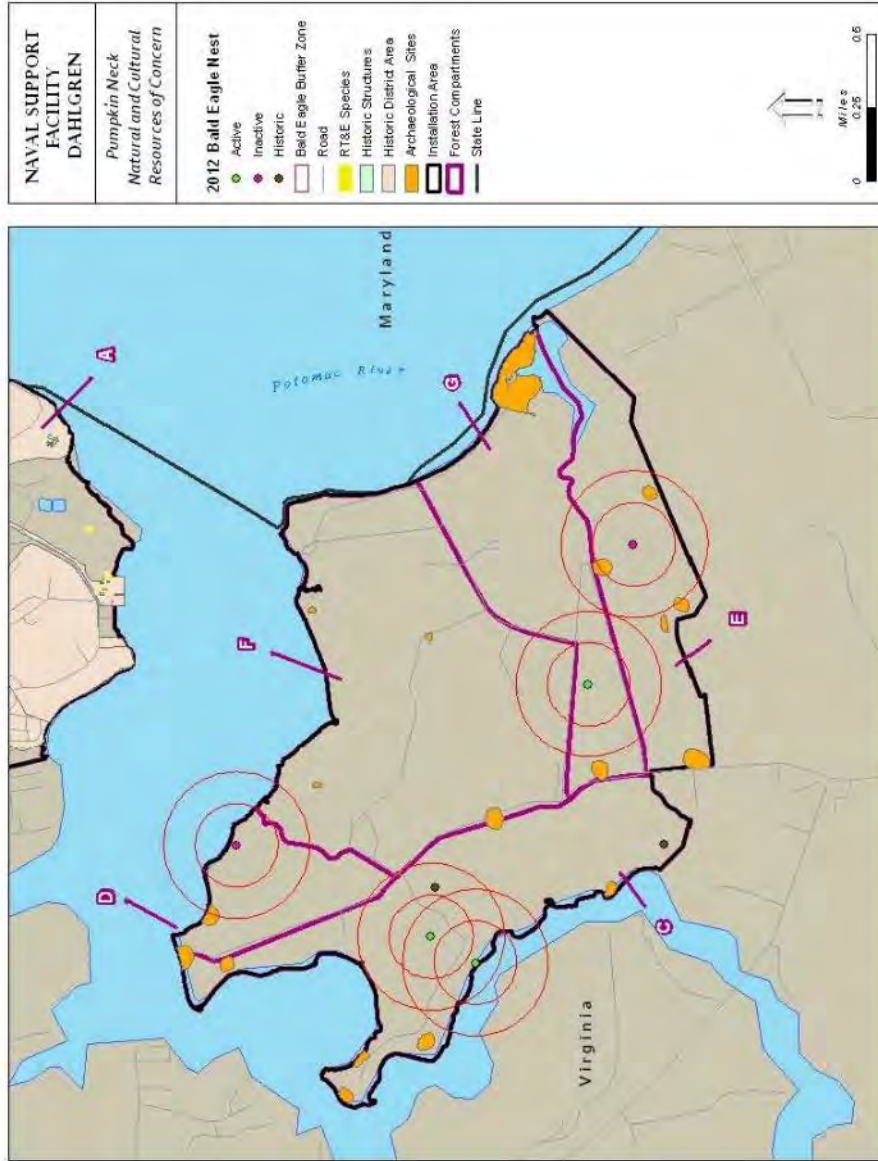


Figure 1-4. Natural and Cultural Resources of Concern on Mainside

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**Figure 1-5. Natural and Cultural Resources of Concern on Pumpkin Neck**

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feet to 1,320 feet (0.25 mile) in radius. Forestry activities and new training/testing requirements are not permitted to take place within these zones during nesting season (see Figures 1-4 and 1-5). The Bald Eagle Management Plan provides guidance for nest PZs to ensure nesting activities are not impacted by installation related projects, activities or training. In accordance with the Bald Eagle Management Plan, prescribed burning cannot be conducted within PZ1 and PZ2 during the nesting season, December 15 through June 15, unless a nest is determined to be inactive (DoN 2007b). All historical nests are assumed to be active unless the aerial surveys indicate otherwise. The bald eagle nest PZ will remain in place while the nest is active and for three consecutive nesting seasons after the last season in which the nest was occupied (USFWS and VDGIF 2000). The immediate threat of damage to a nest tree from wildfire or prescribed fire can be prevented by removing ladder fuels and creating firebreaks around the tree each year and before a prescribed burn takes place.

### **1.2.1.3 Herpetofauna**

Although prescribed burns can be valuable for increasing suitable habitat for some herpetofauna, there is evidence that it may also be damaging to resident populations of reptiles and amphibians (Midwest PARC 2009). When planning prescribed burns, it is important to know which amphibian and reptile species have potential to occur within burn area. Turtle and some snake populations can be particularly sensitive to burns because the length of time for individuals to become sexually mature means that the loss of only a few adults can dramatically affect population viability. Additional mortality and injury of aquatic or semi-aquatic species such as turtles, amphibians, and some snakes can be caused by fire by raising water temperature to lethal levels, possible toxic effects caused by fire-induced changes in stream pH, and acute levels of toxic chemicals (Engstrom 2010).

Although seasonal activity varies depending on location and species, herpetofauna in Virginia are generally inactive in the winter and are underground or underwater, and are therefore less vulnerable to the impacts of fire. Most herpetofauna activity begins in March and April, though some species begin emerging in February (VDGIF 2013). This offers a brief window of opportunity for burning in the winter; however, care must be taken to consider species assemblages that are present in a particular habitat prior to conducting burns. Burns around wetlands may interfere with salamander breeding migrations by removing the detritus upon which they rely for cover. Winter fires can also expose hibernating frogs and terrestrial salamanders using the detritus and duff for cover, insulation, and moisture retention. Early spring burns in forested habitats may harm eastern box turtles (*Terrapene carolina*) emerging from hibernation, whereas burns later in spring and early summer during nesting season may impact turtles laying eggs.

The following recommendation for mitigating effects to herpetofauna during prescribed burns is adapted from the Midwest Partners in Amphibian and Reptile Conservation (PARC) (2009).

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- Identify the herpetofaunal diversity of your site prior to large scale management and consider the potential impacts of prescribed burning compared to not burning regarding habitat change that could result from invasive species, succession, or the risk of catastrophic wildfire.
- Burning should be conducted during winter months when most herpetofauna are inactive. Most Virginia herpetofauna are in winter refugia during this period. In most areas this would be from November 1 to March 1, but will vary based on location and latitude as well as fluctuations in annual precipitation and temperature conditions. Soil temperature inversions (i.e., when soil surface temperatures exceed deeper soil temperatures) may be used as an indicator of the onset of activity for many reptiles. However, because some salamander species emerge from hibernation very early, February burns may impact salamander migration. It is necessary to understand where populations of these species occur and plan accordingly.
- Avoid burning after April 1. However, harm may be minimized for many species if unusually cool (overcast, <10 degrees Celsius (50 degrees Fahrenheit) conditions have persisted for many days. Management plans should allow for flexibility to respond to each year's conditions-planning should be more conservative during unusually warm years.
- Spring burns in proximity to snake hibernacula should be conducted well before the active season or not at all. Snakes are concentrated early in the active season before they disperse from hibernacula and are vulnerable at that time. If these areas can be avoided and other management techniques used this would be preferable. Firebreaks constructed around known hibernacula may protect the animals during the burn.
- The intensity and speed of the flames should be adjusted and controlled to accommodate the herpetofaunal species present in the habitat. Backfires and headfires may vary in mortality due to the slow and more complete burn of a backfire, compared to quick-moving headfires that tend to leave patches of refugia.
- Consider burn patch size in fragmented habitats. If it is desirable to burn an area that is isolated from nearby habitats, it will benefit herpetofaunal populations if the area is divided into smaller segments and each segment burned on a different day or in different years.
- Consider summer burn costs and benefits. Mid- to late-summer burns can be an effective tool for land managers targeting exotic vegetation. Due to the presence of green vegetation, late-season burns are often patchier, slower, and cooler than early spring burns. It is important to note, however, that summer burns in uplands can be very intense.



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When possible, only small units should be burned and extra measures should be taken to provide buffers around known herpetofaunal concentrations (such as nesting areas).

- Avoid burns that completely expose soil over extensive areas. If burning during the active season, weather or site conditions that result in spotty burns are preferred. Some of these conditions include high humidity, green vegetation, and low temperatures. This approach also provides refugia for herpetofauna. Additionally, fire breaks could be created around select snags, standing dead trees, and downed logs to provide places for animals to escape the heat and flames.
- Alternate burn periods among years. This action may also provide some relief to vulnerable herpetofaunal populations. In general, diversifying the burn units and burn periods may be beneficial to a variety of grassland species and come closer to mimicking the natural burn regime that historically occurred on the land.
- Avoid burning wetland shorelines. Detritus provides cover for salamanders and frogs (and their prey) as they migrate to and from wetlands to breed. Create burn perimeters around these areas of at least 50ft when possible.
- Do not use fire retardant chemicals around wetlands as these chemicals may harm amphibians and other wetland species (USFS 2007). Fire retardant chemicals have been used to create burn breaks including around wetlands. Because the skin of amphibians is highly absorptive, these compounds could cause harm to these animals. Instead, use leaf blowers, rakes, and water to create the desired barrier.
- If fall burns are being considered, avoid October as many herpetofaunal species may still periodically be on the ground surface and active. Burning prior to November 1 is discouraged. If possible burn oak forests while cool, but prior to leaf fall. This will help provide cover and insulation for wildlife using the forest floor over winter.
- Avoid constructing brush piles, and when they are necessary, burn them immediately. Snakes and other wildlife will take advantage of the presence of new habitat like brush piles, creating traps during burns. If piles are left out for more than a few weeks, they should be disassembled prior to the burn. Alternatively, allowing some of the older brush piles to remain with burn breaks around them will not only add additional habitat for wildlife, but will provide refugia during a fire.
- Repeated burns will have cumulative effects on population viability. Populations of turtles and several species of snakes are sensitive to even small increases in mortality, especially if losses occur regularly. While only a few individuals may be lost during a single burn, recurring losses of a few individuals can quickly deplete populations of long-lived, slowly maturing animals such as turtles and many snakes.

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#### **1.2.1.4 Forest Interior Dwelling Birds**

Direct mortality from wildland fire on birds, including forest interior dwelling species (FIDS) is considered minimal, as they are highly mobile, and avoidance of heat and gases associated with fires by flight or movement on the ground is relatively easy (Engstrom 2010). Wildland fires that occur during the nesting season may cause some direct mortality by destroying nests and killing young birds, although if early in the season, many bird species will renest (Knapp et al. 2009). Changes in forest structure and composition, and availability of preferred foods following fire, however, may affect FIDS at NSFDL.

In a number of studies on wildlife response to fire, the majority of bird species studied in Eastern Hardwood Forest Region responded negatively to prescribed fire or had no response to the changed conditions created by fire (Kennedy and Fontaine 2009). Several ground- and low-shrub nesting FIDS species had negative responses to low to moderate-severity fire in this region. Species that responded negatively included ovenbird (*Seiurus aurocapilla*), hooded warbler (*Setophaga citrina*), Kentucky warbler (*Geothlypis formosa*), and black-and-white warbler (*Mniotilta varia*), whereas other ground nesters such as veery (*Catharus fuscescens*), wood thrush (*Hylocichla mustelina*), and worm-eating warbler (*Helminthos vermivorum*), showed no response or conflicting responses to fire. No response or conflicting responses were observed in FIDS several canopy species including red-eyed vireo (*Vireo olivaceus*), black-throated green warbler (*Setophaga virens*), and scarlet tanager (*Piranga olivacea*). These species are likely unaffected by low-severity surface fires with minimal overstory mortality and change in brushy undergrowth.

As with other forest management activities, prescribed burning often provides temporary, short-term benefits to some FIDS species, while simultaneously reducing habitat suitability for others. Despite wide variation in response to prescribed burning, some generalities regarding forest bird habitat are apparent from the research literature. Studies have typically detected reductions in ground- and low-shrub nesting species following prescribed fires, presumably because habitat conditions in these strata were significantly altered by burning, and low intensity fires may affect overall community structure by benefiting species requiring snags and open understories (Haulton 2008).

As FIDS birds are represented by a number of guilds, the effects of wildland fire will vary from species to species. Several recommendations adapted from the Maryland Critical Area Commission for the Chesapeake Bay (2000) that are relevant to prescribed burning are as follow:

- Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS are present.
- Protect down woody debris and snags.

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- Minimize forest isolation. Generally, forests that are adjacent, close to, or connected to other forests provide higher quality FIDS habitat than more isolated forests.

#### **1.2.1.5 Forest Dwelling Bats**

For organisms that are highly mobile, avoidance of heat and gases associated with fires by flight or movement on the ground can be relatively easy. However, once the primary threat is avoided the organism must be able to contend with secondary factors such as energy conservation and predator avoidance. The effect a wildland fire has on bats varies with the time of year as well as the species of bat. Many bat species utilize caves for roost and hibernacula sites. Forest dwelling bats are of particular concern in relation to wildland fire because they frequently use forests for roosting, foraging, and hibernation. Similar to birds, forest dwelling bats are more or less migratory in early spring and late fall, roost in forests from April to October, and use forest roosts in the summer to raise young that are flightless and vulnerable for a short period of time. During warmer temperatures the bats are likely to escape quickly unless in maternity roosts with young or in torpor. Some female bat species gather in maternity roosts approximately May to July in a warm secure location, frequently large snags, to give birth. Bats go through periods of torpor in cool months and hibernate in winter months during which they are at increased risk. Bats that flush from day roosts and hibernation sites during fires may be vulnerable in cooler burning weather when arousal from torpor is delayed (Engstrom 2010).

One species of bat is listed in Appendix 3e of the NSF/DL INRMP as known to occur at NSF/DL (DoN 2007a). The eastern red bat (*Lasiurus borealis*) are considered forest dwelling and may roost under bark in the warm seasons. Eastern red bats are mostly solitary; in the winter they either migrate or hibernate in tree cavities or leaf litter (Harvey et al., 1999). Dickinson et al. (2010), investigated fire effects on Indiana bats (*Myotis sodalis*), which is a forest dwelling species, and found that heat presents a risk to bats that cannot escape the roost site but gases are not a major risk. As a rule of thumb, the height at which injury from heat would occur corresponds to the height at which crown scorching occurs. Cool season burning represents a risk to forest dwelling bats because the time it takes for a bat to rouse from torpor is increased as the temperature decreases. This is especially important if the bat is hibernating on or near the ground. Red bats hibernating in leaf litter have been observed arousing themselves in response to a combination of fire sounds and smoke (Engstrom 2010). This behavior is a likely response to inhabiting fire adapted habitats however it is not clear whether other bat species exhibit this ability.

Dickinson et al. (2010) offers several management approaches to reduce the risk of wildland fire on forest dwelling bats:

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- Using ignition tactics that reduce fire intensity, such as backing fires with enough wind speed to disperse heat, reduces the risks of heat effects and provides cues for bats to rouse from torpor.
- Proceeding slowly during the early phase of ignition provides cues to bats that fire is on the landscape and allows them to arouse from torpor and flush.
- Choosing appropriate burn season and weather; burning later in the spring may both help achieve ecosystem management objectives in oak forests and reduce risk to bats because they arouse from torpor more quickly in warmer ambient temperatures.
- Leaving large snags and trees that will become snags will provide potential roost and maternity sites for bats.

### **1.2.2 Invasive Plant Control**

A variety of non-native, invasive plant species have been introduced, both intentionally and accidentally, to NSFDL. The overall goal of the Invasive Species Management Program is to control, reduce, or eliminate invasive plant populations, in order to protect biodiversity and ecosystem stability. The NSFDL INRMP (DoN 2007a) identifies invasive plant control as a primary natural resources objective for the installation.

Invasive plant surveys were conducted at NSFDL Mainside in 2001 (DoN 2001) and 2011 (DoN 2012). The 2001 survey provided a baseline for invasive species occurring on Mainside and identified several of the most problematic species and highly infested areas. The 2011 survey characterized the number and relative abundance of invasive plant species in 43 forest stands that were not surveyed in the 2001 inventory and identified the location and density of invasive plant species populations in areas easily accessible to management/control efforts.

Survey efforts have focused on 14 species considered to be the most problematic at NSFDL including:

1. Tree-of-heaven (*Ailanthus altissima*)
2. Mimosa (*Albizia julibrissin*)
3. Porcelain-berry (*Ampelopsis brevipedunculata*)
4. Oriental bittersweet (*Celastrus orbiculatus*)
5. Autumn olive (*Elaeagnus umbellata*)
6. Sericea lespedeza (*Lespedeza cuneata*)
7. Chinese privet (*Ligustrum sinense*)
8. Japanese honeysuckle (*Lonicera japonica*)

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9. Japanese stilt grass (*Microstegium vimineum*)
10. Princess tree (*Paulownia tomentosa*)
11. Common reed (*Phragmites australis*)
12. Japanese knotweed (*Polygonum cuspidatum*)
13. Multiflora rose (*Rosa multiflora*)
14. Wineberry (*Rubus phoenicolasius*)

Beginning in 2009, invasive plant control efforts have been conducted annually on a number of high-priority areas at NSFDL where between 10 and 20 acres of invasive plants have been treated each year. Control methods have included foliar herbicide application, basal bark applications, and cutting and spraying with herbicides. Using prescribed fire in conjunction with herbicide application could improve efficacy and reduce the amount of herbicide used in the long term on several infested areas at NSFDL, particularly in the ranges that are currently maintained through mowing. However, the effectiveness of invasive species control using fire is variable for different species and can promote invasiveness of certain species if implemented incorrectly (Dibble et al. 2008). Table 1-1 presents invasive plants of the highest concern on NSFDL and potential use of prescribed fire for their control.

### **1.3 REGIONAL FIRE HISTORY**

Wildland fire is a natural component of the disturbance regime in Virginia's coastal plain. Historically, large-scale disturbance events such as hurricanes and ice storms created more natural gaps in northeastern forest canopies than fires. Although natural ignition of wildfire by lightning strikes is uncommon in Virginia, many natural communities in eastern Virginia have a history of ignition by Native Americans and European settlers. Wade et al. (2000) propose that historically, frequent surface fires occurred in oak-hickory forests (*Quercus* spp.- *Carya* spp.), savannas, barrens, and prairie remnants in the northeast; however, historical fire regimes were more often determined by Native American practices than by lightning strikes. The occurrence and frequency of pre-European settlement fire vary according to vegetative cover type and have been estimated for many eastern ecosystems.

In mesic hardwood forests, fire frequency is thought to range from 35 years to greater than 200 years; in chestnut oak (*Quercus prinus*), mixed upland hardwoods, upland oaks, and sweetgum/yellow poplar (*Liquidambar styraciflua/Liriodendron tulipifera*), fire frequency is estimated to be from 1 to 35 years; and in natural loblolly pine (*Pinus taeda*) stands and eastern prairies, fire frequency is thought to be from 1 to 10 years (Wade et al. 2000). Mixed pine-hardwood stands are the dominant cover type at NSFDL, in both acreage and volume, followed by hardwood and pine (DoN 2007a).

Table 1-1. Invasive Species Control using Fire

Scientific Name	Common Name	Fire Effects on Species*	Recommended Fire Strategy*
<i>Ailanthus altissima</i>	Tree-of-heaven	Fire could to-kill tree-of-heaven, but would also induce re-sprouting and abundant root suckering. Tree-of-heaven may outcompete native woody species for the open spaces and flush of nutrients that often occur after fire.	Avoid burning or conduct follow-up herbicide treatments. Treat adjacent infestations to avoid introduction following prescribed burns.
<i>Albizia julibrissin</i>	Mimosa	Mimosa is likely only top-killed by fire and fire may increase germination rate from the seed bank, therefore mimosa is likely to persist and may spread even under a regime of frequent fire.	Avoid burning or conduct follow-up herbicide treatments. Treat adjacent infestations to avoid introduction following prescribed burns.
<i>Ampelopsis brevipedunculata</i>	Porcelain-berry	Porcelain-berry's underground structures may provide a source for postfire sprouting if they are not damaged by fire. Porcelain-berry spreads by seed and may establish on burned sites from off-site seed sources.	Avoid burning or conduct follow-up herbicide treatments. Treat adjacent infestations to avoid introduction following prescribed burns.
<i>Celastrus orbiculatus</i>	Oriental bittersweet	It is likely that fire top-kills Oriental bittersweet but does not damage the root crown and roots. Bittersweet would likely establish from sprouts and/or seed after fire.	Avoid burning or conduct follow-up herbicide treatments. Treat adjacent infestations to avoid introduction following prescribed burns.
<i>Elaeagnus umbellata</i>	Autumn olive	Autumn-olive will sprout in response to damage from fire, indicating single fire is unlikely to eradicate autumn-olive; however, periodic burning might control its spread and eventually reduce its presence. Postfire colonization via nearby seed sources is also likely without repeated treatments.	Burning annually or bi-annually may provide some control, but herbicide treatment is likely more effective. A combination of herbicide and prescribed fire may be used in native warm season grasslands.
<i>Lespedeza cuneata</i>	Sericea lespedeza	Fire can promote seed germination from seed bank. Increased germination allows for faster depletion of seed bank. Established plants re-sprout after fire. Effects vary with fire season and severity.	A combination of winter or spring prescribed burns followed by growing season herbicide treatments may be used in native warm season grasslands.
<i>Eupatorium capillifolium</i>	Dogfennel	Although a native species, dogfennel can quickly re-colonize a recently disturbed, open canopy site. Off-site dogfennel seed commonly establishes on recently burned sites.	Most fires at least top-kill dogfennel, but the species can survive cool fires if the caudex remains unburned. Monitor burned sites for resprouts or recruited seedlings and apply herbicide to new growth.

Table 1-1. Invasive Species Control using Fire (cont'd)

Scientific Name	Common Name	Fire Effects on Species*	Recommended Fire Strategy*
<i>Ligustrum</i> ssp.	Privet	Burning top-kills privet, and if repeated annually, may eliminate it. Re-sprouting will occur. Results vary in literature.	Burning annually at low fuel moisture levels may provide some control, but herbicide treatment is likely more effective.
<i>Lonicera japonica</i>	Japanese honeysuckle	Stimulates re-sprouting. Burning alone will not result in good control without long-term, annual fire in late fall or early winter.	Herbicide treatment followed by fire 2 months later may be effective, but re-sprouting will occur. Or burn in the spring and follow with herbicide.
<i>Microstegium vimineum</i>	Japanese stiltgrass	Promotes invasion at newly disturbed burn sites. Late fall burns when plant is flowering, but has not yet set seed may be effective.	Mowing or burning before herbicide application can help reduce the litter and increase effectiveness of chemical treatments. Consider late fall burn.
<i>Faulowinia tomentosa</i>	Princess-tree	Newly dispersed seeds germinate readily on exposed post-burn soils, but high severity fires may damage seeds on soil surface. Likely resprouts after fire.	Avoid burning, if possible, but if not, chemically treat pre- and post-fire in late summer and fall.
<i>Phragmites australis</i>	Common reed	Deep-burning fire in the driest possible conditions can result in some root kill.	Apply wetland-approved herbicide in two successive late summer treatments with a controlled burn during the winter between the two herbicide applications. Do not burn during prime nesting season.
<i>Polygonum cuspidatum</i>	Japanese knotweed	When burned, re-sprouting is likely to occur with little negative effect on the plant.	Fire is considered a poor control method. However, after mechanical removing root systems, plant remnants can be burned to prevent propagation at disposal site.
<i>Rosa multiflora</i>	Multiflora rose	In fire-adapted communities, periodic prescribed burns are expected to retard multiflora rose invasion and establishment. A single prescribed fire is unlikely to eradicate multiflora rose, periodic burning may control its spread and eventually reduce its presence.	Burning annually or bi-annually may provide some control, but herbicide treatment is likely more effective. A combination of herbicide and prescribed fire may be used in native warm season grasslands.
<i>Rubus phoenicolasius</i>	Wineberry	Wineberry is probably top-killed by fire, while some portion of the roots and rhizomes are likely to remain unharmed. Wineberry may occupy post-fire habitat by sprouting and/or seedling establishment.	Avoid burning or conduct follow-up herbicide treatments. Treat adjacent infestations to avoid introduction following prescribed burns.

\*Sources: DoN 2012 and USDA 2013

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#### **1.4 NSFDL WILDLAND FIRE HISTORY**

Prescribed fire is an important land management tool used to maintain grassland and some forest wildlife habitats, prevent woody species invasion in grasslands, reduce pest populations, and reduce wildfire hazard. As with most of Virginia's vegetative cover types, grasslands and woodlands on NSFDL have experienced both natural and human-induced fire regimes.

Wildfire occurrences at NSFDL are infrequent, generally affect a relatively small area, and are quickly extinguished by the NSFDL F&EMS. Brush fires primarily occur on Mainside near the Rail Gun (Figure 1-6) and on Pumpkin Neck surrounding Harris and Churchill Ranges (see Figure 1-3). Mainside has many paved and grass forest roads that act as firebreaks, which aid firefighters in containing them quickly. Explosive hazards occur at Mainside and Pumpkin Neck, but risk of wildfire spread is higher at Pumpkin Neck because fewer firebreaks exist throughout.

By 2001, the Natural Resources Program, with the assistance of the NSFDL F&EMS, had implemented prescribed burns at 17 locations on Mainside (Figure 1-6), and no locations on Pumpkin Neck. One site in Forest Compartment A and five in Forest Compartment B were old fields consisting of grasses, herbaceous material, shrubs, and pine and hardwood saplings. The remaining 11 sites were primarily pine and pine-hardwood stands, as well as one hardwood stand.

A Prescribed Burn Plan was written in February 2002 for 5 old fields not previously burned, 3 previously burned old field locations, and one previously burned forested site on Mainside (DoN 2002). The burns did not occur due to heightened security after the events of September 11, 2001.

##### **1.4.1 Firebreak Maintenance**

Firebreaks are natural or man-made barriers used to halt the spread of fire (NWCG 2013a). When constructed within forested areas, they are often 10- to 15-feet wide and maintained in mowed or burned grasses (USDA-NRCS no date, USDA-NRCS 2005, USDA-NRCS 2010, Weir et al. no date). If a wildfire occurs, a fireline can be constructed within the firebreak by scraping or digging a line of a smaller width to mineral soil (NWCG 2013a).

A network of forest roads throughout NSFDL are maintained in short grasses with wide canopy openings to create firebreaks that can be used to stop the spread of wildfire, if necessary (see Figures 1-2 and 1-3). Some of the forest roads on base were historically planted as wildlife food plots, but currently, are maintained by mowing. However, access roads that are most often used



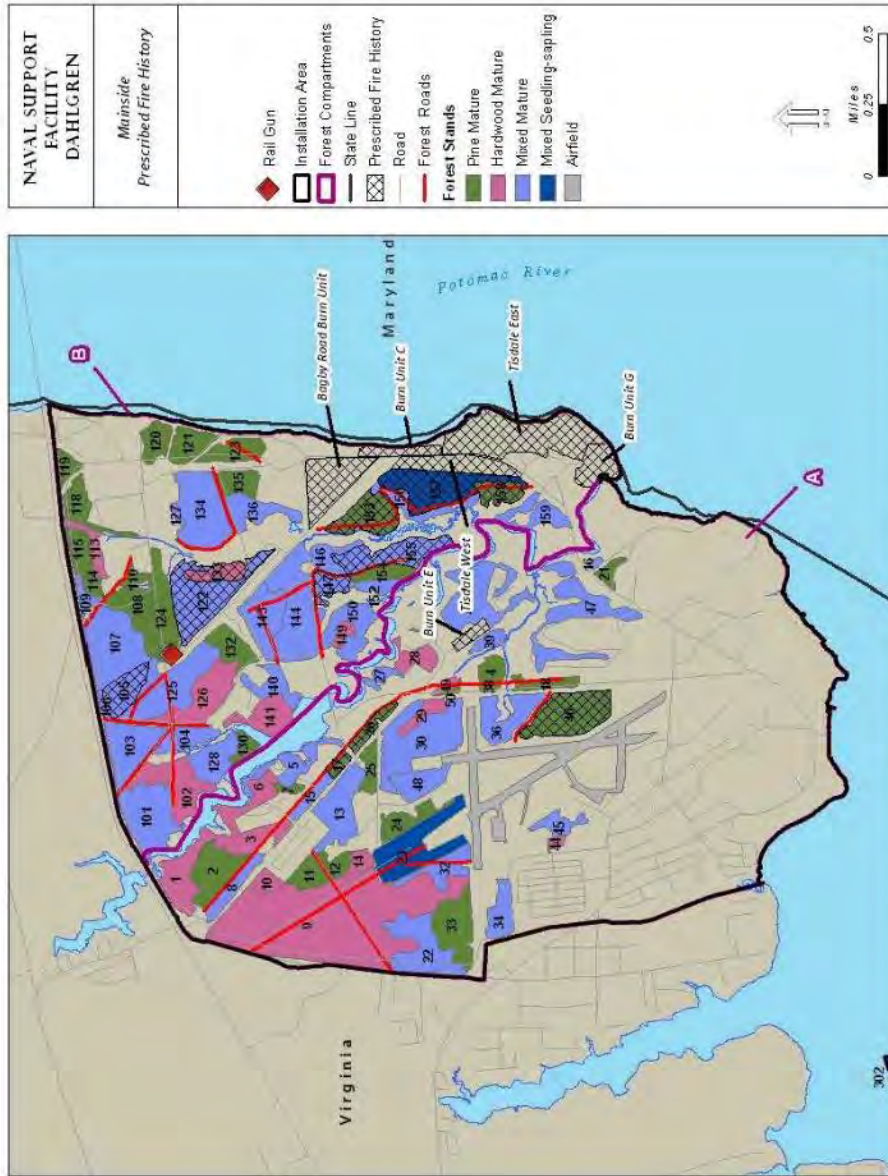


Figure 1-6. Prescribed Fire History on Main Site

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for other activities, rather than wildfire control, are typically better maintained than more isolated forest roads. It is critical that a new maintenance schedule is developed to ensure that even remote forest roads are maintained. Those that are most heavily utilized and those closest to explosive areas or forests and fields with high fuel loads should be given the highest priority in maintenance scheduling. Mowing can be effective in maintaining firebreaks, but chemical control and prescribed burning may also be options for maintenance in some areas on base.

Firebreak and fireline width recommendations vary among wildland fire experts, but are generally dependent on fuel type, fuel load, topography, and other factors specific to a burn site. The Natural Resources Conservation Service (NRCS) Conservation Practice Standard for Firebreaks- Code 394 recommends "Firebreaks will be of sufficient width and length to contain the expected fire (USDA-NRCS 2010)." The Publication Management System (PMS) 410-1 Fireline Handbook states, "Make [fire]line no wider than necessary; consider height of vegetation (NWCG 2004)." In wildfire scenarios where heavy loads of dry fuels may produce extreme fire behavior, it is generally acceptable to create a firebreak that is 1.5 times the width of the tallest adjacent vegetation, reduce fuels near the line, and create a fireline approximately 1 to 3 feet wide (Utah State University 2013). But, in prescribed fire planning for NWSG maintenance, multiple state NRCS offices recommend firebreaks between 10-15 feet wide, depending on surrounding fuel types and loading (USDA-NRCS no date, USDA-NRCS 2005, USDA-NRCS 2010, Weir et al. no date).

**1.4.2 Protection of Cultural Resources from Fire**

The National Historic Preservation Act and the Archaeological Resources Protection Act mandate protection of significant historical and cultural resources. The Cultural Resources Program Manager must be notified before a prescribed burn takes place or in the event of a wildfire in an area with historical and cultural resources present. Based on previous surveys conducted on NSFDL during the 1990s to 2006, approximately 44 archaeological sites have been identified at Mainside and Pumpkin Neck (see Figures 1-4 and 1-5). Historical and cultural resources are discussed in further detail in the NSFDL INRMP (DoN 2007a) as well as in later sections of this document.

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**2.0 POLICY, LAND MANAGEMENT PLANNING, AND PARTNERSHIPS**

**2.1 FIRE POLICY**

Depending on property ownership, different safety and operations requirements must be met in the planning and implementation of prescribed fire and wildfire management. The Department of Defense (DoD), The Department of the Navy (DoN), and NSFDL have provided standards for wildland fire management through the issuance of Instructions.

**2.1.1 DoDI 6055.06 (Fire and Emergency Services Program)**

In Section E3.8 of DoDI 6055.06 (Fire and Emergency Services Program, December 21, 2006) (Appendix A), installations are required to follow 2001 Federal Wildland Fire Management Policy (NWCG 2001a) and create a WFMP which contains the following information:

*E3.8.1.1. All wildland fire management strategies including military training availability, ecosystem sustainability, and protection of F&ES personnel and the public.*

*E3.8.1.2. Wildland fire preparedness, preplanned dispatch for both initial and extended attack, and prescribed fire and prevention per NFPA Standard 1710 [<http://www.nfpa.org/catalog/>]. If required, the minimum level of service for wildfire suppression shall consist of a direct wildland attack capability within 10 minutes of arrival of the initial wildland fire company at the fire scene.*

*E3.8.2. Train all personnel involved in wildland fire management activities to the appropriate PMS 310-1 ... [<http://www.nwcg.gov/pms/docs/pms310-1.pdf>] or NFPA Standard 1051, and all personnel shall be outfitted with protective clothing and equipment per NFPA 1977.*

DoD was not involved in the production of the 2005 Wildland Fire Use Implementation Procedures Reference Guide, but it is the most recent document available which provides guidance in implementing the 2001 Federal Wildland Fire Management Policy. The document addresses safety, response to wildland fire, use of wildland fire (i.e., prescribed fire), fire science, interagency cooperation, and communication and education. The guide provides detailed steps for creating a Wildland Fire Implementation Plan which is specific to management of individual fires, or prescribed fires.

DoDI 6055.06 recommends DoD agencies prepare and respond to wildfires in accordance with “the standards promulgated by the Department of Labor - Occupational Safety and Health Administration, National Fire Protection Association (NFPA), National Fire Codes, Unified Facilities Criteria 3-600-01, and other fire safety criteria published by the Department of Defense.”

Although DoDI 6055.06 requires that numerous qualifications are met to manage wildland fires, Section 6.16 describes risk management procedures by which an installation may deviate from minimum requirements. A long-term deviation from the instruction may be requested by following instructions provided in Section 6.16.3 of DoDI 6055.06 (Appendix A).

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**2.1.2 Naval District Washington Instruction 11320.10E**

Each Naval Station within Naval District Washington (NDW) must follow *NDW Instruction 11320.10E, March 29, 2011* (Appendix B). The majority of the publication focuses on structural fire prevention and suppression on the installation rather than wildland fire or prescribed fire. The “Outdoor Areas” section of the document specifies the following:

*a. Dry weeds, grass and brush.*

*(1) These may not be permitted to accumulate around buildings, open storage areas, fuel storage tanks, and railroad properties. Such growth should be cut frequently and disposed of in a safe manner or chemically controlled.*

*b. Areas beneath or within 50 feet of buildings must be regularly policed to keep them free from accumulation of debris and combustible vegetation.*

In the event of a structural fire or wildfire, NSFDL personnel are instructed to call NSFDL Station Dispatch to alert officials. NSFDL Fire and Emergency Medical Services (F&EMS) will respond immediately and activate the Incident Command System (ICS). If more personnel are required, outside assistance will be requested.

**2.1.3 Naval Support Activity South Potomac Instruction 11010.45**

A Comprehensive Work Approval Planning (CWAP) Instruction, Naval Support Activity South Potomac (NSASP) Instruction 11010.45, was published in 2010. It requires inter-organizational evaluation and approval of proposed actions within NSASP (Appendix C). This process ensures that potential impacts to the environment, infrastructure, explosive safety, safety, security, anti-terrorism and force protection, land use planning goals, and supported and supporting commands missions and objectives are carefully evaluated. Accordingly, all wildland fire planning will comply with the CWAP Explosive Safety Requirements (ESR) memo and a CWAP permit shall be prepared and approved for all proposed prescribed burns.

**2.2 FIRE AS A TERRORIST ELEMENT**

In May of 2012, the U.S. Department of Homeland Security (USDHS) alerted governmental agencies, first responders, and the private sector to a new potential threat by issuing (*Unclassified//For Official Use Only*) *Terrorist Interest in Using Fire as a Weapon* (USDHS 2012). This document describes the intelligence that lead to this belief, the implications of this type of terrorism, and protective measures that can be taken. Appendix A of the USDHS document promotes the following preventative actions to protect against the specific use of wildfire as a terrorist weapon:

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**Wildfires**

- Promote public awareness by working with the community to remove combustible fuel and vegetation from around homes and businesses.
- Identify critical infrastructure or key resources that may be affected by large-scale, rapidly moving wildfires, and plan for accessibility for firefighting resources and water supply.
- Ensure personnel review current standard operating procedures (SOP) for brush and wildfires, and train for large-scale, advanced fires that are common to arson crimes.
- Ensure that the equipment needed to control and extinguish fires is ready and properly maintained (such as off-road vehicles, brush fire pumps, and chain saws).
- When possible, increase staff during high-risk periods of low humidity, little or no rainfall, and high winds.
- Coordinate law enforcement and park service patrols of high-risk areas, identified as those with residential, business, or critical infrastructure.
- Preplan operations and coordinate necessary equipment needs (water shuttles, relay pumping operations, or drafting from natural water resources) for potential incidents where accessibility to water is limited.
- Confirm and coordinate the availability of aviation resources for command and control of large-area brush and wildfires.
- Confirm the availability of any maps or depictions of park areas as a resource for incident command.
- Coordinate and preplan the effective evacuation of residential and business communities as well as scene security and force protection.

**2.3 LAND/RESOURCE MANAGEMENT PLANNING**

The NSFDL Natural Resources Program follows multiple natural resources management documents, with which this document must comply including: the NSFDL INRMP (DoN 2007a), NSFDL Bald Eagle Management Plan (DoN 2007b), Virginia's Comprehensive Wildlife Conservation Strategy (VDGIF 2005), and U.S. Fish and Wildlife Service (USFWS) Recovery Plans for all endangered species on NSFDL property (DoN 2007a). All of these land management planning documents contain vital information necessary to relay in wildland fire planning and implementation.

Previously, NSFDL used *SOP XSM-OM-002-06: Risk Hazard Assessment for Prescribed Burning Program* (DoN, no date) and *Procedures for Prescribed Burning Program* (DoN 2007c, Appendix D) to address potential risks of prescribed burning and required procedures to

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implement it. However, this SOP is now inactive and a new SOP must be developed to address future prescribed burning activities. The *Risk Hazard Assessment* describes potential risks and hazard reduction and mitigation techniques. The more detailed *Procedures for Prescribed Burning Program* document discusses Navy regulations, responsibility, location of operations, personnel and material limits, safety requirements, emergency response and contingency plans, environmental protection procedures, security requirements, hazard control brief, equipment needed, and step-by-step procedures to conduct prescribed burns.

**2.4 PARTNERSHIPS**

DoD installations are encouraged to develop regional partnerships for wildland fire management support by means of reciprocal agreements with federal, state, local, and private entities to share human, logistical, and operational resources. Fire management personnel at the Virginia Department of Forestry (VDOF) are not required to, but may agree to review and approve prescribed fire plans for NSFDL, if desired. The VDOF is headquartered in Charlottesville, Virginia; maintains the Eastern Region Office in Providence Forge, Virginia; and a county office in King George, Virginia for the Mattaponi Work Area that includes King George County. The VDOF Eastern Region Office in Providence Forge can be reached at (804) 966-5092 and the Mattaponi Work Area office in King George and can be reached at (540) 663-0181.

Currently, NSFDL holds three Mutual Aid F&EMS Assistance Agreements with King George County, the Charles County Board of County Commissioners, and the Colonial Beach Volunteer Fire Department (also known as Westmoreland Engine/Truck Company 1), in Westmoreland County. In the event of a wildfire, NSFDL can request assistance from any of these resources (Appendix E).

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### **3.0 FIRE MANAGEMENT UNIT CHARACTERISTICS**

The National Wildfire Coordinating Group (NWCG) is an interagency partnership between the Bureau of Indian Affairs, U.S. Forest Service (USFS), Bureau of Land Management, National Park Service (NPS), USFWS, and the National Association of State Foresters “designed to coordinate programs of the participating wildfire management agencies” (NWCG 2013b). The NWCG defines a Fire Management Unit (FMU) as “a land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, major fire regime groups, or other characteristics that set it apart from an adjacent FMU. The FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives” (NWCG 2013a).

FMUs must be defined throughout the entire installation for areas where both wildfire and prescribed fire can occur. In either instance, firefighters must know the location of potential hazards, access routes, and all other information that could affect fire behavior and the safety of the community. FMUs have been defined for the entire installation using the locations and names of pre-defined forest compartments (Figures 3-1 and 3-2). Prescribed burn units are smaller areas burned within FMUs. The number of prescribed burn units at NSFDL is limited by the high occurrence of explosive areas throughout the base.

All prescribed burning is conducted in accordance with DoD, State, and NSFDL regulations. This includes an approved CWAP permit, an approved NSFDL Prescribed Burning Program SOP, and site-specific prescribed burn plans. Burn plans follow the guidelines of the State Prescribed Burn Program and must include wildfire protection procedures. The plan must also address smoke management, state the objective of the treatment, and include a materials list and safety contact numbers. A map that indicates each burn unit and the location of all firelines, firebreaks, roads, adjacent properties, and other important landscape features is included (Appendix D).

### **3.1 AREA-WIDE MANAGEMENT CONSIDERATIONS**

#### **3.1.1 Fire Management Objectives**

Traditionally, wildland fire management programs have focused on maximum prevention, detection, and suppression of wildfires. Due to the many hazardous constraints on NSFDL, the base must maintain vigilance in wildfire prevention. However, prescribed fire can be implemented in a safe and controlled environment in some areas to meet habitat management and fuel reduction goals. Prescribed fires planned for these areas can decrease potential wildfire risks, increase the quality of wildlife habitat, help control particular invasive species, thin dense vegetation, and increase plant diversity in various plant communities

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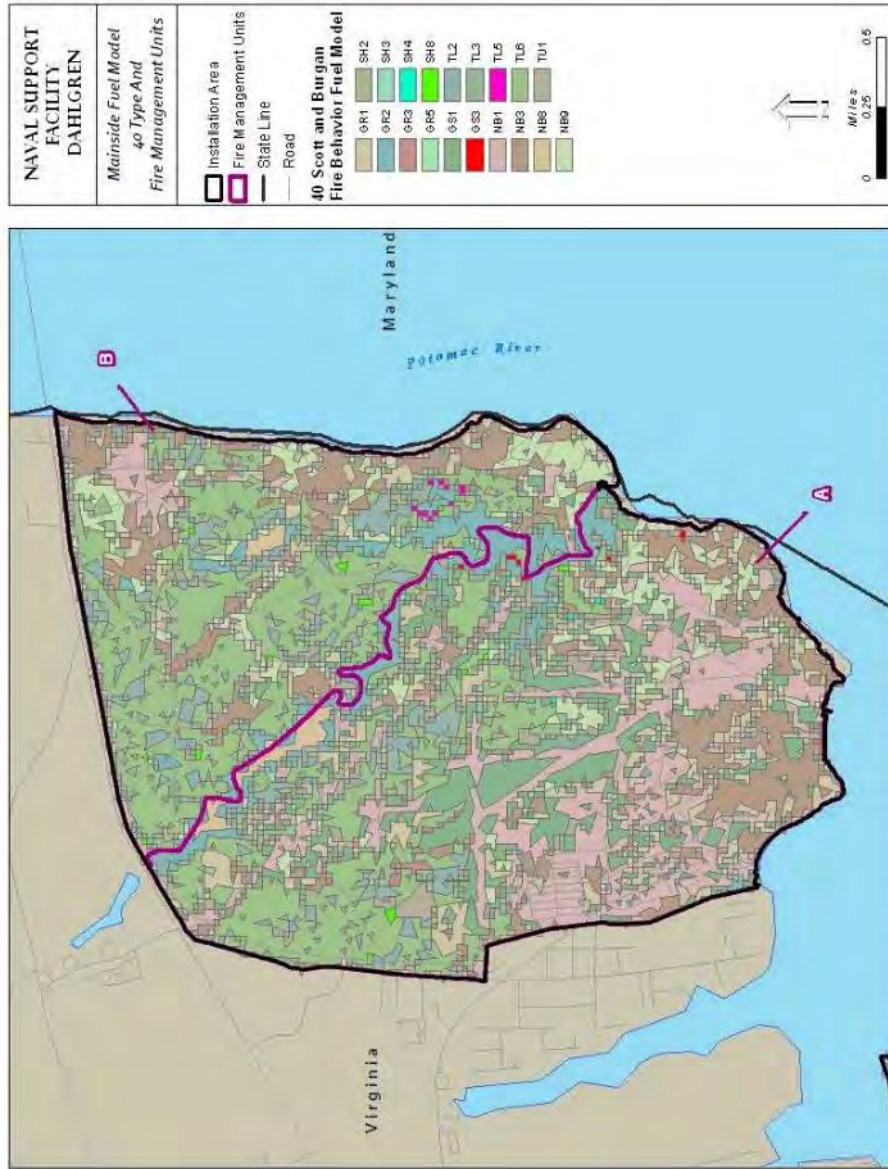
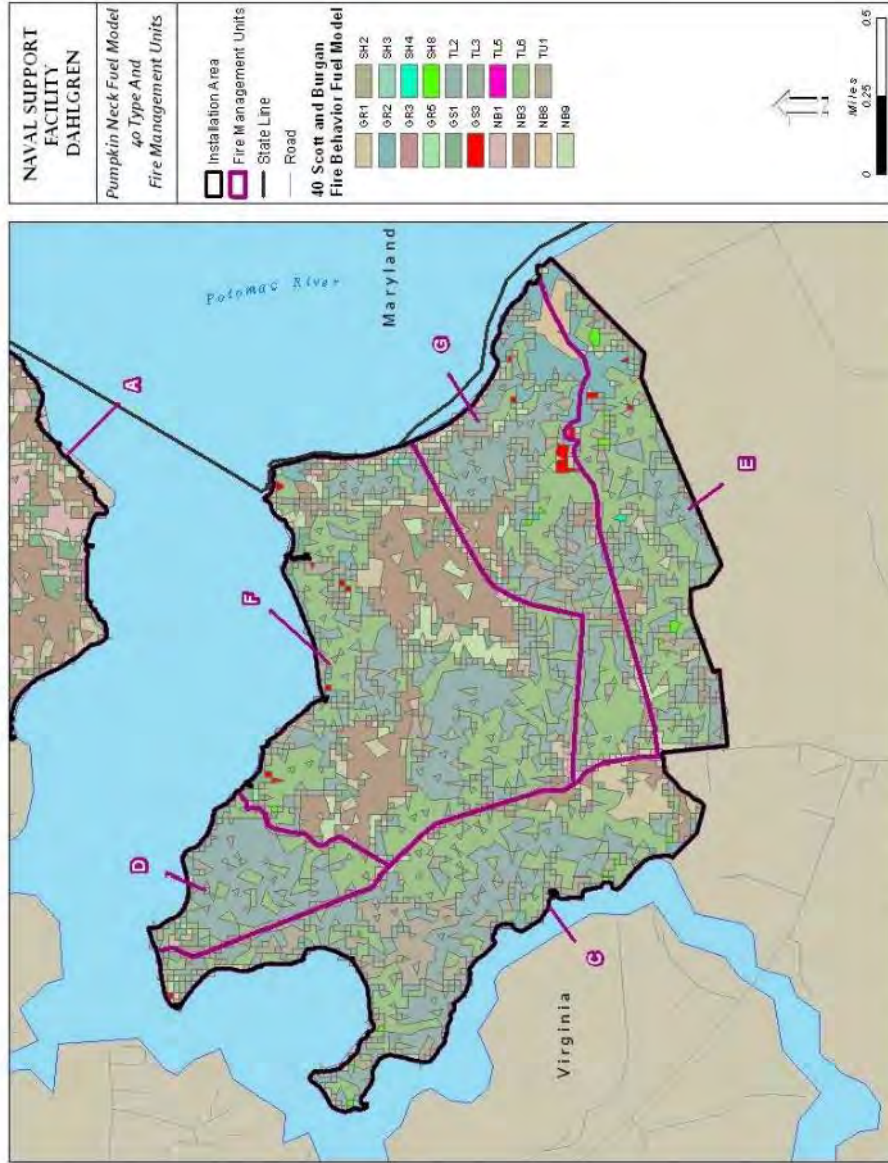


Figure 3-1. Fuel Model 40 Types in Fire Management Units on Mainside



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**Figure 3-2. Fuel Model 40 Types in Fire Management Units on Pumpkin Neck**

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Although wildfire has rarely occurred in the past on NSFDL, the implementation of prescribed fire in high risk habitats can help reduce fuel loads, preventing high intensity fire behavior in the event of an unplanned ignition. The forest in some stands is covered with thick leaf litter and woody debris that can pose a wildfire risk to the installation, especially in explosive areas. Due to these issues, the primary goals of wildfire management at NSFDL are to minimize the potential for wildfire, reduce its impacts to the greatest extent practicable, and to use prescribed fire as a cost effective management tool to enhance wildlife habitat and manage vegetation on operational lands. Related objectives are to:

- Decrease the risk and intensity of potential wildfires by reducing fuel loads through a prescribed fire program.
- Reduce fuel loads using non-fire, planned fuel treatments to lower risk of wildfire around explosive buildings and operations.
- Identify, prioritize, and treat high hazard areas adjacent to private and commercial landowners to mitigate the potential for wildfire to damage private or installation property.
- Utilize an appropriate wildfire suppression response, which emphasizes the use of natural and man-made barriers to minimize impacts on the environment; and establish and maintain strategically-placed firebreaks in areas of high fire risk..
- Promote forest, NWSG, and early successional habitat health and native species regeneration by removing competition from undesired/non-native species through a regular prescribed fire cycle.
- Reduce vegetation to allow greater visibility (i.e., clear range) for safe conduct of explosive test operations.

**3.1.2 Fire Behavior Fuel Model 40**

To prioritize the treatment of fuel reduction areas at NSFDL, the location of current fuel types and loads across the base must first be determined. Fire behavior can significantly vary between different fuel types and fuelbed inputs such as load, bulk density, fuel particle size, heat content, and moisture of extinction. Fire Managers must be aware of these factors at a site to accurately predict the most effective and safest burn prescription for a burn unit.

Scott and Burgan's (2005) Fire Behavior Fuel Model (FBFM) 40 addresses fire behavior fuel models for use in the Rothermel (1972) surface fire spread model. The FBFM 40 consists of more fuel models for all fuel types (e.g., grass, shrub, timber, slash) than earlier models. The FBFM 40 also handles fuel models that treat herbaceous content as a dynamic fuel. Live herbaceous fuel is converted to dead fuel, as a function of live herbaceous moisture content, adjusting the predicted fire behavior associated with a static fuel type. FBFM 40 integrates fuel

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load by category (live and dead) and particle size class (0 to 0.25 inch, 0.25 to 1.0 inch, and 1.0 to 3.0 inches diameter); surface-area-to-volume ratio by component and size class; heat content by category; fuelbed depth; and dead fuel moisture of extinction. FBFM 40 classifications were determined for NSFDL to aid managers in updating current prescribed burn plans and recognizing potential wildfire risks throughout the installation (Table 3-1, see Figures 3-1 and 3-2). Geo-Marine, Inc. Geographical Information System (GIS) Analysts compared FBFM 40 high risk fuel locations to the most current aerial imagery available (USDA FSA 2012) to assess model results. Inaccurate data such as high risk fuel types on paved roads and buildings, and data depicting low risk situations, such as dead grass fuels surrounded completely by water, were removed from the FBFM 40 GIS layer. FBFM 40 data are most useful as a guide to locate potential high risk fuels on a landscape. However, ground-verification is necessary to confirm their presence.

### **3.1.3 High Risk Fuels**

The fuel model types found at NSFDL that are the most dangerous to combat in a wildfire event are GS3, SH4, SH8, and TL5. GS3, SH4, and TL5 types are predicted to contain high levels of at least one of the fire behavior prediction factors: fuel load, rate of spread, or flame length. SH8 type is predicted to contain fuels with high levels of all three factors. These high risk fuel types are relatively uncommon throughout NSFDL, with the highest concentrations in stand 157 within FMU B, and in Stands 416, 422, and in waterways within FMUs E and G (Figures 3-3 and 3-4).

The majority of high risk fuels indicated in the FBFM 40 model are SH8 and GS3 fuels. SH8 is defined by FBFM 40 as thick areas of shrubs and shrub litter, but appears on aerial imagery of NSFDL to correlate more closely with dead or dry patches of vegetation within forest stands or wetland perimeters where palustrine shrubs may occur. Areas identified as GS3 grass fuels appear on aerial imagery to most closely resemble common reed or marsh grass (*Spartina* spp.) stands.

High risk fuel types within potentially explosive areas should be treated as the highest priority locations to implement non-fire fuel reduction treatments (Figures 3-3 and 3-4). Management is critical in explosive areas that contain large stands of dry or dead fuels adjacent to contiguous forested areas that could carry fire long distances without being stopped by firebreaks. Forest stands with small, crowded pine trees, high densities of snags, or dense climbing vines in explosive areas are also at a heightened risk for wildfire. Preventative measures such as raking and maintaining firebreaks around high risk sites, pine needle raking within stands, manual down woody debris removal, and mechanical and chemical thinning of trees and vines can be implemented to slow wildfire spread in the event of accidental ignition.

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**Table 3-1. Fire Behavior Fuel Model 40 Descriptions**

Fuel Model	Description
GR1	Short, sparse dry climate grass is short, naturally or heavy grazing, predicted rate of fire spread and flame length low
GR2	Low load, dry climate grass primarily grass with some small amounts of fine, dead fuel, any shrubs do not affect fire behavior
GR3	Low Load, Very Coarse, Humid Climate Grass (Dynamic) The primary carrier of fire in GR3 is continuous, coarse, humid-climate grass. Grass and herb fuel load is relatively light; fuelbed depth is about 2 feet. Shrubs are not present in significant quantity to affect fire behavior.
GR5	Low load, humid climate grass, fuelbed depth is about 1-2 feet
GS1	Low load, dry climate grass-shrub shrub about 1 foot high, grass load low, spread rate moderate and flame length low
GS3	Moderate load, humid climate grass-shrub, moderate grass/shrub load, grass/shrub depth is less than 2 feet, spread rate is high and flame length is moderate
NB1	Urban
NB3	Agriculture
NB8	Open Water Land covered by open bodies of water such as lakes, rivers and oceans comprises NB8. Expected fire behavior: No fire spread
NB9	Barren
SH2	Moderate load dry climate shrub, woody shrubs and shrub litter, fuelbed depth about 1 foot, no grass, spread rate and flame low
SH3	Moderate load, humid climate shrub, woody shrubs and shrub litter, possible pine overstory, fuelbed depth 2-3 feet, spread rate and flame low
SH4	Low load, humid climate timber shrub, woody shrubs and shrub litter, low to moderate load, possible pine overstory, fuelbed depth about 3 feet, spread rate high and flame moderate
SH8	High Load, Humid Climate Shrub The primary carrier of fire in SH8 is woody shrubs and shrub litter. Dense shrubs, little or no herbaceous fuel, fuelbed depth about 3 feet. Spread rate is high; flame length high.
TL2	Low load broadleaf litter, broadleaf, hardwood litter, spread rate and flame low
TL3	Moderate load conifer litter, moderate load conifer litter, light load of coarse fuels, spread rate and flame low
TL5	High load conifer litter, light slash or dead fuel, spread rate and flame low
TL6	Moderate load broadleaf litter, spread rate and flame moderate
TU1	Low load dry climate timber grass shrub, low load of grass and/or shrub with litter, spread rate and flame low

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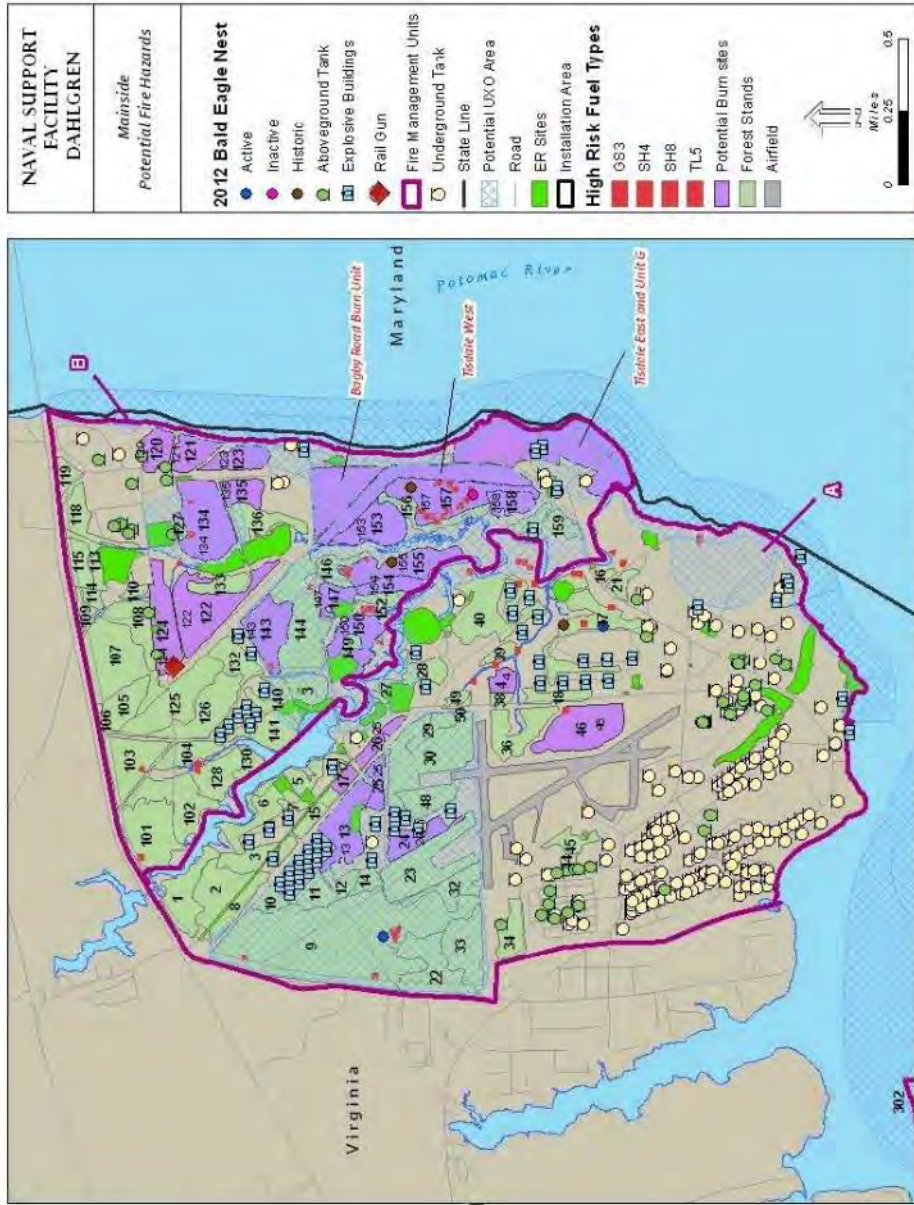


Figure 3-3. Potential Fire Hazards on Mainside

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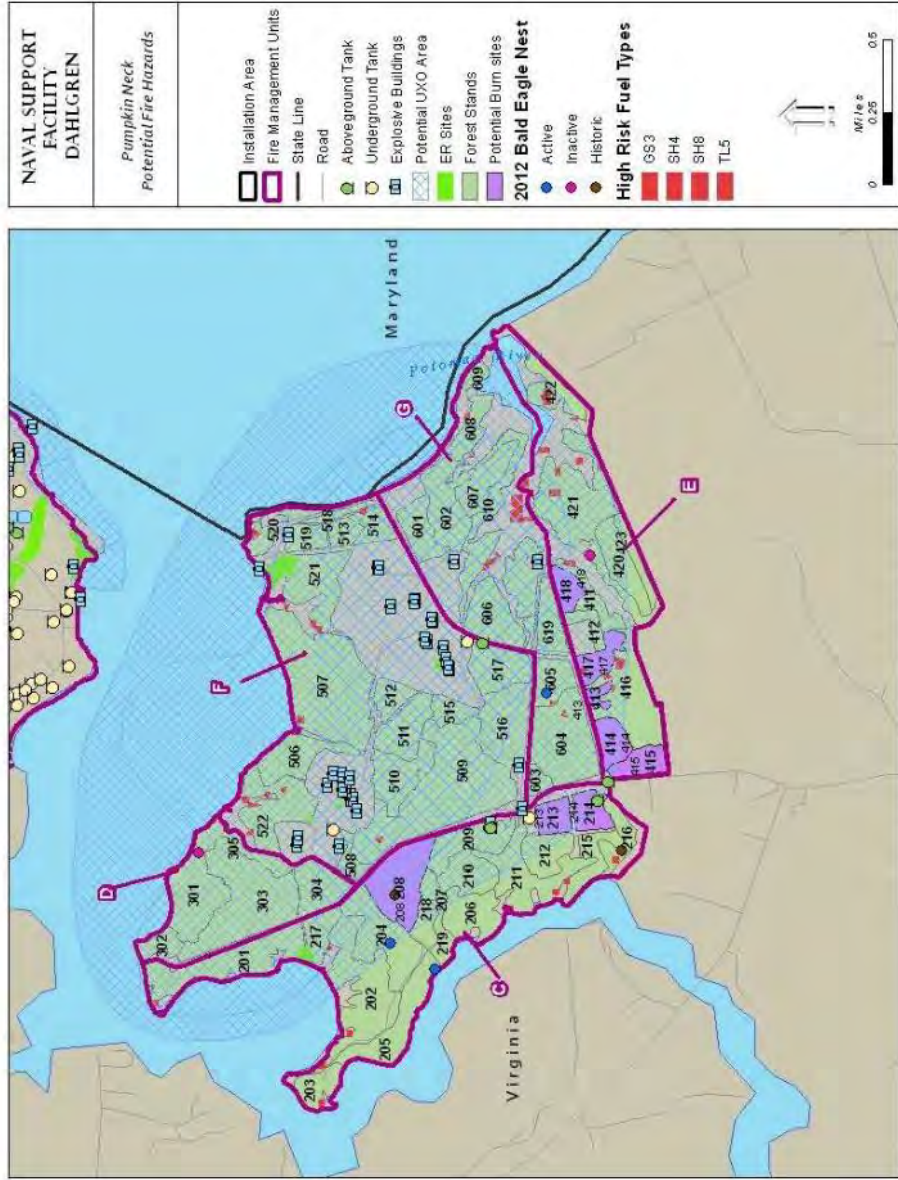


Figure 3-4. Potential Fire Hazards on Pumpkin Neck

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### **3.1.4 Wildland Fire Management Constraints**

NSFDL will face various constraints to prescribed fire and wildfire fighting such as avoiding explosive areas, high risk fuels in wildland areas, and protecting natural and cultural resources from fire, when necessary. All of the forest stands in FMUs D, F, and G (i.e., all 300, 500, and 600 series forest stands) are classified as off-limits due to safety concerns associated with the potential for unexploded ordnance (UXO). No types of active forest management are allowed in these areas unless specific controls and guidance are identified in the approved CWAP permit, and the activity is conducted in accordance with current regulations. This represents approximately 47 percent of Pumpkin Neck's 1,182 forested acres (DoN 2007a). Additionally, all potential UXO contamination areas and Environmental Restoration (ER; formerly Installation Restoration [IR]) Program sites throughout the base may need to be surveyed and cleared before prescribed burning can be conducted if the CWAP ESR memo so directs (see Figures 3-3 and 3-4; DoN 2007c, Appendix C).

All buildings designated as having explosive potential must be protected with at least a 50-foot firebreak, as required by *Naval Sea Systems Command (NAVSEA) OP-5, Volume 1: Ammunition and Explosive Safety Ashore (NAVSEA OP-5)*. Prescribed fires will take place outside of these zones and firebreaks will be maintained around explosive buildings on an ongoing basis as a component of wildfire preparedness. The locations of any structures that could present a fire hazard or impede access routes during a wildfire or prescribed burn scenario must be identified during pre-season fire preparedness planning. If a hazardous or valuable structure is present in a prescribed fire unit or in an area with high risk fuels, a preemptive firebreak can be raked around the structure.

Protected RT&E species habitat and cultural resources locations are recorded and maintained for use in prescribed burn plans and in preparedness planning for wildfires (see Figures 1-4 and 1-5). All necessary measures will be taken by the Natural Resources Program to maintain compliance with USFWS RT&E species recommendations and guidelines during firing operations. Protective prescribed fire techniques described in Sections 1.2.1.1 and 1.4.2 of this document should be implemented to prevent harmful effects from occurring from species that are not adapted to fire.

Invasive species infestations within FMUs should be mapped so mechanical or chemical control can be considered before prescribed burns take place to avoid a potential spread of unwanted species due to inappropriate timing of fire introduction.

Mapped locations of all constraints should be readily available to the NSFDL F&EMS in the event of a wildfire and should be included in prescribed burn plans for areas that contain these fire constraints (see Figures 3-3 and 3-4).

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### **3.2 FIRE MANAGEMENT UNITS- SPECIFIC DESCRIPTIONS**

An understanding of the overall fuel loads, potential fire behavior, fire hazards, and management constraints across NSFDL is important to the planning process for wildland fire. But, more detailed descriptions of FMUs on a finer scale are also necessary to be fully prepared for a wildfire incident or prescribed burn. FMU boundaries were developed based on forest compartments, which have similar land management needs, management constraints, access routes, natural barriers, and fuel types. The following sections describe locations, constraints, and any factors that may affect fire behavior, specifically within each FMU.

#### **3.2.1 Fire Management Unit A**

Unit A comprises the southwestern half of Mainside and is bounded to the south by Upper Machodoc Creek, to the west by the town of Dahlgren, Virginia, and to the northeast by Gambo Creek. Forest stands in this FMU are primarily mature, mixed pine-hardwood stands, some of which have recently been thinned. Pine thinning was conducted in Stands 4, 24, and 33 during the fall of 2012, effectively reducing fuels in these areas. Stand 2 was thinned using a mulcher in 2013. FMU A also contains the largest hardwood stand on base, stand 9. A few locations in this stand were identified as FBFM 40 Type SH8, the highest risk fuel type found at NSFDL (see Figure 3-3). The largest area of this fuel type in stand 9 is in the proximity of an active eagle nest, making fuel reduction treatments here a potentially high priority. This stand falls within a potential UXO contamination area and the western side of it is a wildland urban interface, as well. An on-the-ground survey should be conducted to assess potential fuel reduction treatment needs.

Seven forest stands and 3 ER sites in this FMU have been designated potential burn sites due to the need for fuel reduction treatments and wildlife management needs. Forest stands 17, 26, 4, and 46 and ER Sites 4, 6, and 9 lie outside of potential UXO contamination areas and do not contain any explosive buildings or storage areas. However, before a prescribed burn can occur, the CWAP ESR memo may require a sweep for UXO in areas that have not been previously burned (DoD 2007c). None of these forest stands or ER sites have been previously burned. If the ER Sites are cleared for prescribed burning, fire can be integrated into site management plans to maintain NWSG habitat for wildlife. NWSG sites should be burned every 3 to 5 years for optimal grassland management.

FMU A has a large number of infrastructure, explosive buildings, and above and below ground fuel storage tanks, making explosive potential in a wildfire event relatively high in these areas. The airfield, which carries the risk of accidental ignition with use, is also within this unit. Relatively little vegetation and an extensive network of roads serving as firebreaks occur within these explosive areas, lowering the overall potential fire risk.

A number of important natural and cultural resources are present on FMU A. Two active eagle nests in this FMU should be protected from wildfire potential by regularly maintaining firebreaks



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around nest trees and controlling fuel buildup within PZs. No disturbances such as prescribed fire or non-fire fuel treatment activities are permitted during nesting season within a 0.25-mile radius PZ buffer of active nest trees or those that were active within the past 3 years. Fire must also be excluded from the historic district and other cultural resources areas to prevent damage (see Figures 1-4 and 1-5).

### **3.2.2 Fire Management Unit B**

Unit B is the northernmost FMU at NSFDL. It is bounded to the west and southwest by FMU A, to the east by the Potomac River, and to the north by State Route 301, which separates the base from off-base property. This wildland-urban interface would likely be unaffected in a wildfire event due to the wide firebreak created by highway 301. On-base infrastructure is located mostly in the northeastern corner of the FMU (see Figure 1-1).

Most forest stands on FMU B are mixed pine-hardwood stands, but this FMU also contains the largest number of pine stands on the installation. Stand 132 is a pine stand that was thinned in fall 2012, reducing fuel levels adjacent to two explosive buildings. The most concentrated high risk fuels present in FBFM 40 data are located in pine stand 157 and consist of SH8 and TL5 fuel types. The NSFDL Natural Resources Program attempted to reduce fuels in this stand in early 2013 by mulching slash, but operations were halted when UXO was found on site, creating a safety hazard for workers. The stand must be officially cleared of explosives before future operations can take place, including prescribed fire.

Fourteen forest stands and three old field sites have been selected as potential prescribed burn sites in FMU B. All three old field sites and eleven of the forest stands have been previously burned through the prescribed fire program. These areas will not be required to be swept for UXO before burning unless the CWAP ESR memo specifies that it is necessary.

Much of the southern portion of this FMU falls within potential UXO contamination areas. Some ER sites, fuel storage, and explosive buildings also present fire hazards. Firebreaks surrounding these areas are particularly important to keep clear by mowing and trimming overhanging branches on a regular basis. Explosive buildings and the Rail Gun must have 50-foot, raked firebreaks buffering them to prevent contact with wildfire.

One inactive and two historic eagle nests are located in the southeastern corner of the unit. If these nests have been active within the past 3 years before a prescribed burn is planned, a firebreak should be cleared around the nest tree and fuels must be kept low within a radius of 0.25 miles from the nest tree. The locations and expected fire effects of RT&E species must also be considered in prescribed burn plans.

More archaeological sites exist in FMU B than in any other FMU on base. The NSFDL Cultural Resources Program should be notified of plans to conduct prescribed burns in locations where cultural resources exist. Archaeological sites fall within potential burn sites in forest stands 120, 121, 123, 134, 153, 157, and Tisdale West Burn Unit (see Figures 1-4 and 3-3). Firebreaks can

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be raked and fire-retardant foam can be used to protect specifically sensitive sites from prescribed fire.

### **3.2.3 Fire Management Unit C**

Unit C is a Y-shaped FMU located at the westernmost side of Pumpkin Neck. It is bounded to the west and north by Upper Machodoc Creek, to the east by FMUs F and G along Harris Road and FMU D along Howland Point Road, and to the south by off-base property (see Figure 3-4). Wood Island Road bisects Unit C from the intersection of Harris Road and Howland Point Road to the end of the northwestern peninsula.

Forest stands in this FMU are primarily hardwood stands to the northern and southern ends with mixed pine-hardwood stands centrally located (see Figure 1-3). Several small areas of high risk, primarily SH8 FBFM 40 fuel types are present within Unit C along wetland edges of hardwood stands (see Figure 3-4). A GS3 fuel type is located at the northwestern tip of Pumpkin Neck near Howland Point Road, and likely represents a common reed or marsh grass stand. A ground survey should be conducted to assess potential fuel reduction treatment needs.

Unit C has three potential prescribed burn sites: stand 208, stand 213, and stand 214 (see Figure 3-4). All of these stands fall within the potential UXO contamination area that encompasses most of Pumpkin Neck. Since none of these stands have been previously burned, the CWAP ESR memo may require a UXO swept before a prescribed burn can occur (DoD 2007c). Stand 208 is a triangular area bordered to the north by Wood Island Road and to the east by Harris Road. This mixed seedling-sapling stand contains a historic bald eagle nest and is within the PZs of two active bald eagle nests. There are no nearby tanks or explosive buildings in or near stand 208 (see Figure 3-4). Stands 213 and 214 are composed of mature pine. There are no natural or cultural resources constraints within these units. A below ground storage tank and an explosive building are located northeast of stand 213 and an above ground storage tank is in the southern portion of stand 214 (see Figure 3-4).

### **3.2.4 Fire Management Unit D**

Unit D makes up most of the northwestern tip of Pumpkin Neck. This relatively small, triangular unit is bounded to the west by Howland Point Road, to the northeast by Upper Machodoc Creek, to the east by FMU F, and to the south by Harris Road (see Figure 3-4). This unit consists almost entirely of mature mixed pine-hardwood forest with a small amount of mature hardwood forest along the eastern edge (see Figure 1-3). No proposed burn units or high risk fuel types were identified within this FMU (see Figure 3-4). All of Unit D falls within a potential UXO contamination area, but no explosive buildings or other fire hazards are nearby. Several cultural resources located on the northwestern portion of the unit at Howland Point Road and one inactive eagle nest located in the unit should be protected from fire (see Figure 1-5).

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**3.2.5 Fire Management Unit E**

The western edge of FMU E consists of Harris Road and the main gate, at the southernmost end of Pumpkin Neck. The unit boundary follows Churchill Road to the east, continues past the northern curve of Churchill Road out to the Potomac River. The FMU boundary turns back southwest from the Potomac River, and follows the southern edge of the marsh around farm fields on adjacent property until reaching Harris Road.

More hardwood stands are located in this FMU than pine or mixed stands, with two of the largest stands, 416 and 422 containing patches of high risk fuel type SH8. On aerial photography, the areas in stand 416 may be a function of shadowing along a stream, but should be investigated. The fuels in stand 422 may be slash piles or excessive downed woody debris in need of removal. Although no explosive buildings or storage tanks fall within areas of high risk fuels in FMU E, both stands are within a potential UXO contamination area, and therefore could pose a safety risk in a wildfire scenario.

Three mixed pine-hardwood forest stands and two pine stands could potentially be burned to meet natural resources objectives. All of these except stand 415 fall within a potential UXO contamination area, potentially making it the least complicated stand to burn in this FMU. However, stand 415 has cultural resources within it that must be protected from prescribed fire or wildfire. Stand 418 also contains archaeological resources that should be protected from fire. The NSFDR Cultural Resources Program must be notified before these stands are burned.

One inactive bald eagle nest site is at the center of FMU E and should be monitored for activity during nesting season to ensure that a firebreak buffer is maintained around it. No RT&E species locations are known within this FMU.

**3.2.6 Fire Management Unit F**

FMU F is the largest FMU and contains the majority of the infrastructure and explosive areas on Pumpkin Neck. It is bounded to the west by Harris Road and FMU D, and to the north and east by the Upper Machodoc Creek and Potomac River. The southeastern boundary follows Launcher Road up Churchill Road, and east to the Potomac River.

Forest stands in this FMU are primarily mixed pine-hardwood stands with infrastructure surrounded mainly by short grasses. Most FBFM 40 fuel types in this FMU are GS3 and SH8 fuels. Upon review of aerial photography, GS3 fuels in this unit appear to mimic the GIS signature of common reed or possibly marsh grasses. The largest concentration of high risk fuels in this unit is in the northwestern corner where surveys have confirmed the presence of common reed. This particular location of GS3 fuels is also close to archaeological sites and relatively close to explosive buildings to the south. These fuel types may be the most important of the FBFM 40 data to verify on the ground, given the ability of common reed to not only create fire hazards, but also to spread by seed and clonal sprouting throughout wetland systems, altering native communities.

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SH4 fuels that are located on the far eastern boundary of Unit F along Rocket Range Road appear to be shrubby or invasive vegetation that should be investigated as a potential fuel treatment site due to its proximity to infrastructure and explosive buildings.

No potential prescribed burn sites fall within this FMU due to the large number of explosive areas and potential UXO contamination throughout the unit. However, non-fire fuel treatments of high risk fuels in this unit may still occur.

**3.2.7 Fire Management Unit G**

Unit G is located in the southeastern portion of Pumpkin Neck between FMU E to the south and FMU F to the north. It is bounded to the west by Harris Road, to the north by Launcher Road and Churchill Road, and to the east by the Potomac River. The southern boundary follows Churchill Road past where the road turns north and continues east to bisect the Black Marsh until it reaches the Potomac River (see Figure 3-4).

Unit G consists of large stands of mature, mixed pine-hardwood stands interspersed with fingers of the marsh (see Figure 1-3). Several small areas of high risk FBFM 40 fuel types are present within Unit G consisting of heavy shrubs in Stands 604 and 605 and common reed or marsh grasses within the Black Marsh (see Figure 3-4). Wetland areas with large common reed stands should be considered a wildland fire management issue when they are in proximity to other dry fuels that could carry a wildfire over narrow or dried waterways. They are less of a hazard in areas where they do not have a clear connection across waterways to drier fuels.

Unit G, fully within a potential UXO contamination area, has two explosive buildings in it, as well as a portion of the Churchill Range. Because this area is relatively wet from the Black Marsh, no prescribed burn sites are proposed for Unit G (see Figure 3-4).

Cultural and natural resources could be negatively affected by wildfire in a few locations on Unit G. SH8 fuel types are in proximity to an active bald eagle nest in stand 605. The PZ for an inactive bald eagle located to the south in FMU E also overlaps into the southern edge of Unit G, where an explosive building is located. A GS3 fuel type is also present within a historic archaeological site on the far eastern edge of FMU G, indicating a potential fire hazard that may need to be addressed (see Figure 3-4).

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**4.0 WILDLAND FIRE OPERATIONAL GUIDANCE**

**4.1 MANAGEMENT OF UNPLANNED IGNITIONS**

Unplanned ignitions can take place on NSFDL from lightning strike or by accidental ignition. Prescribed fire may also transition into a wildfire if the fire escapes control. Wildfires will be suppressed in the safest, most cost-effective manner, and with the least impact to installation resources as possible, as required by interagency wildland fire policies (Appendix A).

Most wildfires occurring on NSFDL will be suppressed by control and confinement options; however, if an unplanned ignition occurs on Pumpkin Neck in a location previously approved for prescribed burning and fire behavior is projected to meet resource objectives, limited suppression may be a management option. Environmental conditions must also meet the standards set by the fire prescription for this option to be used.

**4.1.1 Preparedness**

Under the heading of “Preparedness”, the 2001 Federal Wildland Fire Management Policy (NWCG 2001a) states “agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight”. Thorough planning enables managers to effectively meet a variety of wildland fire management objectives. The preparedness planning process includes routine actions completed prior to each spring (February 15 to April 30) and fall fire season (October 15 to November 30) (VDOF 2013a), as well as supplemental actions conducted in response to changing fire danger. Firebreak construction and maintenance is an example of a routine preparedness action. As fire danger increases, the level of effort must also increase and supplemental actions may need to be taken.

At a minimum, NSFDL should consider accomplishing the following preparedness actions:

- Update the Pre-season Wildfire Risk Analysis;
- Establish and maintain record systems, weather data, maps, and other related information prior to beginning of fire season;
- Adhere to a step-up plan based on staffing classes derived from the National Fire Danger Rating System (NFDRS). NFDRS is an interagency decision support tool that uses local fuels and weather data to calculate preparedness and dispatch levels and also provides guidelines for actions to be taken when specific preparedness levels are reached. Local information can be input to obtain specific site fire danger ratings, or data from nearby Remote Automatic Weather Stations and National Weather Service (NWS) Stations can be accessed to obtain daily fire weather forecasts (EACC 2013);
- Ensure prescribed fire and wildfire crew has current training qualifications and equipment is ready and functioning properly;

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- Alert Station Dispatch, King George Fire and Rescue, Charles County Fire Board, and Colonial Beach Volunteer Fire Department of upcoming prescribed fires; and
- Review agreements to coordinate interagency operations and update as necessary.

**4.1.1.1 Pre-Season Wildland Fire Risk Analysis**

Pre-season risk analysis provides the basis for wildland fire management actions such as pre-positioning of critical resources, requesting additional funding, or modifying applicable cooperative agreements to meet anticipated needs. The following should be considered to prevent the escape of prescribed fires and possible wildfires:

- Check current and predicted weather, especially precipitation levels and drought indices,
- Compare current and predicted weather with historical information,
- Check fuels information, such as areas of new disease or dieback, and recent blowdown,
- Compare fuels information with historical fuel levels.

Many different indicators can be used to develop a pre-season risk analysis including precipitation levels, drought indices, fires to date, and regional fire preparedness level. Current regional drought levels and other fire weather information are available at <http://va.water.usgs.gov/drought/> and [http://nidis1.ncdc.noaa.gov/portal/server.pt/community/drought\\_gov/202](http://nidis1.ncdc.noaa.gov/portal/server.pt/community/drought_gov/202). If the analysis suggests that an abnormal fire season might be anticipated, local and regional resources should be notified of the potential need for additional resources.

**4.1.1.2 Fire Weather Forecasting**

The NFDRS uses the Weather Information Management System (WIMS) processor to manipulate weather data and forecasts stored in the National Interagency Fire Management Integrated Database and to produce fire danger ratings within a pre-determined Fire Danger Rating Area (FDRA). The NFDRS system is designed to calculate worst-case scenario fire danger. This system can be used to increase preparedness of NSFDL by computing a Division Planning Level, which will help F&EMS personnel determine an appropriate state of readiness of suppression forces and a pre-planned response. NFDRS can also be used to complete the Adjective Fire Danger rating for the purpose of communicating fire danger to public and industrial interests. NSFDL F&EMS should communicate the fire danger as it changes throughout the fire season to inform the installation and the adjacent public community and help minimize human-caused fires.

NSFDL contains varying fuel types that react differently under different drought conditions. Drought index, energy release component, and water levels can be used as measurable objective factors to indicate an appropriate preparedness level. Ignition component, season, national and regional fire activity, and other circumstances are also considered in preparedness decisions.

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Ignition sources for wildland fire at the NSFDL include but are not limited to explosives and propellant testing, chemical testing, explosives storage, escaped prescribed fires, equipment fires, firing ranges, and lightning. Ignition sources vary by season since temperature, lightning activity, rainfall, relative humidity, fuel moisture content, and curing stage of live fuels vary seasonally. Although lightning is not an important ignition source at the NSFDL, lightning fires may occur more frequently during the Atlantic storm season from May through August.

The Eastern Area Coordination Center (EACC) provides incident information, predictive services, logistical and dispatch information, and administrative information relevant to safety, training, equipment, etc. The website, <http://gacc.nifc.gov/eacc/>, provides a variety of preparedness resources such as Weekly Fire Danger/Fire Weather Outlooks, Monthly/Seasonal Fire Potential Outlooks, and Eastern Area Situation Reports which include Preparedness Levels.

#### **4.1.1.3 Roles and Responsibilities**

Unless a waiver is granted by the installation commander (DoDI 6055.06), all fire operations personnel and contractors involved in wildland fire activities, including both wildfire and prescribed fire, shall meet the current wildland fire qualification standards for command and general staff positions required by Section E3.8 of DoDI 6055.06 and outlined in the NWCG publication, PMS 310-1 (NWCG 2012). PMS 310-1 states, "In the performance-based Wildland Fire Qualification System, qualification is based on completion of Required Training and demonstrated successful position performance by completing the applicable position task book on wildland fires, events, incidents, job activities, and in simulated exercises or classroom activities." All personnel assigned to positions with fire ignition or suppression duties and those assigned to other designated positions must complete an Annual Fireline Safety Refresher (RT-130) course in order to maintain currency. More information about NWCG training requirements can be found in Chapter 13 of the National Interagency Fire Center (NIFC) Red Book (NIFC 2013) and in PMS 310-1 (NWCG 2012).

An exception for Required Training as presented in PMS 310-1 is for structural firefighters who use the Skills Crosswalk (Table 4-1). The Skills Crosswalk was developed by analyzing and comparing NFPA structural firefighting standards with NWCG wildland firefighting Position Task Books (NWCG 2009). The Crosswalk identifies the level at which fire department personnel are qualified to fight wildland fire as a result of previous structural training. Hence, a structural firefighter can be trained to fight wildfire with reduced classroom hours, curriculum redundancies, and training hours. Four specific NWCG positions are incorporated in the *Crosswalk*, each paired with a counterpart structural position (Table 4-1). The Skills Crosswalk is further explained in PMS 310-1 (NWCG 2012) and the US Fire Administration website: <http://www.usfa.dhs.gov/fireservice/subjects/wildfire/>.

Individuals interested in gaining wildland fire training may also participate in interchangeable and agency equivalent courses identified by the NWCG Training Working Team. These courses

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**Table 4-1. NWCG and Structural Fire Paired Crosswalk Counterpart Position**

<b>Structural Fire Counterpart Position</b>	<b>Entering Qualifications</b>	<b>NWCG Position</b>
Non-Supervisory Structural Firefighter, Basic	Meets NFPA standard 1001 for Firefighter 1 or equivalency	Firefighter Type 2
Non-Supervisory Structural Firefighter, Advanced	Meets NFPA standard 1001 for Firefighter 2 or equivalency	Firefighter Type 1
Driver/Operator/Engineer or Company Officer	Meets NFPA standard 1021 for fire officer or equivalency	Engine Boss, Single Resource
Experienced lieutenants, captains, chief officers	Meets NFPA standard 1021 for fire officer or equivalency	Strike Team Leader

Source: NWCG 2009

can be found in the Field Manager's Course Guide, PMS 901-1, available at <http://www.nwcg.gov/pms/training/training.htm>.

**4.1.1.4 Personnel Qualifications Records Management**

Current training and qualification records should be maintained by all fire management personnel. Copies of records should be available to NSFDL personnel upon request. Training and qualification records include but are not limited to: Incident Qualification Classification System records, position taskbooks, and physical fitness test records. Permanent records should be kept by the NSFDL F&EMS or the NSFDL Natural Resources Program to facilitate effective and defensible wildland fire management and planning.

**4.1.1.5 NSFDL Staff and Equipment Resources**

The NSFDL F&EMS is an all-hazards trained department, and is capable of responding to fire, medical, hazardous materials, and technical rescue emergencies. These capabilities are completed utilizing the resources and staffing identified in Table 4-2. The installation also has a brush unit for response to brush/wildland fire emergencies. A trac-loader, rubber-tired loader, and backhoe and equipment operators are also available from Dahlgren Transportation if required.



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**Table 4-2. NSFDL Staff and Equipment Resources**

Staffing / Number		Equipment / Type / Number		
District Fire Chief	1	Brush Truck 28	2012 Ford F-550	1
Battalion Chief	2	Engine 281	2010 Pierce Contender	1
Fire Captain	4	Truck 28	2005 Pierce Arrow	1
Fire Inspector/Prevention	2	Command Unit 28	2010 Ford Expedition	1
Firefighters	15			

The minimum number of on-duty personnel needed for staffing each shift is 9 personnel. The daily staffing includes 1 Battalion Chief and 8 suppression staff (including Fire Captains, Firefighters, and Fire Inspectors).

A certain level of inventory must be maintained to prepare for fire season. Some materials are expendable and must be replaced when used. Other materials such as primary suppression equipment may be costly, but utilized for multiple years or decades. Equipment that should be available to the NSFDL F&EMS for prescribed fire escapes or wildfire incidents through the combined resources of NSFDL Company 28 firefighters, and partnering agencies are listed at <http://www.nifc.gov/PUBLICATIONS/redbook/2013/Chapter14.pdf> in Chapter 14 of the Red Book (NIFC 2013).

**4.1.1.6 Mutual Aid Agreements**

Emergency assistance and mutual aid agreements should conform to the guidelines stated in DoDI 6055.06 (Appendix A). The NDW Fire and Emergency Services Division currently shares a Mutual Aid Agreement with King George County, Charles County Board of County Commissioners, and the Colonial Beach Volunteer Fire Department (also known as Westmoreland Engine/Truck Company 1), in Westmoreland County, to provide assistance with wildfire suppression efforts, if necessary (Appendix E). NSFDL F&EMS is included in this agreement as part of the NDW Fire and Emergency Services Division. In the event of a wildfire or prescribed fire escape, NSFDL F&EMS may request that Station Dispatch contact the King George County Communication Center, Charles County Fire Board, or the Colonial Beach Volunteer Fire Department (Westmoreland Engine/Truck Company 1) for additional assistance.

Virginia is represented in the Mid-Atlantic Interstate Forest Fire Protection Compact (MAIFFPC) by a State Forester or State Fire Supervisor. Resources may be available for NSFDL in the case of a wildfire emergency through this organization. The group meets regularly with the following purpose:

“The purpose of the MAIFFPC is to promote effective prevention and control of wildfires in the Mid-Atlantic region by developing and integrating forest fire plans, developing and maintaining effective wildfire suppression programs in each of the member states, providing mutual aid for fire suppression and training efforts, acting as a liaison between various fire control agencies and

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by facilitating the mobilization of firefighting resources during periods of national emergencies” (Public Law 84-790, MAIFFPC Act of 1956).

**4.1.1.7 Step-Up Staffing Plans**

A step-up plan addresses all actions that should take place under each predetermined preparedness level within a burn unit. It provides direction on mitigating actions in a situation of increasing fire danger in which the available number of personnel may not be enough to suppress a fire. Step-up plans typically use NFDRS calculated values such as Burning Index, Energy Release Component, or staffing class to determine the current and expected level of fire danger. As the level of fire danger increases, various wildfire management actions should be predetermined and ready for implementation at each fire danger level. This includes authorization of funding during periods of high to extreme fire danger for extra staffing, extended work hours, and emergency equipment rentals such as air tankers and helicopters.

Preparation for the normal sequence of fire seasons begins with the fire crew servicing equipment, reviewing the maintenance needs of firebreak and control lines, and reviewing cooperative agreements. Protection and prevention plans during extreme dry periods would include more stringent precautions, such as the suspension of any prescribed fire operations and implementation of preparation sequences in the step-up plan.

Using the step-up staffing plan, wildland fire management resources may be pre-positioned during periods when preparedness levels are high, or when a pre-season risk analysis predicts that initial and extended attack needs will exceed the installation’s response capability. More information about preparedness level and step-up staffing plans can be found in “Chapter 10: Preparedness” of the 2013 NIFC Red Book at [http://www.nifc.gov/policies/red\\_book.htm](http://www.nifc.gov/policies/red_book.htm) (NIFC 2013).

**4.1.1.8 NSFDL Preparedness Levels, Preparedness Actions, and Step-Up Plans**

**Preparedness Level 1:**

- NFDRS Staffing Class of 2 or lower
- Little or no commitment of installation fire management resources
- Potential for escaped prescribed fires is low
- Any fires occurring present low to moderate difficulty of control using existing resources

Preparedness Actions:

- Review fire weather daily
- Maintain and stage fire suppression equipment

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Step-Up Plan:

- NSFDL F&EMS may provide resource/personnel to King George County, Charles County, and the Colonial Beach Volunteer Fire Department if requested as part of the respective Mutual Aid Agreements (see Appendix E).

**Preparedness Level 2:**

- NFDRS Staffing Class of 3 or lower
- Wildland fire activity is occurring in the region and a low to moderate potential exists of escapes
- Minimal regional mobilization is occurring

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that qualified fire personnel are available for initial attack

Step-Up Plan:

- Consider increasing or transitioning to 7 day wildland fire personnel staffing
- NSFDL F&EMS may provide resource/personnel to King George County, Charles County, and the Colonial Beach Volunteer Fire Department if requested as part of the respective Mutual Aid Agreements (see Appendix E)

**Preparedness Level 3:**

- NFDRS Staffing Class of 4 or lower
- Wildfire activity requiring significant commitment of regional resources
- Initial attack is generally successful but the installation has an increasing number of ignitions
- Regional wildland fire resources are being mobilized
- Type III Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified fire personnel are available for initial attack
- Wildland fire personnel will be on fire standby at the discretion of NSFDL F&EMS in the event of an escaped prescribed fire or wildfire

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Step-Up Plan:

- Anticipate multiple ignitions
- Provide 7-day wildland fire personnel staffing at the discretion of NSFDL F&EMS in the event of an escaped prescribed fire or wildfire
- Consider limiting resources/personnel support to King George County, Charles County, and the Colonial Beach Volunteer Fire Department.

**Preparedness Level 4:**

- NFDRS Staffing Class of 4 or higher
- Large or multiple wildfires in progress on the installation
- Multiple ignitions are occurring
- Resource shortages exist in the region
- Type II Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified wildland fire personnel are available for initial attack
- Increase fire detection patrols or coordinate with VDOF for wildfire detection
- Wildland fire personnel consisting of 1 strike team leader, 1 tractor crewman, 1 tractor plow strike team, and Type 6 engine will be on duty for extended shifts as determined by the Incident Commander; additional resources may be placed on standby at the discretion of NSFDL F&EMS

Step-Up Plan:

- Anticipate multiple ignitions
- Prepare for a large wildfire by setting up expanded dispatch and support
- Assess the need for additional wildland fire leadership support
- Consider pre-positioning resources in high risk areas

**Preparedness Level 5:**

- NFDRS Staffing Class of 5
- Large or multiple wildfires in progress on the installation
- Significant competition for resources is occurring

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- Type I Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified fire personnel are available for initial attack
- Increase fire detection patrols or coordinate with VDOF for wildfire detection
  - Wildland fire personnel consisting of 1 strike team leader, 1 tractor crewman, 1 tractor plow strike team, and Type 6 engine will be on duty for extended shifts as determined by the Incident Commander; additional resources may be placed on standby at the discretion of NSFDL F&EMS

Step-Up Plan:

- Consider ordering additional wildland fire leadership assistance
- Consider pre-positioning resources in high risk areas

**Preparedness Level 6 and Above:**

- NCDFR Level 6 or above
- Large or multiple wildfires in progress on the installation
- Significant competition for area resources is occurring
- One or more Type I Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified wildland fire personnel are available for initial attack
- Wildland fire personnel consisting of at least 2 strike team leaders, 2 tractor crewmen, 3 tractor plow units, and two Type 6 engines, will be on standby for extended shifts as determined by the Incident Commander

Step-Up Plan:

- Consider ordering additional wildland fire leadership assistance
- Consider pre-positioning resources in high risk areas

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**4.1.1.9 NSFDL Fire Readiness Plan**

Fire readiness planning establishes installation restrictions and preparation commensurate with wildfire danger by establishing forest fire danger ratings. NSFDL will use the following Fire Readiness Plan:

**Fire Readiness Plan 1**—Fire danger is low. Normal safety precautions will be followed.

**Fire Readiness Plan 2**—Occasional fire activity. Normal safety precautions will be followed.

**Fire Readiness Plan 3**—Fire danger is moderate. Installation activities may be curtailed at the discretion of the Commanding Officer, NSASP. Normal safety precautions will be followed.

**Fire Readiness Plan 4**—Fire season. Installation activities may be curtailed at the discretion of the Commanding Officer, NSASP. Open fires will only be allowed in designated places under fire management supervision.

**Fire Readiness Plan 5**—Fire danger is high/severe. Any areas that have a high potential for fire will be fireproofed and supervised. The use of generators will be restricted to areas that have been fireproofed to mineral soil for a 50-foot diameter around each generator.

**Fire Readiness Plan 6**—Fire danger is critical.

**Fire Readiness Plan 7**—Fire danger is extreme.

**Blow-Up Alert**—An alert to units that conditions could quickly elevate from level 4 to level 7 or higher. The use of any significant ignition sources will be prohibited.

**4.1.2 Incident Management**

**4.1.2.1 Preplanned Dispatch**

DoDI 6055.06 (Appendix A) requires installations to follow wildland fire preparedness, preplanned dispatch, and prescribed fire and prevention standards as determined by NFPA 1710. Section 5.7 of NFPA 1710 discusses requirements and recommendations of fire companies that provide wildland fire suppression services. Fire companies must possess all levels of capability including personnel, equipment, and resources to deploy to wildfire suppression operations. Direct attack requirements include the capability to begin initial attack within 10 minutes after arrival of the initial company or crew at the scene, deploy water to the fire, secure threatened structures or development, and provide any other support activities.

NSFDL F&EMS is an all-hazards trained department, and is capable of responding to fire, medical, hazardous materials, and technical rescue emergencies. Standard of Coverage provides for the rapid and safe deployment of minimal resources to mitigate emergency incidents with the effective use of the minimal personnel.

NSFDL F&EMS has developed preplanned response assignments that identify the units to be dispatched based on the type of incident. The response dispatch guidelines are scalable from

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small to large incidents. There are three alarm types for dispatch to wildfires on both the Mainside and on Pumpkin Neck. The call response types are determined based on the risk level or special equipment needs for the incident. The alarm responses are listed in Tables 4-3 and 4-4.

**Table 4-3. Mainside Alarm Response**

Alarm	Equipment	No. Personnel	F&EMS Station
<b>First</b>	Brush Truck 28	2	NSFDL
	Engine 281	2	NSFDL
<b>Second</b>	Engine 281	2	NSFDL
	Truck 28	4	NSFDL
	Brush Truck	2	King George Co.
	Tanker	1	King George Co.
<b>Third</b>	Brush Truck 20	2	NSFDL
	Ambulance	1	King George Co.
	Brush Truck	2	Charles Co.
	Brush Truck	2	Westmoreland Co.
	Engine	3	Charles Co.
	Tanker	1	Westmoreland Co.
	Brush Truck	2	Fort A.P. Hill
Ambulance	1	King George Co.	

**Table 4-4. Pumpkin Neck Alarm Response**

Alarm	Equipment	No. Personnel	F&EMS Station
<b>First</b>	Brush Truck 28	2	NSFDL
	Engine 281	2	NSFDL
<b>Second</b>	Engine 281	2	NSFDL
	Truck 28	4	NSFDL
	Brush Truck	2	Westmoreland Co.
	Tanker	1	Westmoreland Co.
	Brush Truck	2	King George Co.
	Tanker	1	King George Co.
	Brush Truck 20	2	NSF Indian Head
<b>Third</b>	Engine	3	Charles Co.
	Tanker	1	Charles Co.
	Ambulance	1	King George Co.
	Brush Truck	2	King George Co.
	Brush Truck	2	Charles Co.
	Brush Truck	2	Fort A.P. Hill
<b>Third</b>	Engine	3	Charles Co.
	Engine	3	Westmoreland Co.
	Boat 6, if necessary	2	Charles Co.
	Ambulance	1	King George Co.

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#### **4.1.2.2 Incident Reporting**

Situation reports contain current information about fire danger, fire status, and resource availability. Situation reports are submitted as situations change throughout the fire season. Outside the official fire season, situation reports are to be completed when an ignition source is present and fire danger is very high or extreme, or whenever a wildfire of at least 100 acres in timber or 300 acres in grass or brush has occurred. Large wildfires, politically sensitive fires, or fires with fatalities will require daily submission of Incident Status Summary (ICS-209) forms (Appendix F) to the appropriate County Fire Board or online at <http://fam.nwecg.gov/fam-web>.

#### **4.1.2.3 Wildland Fire Decision Support System**

If an incident occurs on NSFDL, the Wildland Fire Decision Support System (WFDSS) must be initiated by the Incident Commander in charge of the wildfire. The system is designed to provide a structure for strategic decision-making for planning stages and ongoing wildfire situations. It allows the user to describe the situation, evaluate the expected effects, establish objectives and constraints for the management of the incident, select an appropriate alternative, and document that decision. The web-based system divides an incident into the following eight subsections: Information, Situation, Objectives, Courses of Action, Validation, Decisions, Periodic Assessment, and Reports. The WFDSS can generate standard and custom reports including the Analysis Report that compiles WFDSS information into a single report. The Analysis Report serves as the formal decision documentation for the incident. Ideally, all wildfires would be entered into the WFDSS early in the planning process with specific elements required by the Red Book. The system is accessible online at [https://wfdss.usgs.gov/wfdss/WFDSS\\_Home.shtml](https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml). More information about WFDSS can be found in Chapter 11 and Appendix N of the Red Book (NIFC 2013).

#### **4.1.2.4 After-action Review**

NFPA 1710 requires that all wildfire suppression operations be organized to ensure compliance with NFPA 1143: Standard for Wildland Fire Management. The 2009 edition of NFPA 1143 includes definitions of wildland fire terminology, discussions of risk assessment and preparedness, and an overview of the structure and responsibilities for incident management, wildfire suppression, and post-incident activities. Designated personnel from all functional areas of fire management should attend an incident review to discuss safety practices and provisions, strategy and tactics, deployment of personnel, equipment and apparatus, support functions, and the overall management of wildfire. At a minimum, NFPA 1143 recommends post-wildfire or prescribed fire escape evaluation of the following:

- Accidents, injuries, or fatalities connected to the incident to determine cause(s) and contributing factors and, where applicable, to recommend corrective actions;



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- Actions used on the incident and confirmation of effective decisions or corrected deficiencies;
- Fire cause(s) and contributing factors; and
- Identification of new or improved procedures, techniques, or tactics used on the incident, or alternatives to be used on future incidents.

#### **4.1.3 Emergency Stabilization**

##### **4.1.3.1 Interagency Burned Area Emergency Response Guidebook**

After a wildfire occurs on NSFDL land, administrators and emergency stabilization specialists may choose to follow post-wildfire procedures outlined in the Interagency Burned Area Emergency Response (BAER) Guidebook (DoI 2006a). This document can be useful in developing emergency stabilization procedures, assessing wildfire damage after an incident, and creating a cost-effective planning mechanism for post-wildfire actions. It outlines data to include in a Burned Area Assessment, the steps to take in forming a BAER planning team, instructions for the creation of a BAER Plan/Report, and Emergency Stabilization Plan implementation procedures to follow after a wildfire incident. The full document is available online at [http://www.fws.gov/fire/ifcc/esr/Policy/es\\_handbook\\_2-7-06.pdf](http://www.fws.gov/fire/ifcc/esr/Policy/es_handbook_2-7-06.pdf).

##### **4.1.3.2 National Fire Plan Operations and Reporting System**

The National Fire Plan Operations and Reporting System (NFPORS) is an inter-departmental, interagency, automated data management and reporting system designed to assist field personnel in managing and reporting accomplishments for work conducted under the National Fire Plan. The NFPORS can produce cost- and time-efficient reports, including the annual National Fire Plan Accomplishments Report which may be used as a major high-level decision making tool by managers to answer detailed National Fire Plan questions in real-time at national, bureau, regional, state, and field-level offices. Users with approved accounts may access planning and accomplishment reports at the NFPORS website: <https://www.nfpors.gov/>.

#### **4.2 BURNED AREA REHABILITATION**

##### **4.2.1 Burned Area Rehabilitation Planning Requirements**

The Interagency Burned Area Rehabilitation (BAR) Guidebook (DoI 2006b) provides direction in planning the recovery of wildfire damaged lands unable to recover naturally within three years of a catastrophic fire event. Most fires that take place on NSFDL lands will not require rehabilitation as fires are generally small and quickly extinguished by the NSFDL F&EMS. BAR will emphasize the monitoring and treatment of invasive, non-native plants to prevent

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establishment and spread during the rehabilitation of native vegetation. Additional vigilance is required to ensure that exotics are not introduced or spread by vehicle and/or equipment.

If NSFDL finds at any time that a BAR plan is needed, a template is available from the Department of the Interior (DoI) at <http://www.fws.gov/fire/ifcc/esr/BARplan.htm> (DoI 2006c). The template provides section headings and tables that include information such as rehabilitation assessment recommended team organization members, and resource advisors. The plan, at a minimum, should include a summary of activities and costs, individual specifications, and a cost-risk analysis.

#### **4.3 MANAGEMENT OF PLANNED FUEL TREATMENTS**

Planned fuel treatments include prescribed fire, mechanical, and chemical methods. Both fire and non-fire fuel reduction actions can be taken to reduce the wildfire hazard of an area. The potential hazard of any given site depends on a number of factors, such as the amount and type of living and dead vegetation on the site, the exposure of the site to wind and other factors involving weather and topography, and the presence of natural barriers to fire spread. Forest management activities primarily impact wildfire hazard by influencing the quantity, structure, and arrangement of fuels.

A variety of non-fire methods, depending on the environment and fuels, can be used to accomplish fuel reduction including: mowing, raking, plowing, shredding, mastication, chipping, and stand harvesting or thinning. Chemical treatments are used to kill or inhibit growth of undesirable vegetation including invasive plants and woody species. Non-fire fuel treatments will be essential at NSFDL in areas where prescribed fire is not feasible, such as potentially explosive areas. In areas on the installation that do not have hazardous constraints, but have heavy fuel loads that may cause high fire intensity or heavy smoke, non-fire treatments can also be an effective tool to use prior to prescribed burning.

Prescribed fire may be used to modify fuels and improve wildlife habitat where constraints to fire are not present. Although there are some risks in using fire to obtain management objectives, those risks are minimized by the implementation of certain safety requirements. In order to reduce the potential for unintended circumstances, extensive planning, coordination, and risk management should be completed prior to the ignition of any prescribed fire. Requirements for effective management of prescribed fire include: measurable objectives, qualified personnel, a quantified range of conditions under which burns will be conducted, a pre-planned course of action to be taken if these conditions are exceeded, a monitoring and documentation process, and a review and approval process.

Prescribed burns are recommended to be scheduled during the late winter. Approximately 30 to 50 acres should be burned per year with no more than 100 acres burned in a given year. Selected forest areas can be burned on a 3-5 year rotation to control woody understory growth and

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encourage herbaceous species (DoN 2007a). Fire effects in timber harvest areas are often improved by leaving logging residue evenly distributed and away from crop trees; implementing cut-to-length harvesting, which leaves residue distributed in the woods rather than at the processing area; thinning; and herbicide management methods. Burning may also be conducted following seed tree cuts in pine stands to assist in regeneration. Selected grassland and successional areas may be burned on a 2-3 year rotation (Wilburn & Munsell 2010).

#### **4.3.1 Management of Prescribed Fire**

Whenever prescribed fire activities are underway, resources must be available to suppress the fire should it escape or weather conditions become undesirable. NSFDL Natural Resources Program or a contracted prescribed fire professional will provide and maintain all necessary suppression equipment for each prescribed fire. NSFDL F&EMS maintains an inventory of suppression resources that can be used as backup, if necessary (see Table 4-2). If installation resources are not adequate to suppress an escaped prescribed fire, additional resources may be obtained through mutual aid agreements (see Section 4.1.1.6). Prescribed fire activities shall be restricted during periods when fire danger is high.

When preparing to utilize prescribed fire at NSFDL, the installation must ensure that the fire will be properly planned and managed by a qualified Prescribed Burn Plan Preparer, an insured Burn Boss, and a crew which meets the qualifications required by PMS 310-1 (see Table 4-1, NWCG 2012). Although NSFDL F&EMS firefighters have been trained to fight basic brush and wildland fires, no NSFDL personnel are currently certified as a Prescribed Burn Plan Preparer or Burn Boss. However, the duties of these positions can be completed by qualified contractors. Prescribed burn plans shall describe all aspects of prescribed burn unit characteristics and provide extensive management guidance. A prescribed burn plan template is provided in Appendix B of the NWCG *Interagency Prescribed Fire Planning and Implementation Procedures Guide* (Appendix G). The prescribed burn plan will be developed in conjunction with an Incident Action Plan, completed by NSFDL F&EMS, to ensure congruency between the documents. Once a prescribed burn plan is completed, the NSFDL Explosive Safety Officer, Command Duty Officer, NSFDL Fire Chief, and a qualified Technical Reviewer will approve the plan for implementation. Prescribed burn plans will be completed and approved at least two weeks prior to the first day on which it will be possible to burn the unit for which it was written.

According to the Interagency Prescribed Fire Planning and Procedures Guide (NWCG 2008), the Technical Reviewer should be qualified as a Burn Boss at or above the level of project complexity. Different qualification levels are necessary of Burn Bosses for prescribed fires of differing complexity levels (Table 4-5). A Prescribed Fire Plan Preparer that is also qualified to be a Technical Reviewer cannot review his own plan, but State Department of Forestry Fire

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**Table 4-5. Personnel Positions Required for the Implementation of High, Moderate-Low, and Low Complexity Prescribed Fires\***

Position	High	Moderate-Low	Low
Prescribed Fire Manager Type 1 (RXM1)	Optional	Optional	Optional
Prescribed Fire Manager Type 2 (RXM2)	Not Allowed	Optional	Optional
Prescribed Fire Burn Boss Type 1 (RXB1)	Required	Optional	Optional
Prescribed Fire Burn Boss Type 2 (RXB2)	Not Allowed	Required	Optional
Prescribed Fire Burn Boss Type 3 (RXB3)	Not Allowed	Not Allowed	Required
Firing Boss, Single Resource (FIRB)	Optional	Optional	Optional
<b>Holding Specialist:</b> Holding functions will be managed by personnel qualified at the appropriate ICS wildland fire operations position as required by complexity, assigned resources and operational span of control. For some projects, there may be no holding requirements or the holding duties are assumed by the Burn Boss.			

\*Table from the Interagency Prescribed Fire Planning and Procedures Guide (NWCG 2008)

Managers will often provide Technical Reviewer services. All crew participating in prescribed burning must be qualified at the same levels maintained by wildfire fighting crews and use the same personal protective equipment required by DoDI 6055.06.

To protect the installation from liability in the event of a fire escape, NSFDL must hire a Burn Boss with proper insurance that covers all affected parties. If an insured Burn Boss is not available, NSFDL may find another federal agency or installation willing to provide a Burn Boss if a written agreement is signed by the Commanding Officer, NSASP, to waive liability for any damage or accidents that may occur during the burn.

**4.3.1.1 Burning Permit**

The VDOF regulates open air burning throughout Virginia and has produced a *Guide to Prescribed Fire in Virginia* (VDOF 2009) that includes voluntary smoke management guidelines, applicable laws, exemption applications, and a sample burn plan. Chapter 9 of the document describes all State prescribed burning laws that NSFDL should follow before implementing a burn (Appendix H-1). To comply with these laws, certified Burn Bosses must apply for an exemption to the VDOF-enforced 4 p.m. Burning Law to conduct burns earlier than 4 p.m. between February 15th and April 30th each year. This ban restricts burning before 4 p.m. if the burn is planned to occur within 300 feet of woodlands, brushlands or fields containing dry grass or other flammable material (VDOF 2013b). The Burn Boss must submit an application to

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the State Forester for approval prior to February 1 (Appendix H-2). The State Forester may revoke approval for the exemption if hazardous fire conditions exist on the day of the burn.

The Commonwealth of Virginia Department of Environmental Quality (VDEQ) enforces regulations for the control and abatement of air pollution. State Air Pollution Control Board general provisions for open burning are contained in 9 Virginia Code (VAC) 5 Chapter 130, Regulation for Open Burning (9VAC5-130-10 et seq.). Regulations 9 VAC5-130-40 and 9VAC5-130-50 allow open burning for specific approved forest management and agriculture practices with provisions. The forest management practices that may use open burning include: fuels reduction; undesirable hardwood species control; disease control in pine seedlings; planting or seeding preparation; habitat enhancement for certain species; and the removal of dead vegetation for the maintenance of railroad, highway, and public utility right-of-way.

Upon request, the State Air Pollution Control Board may approve controlled open burning for special circumstances for the elimination of a hazard that constitutes a threat to the public health, safety or welfare and that cannot be remedied by other means. Such uses of open burning may include, but are not limited to, the following: destruction of deteriorated or unused explosives and munitions on government property where other options are not available (may require a hazardous waste permit); destruction of debris caused by floods, tornadoes, hurricanes or other natural disasters, where alternatives are not practical or economical; and pest or disease management for animal or plant life infestations.

#### **4.3.1.2 Coordination and Notifications**

Notification and coordination are essential parts of prescribed fire planning. Each prescribed burn plan incorporates required internal and external notifications that must be completed prior to ignition and upon completion of the burn. This includes identifying and listing those involved in the fuels management process and the general public (e.g., news releases, radio spots, outreach pamphlets).

Prior to the beginning of the burn season, prescribed burn units should be selected and burn plans must be completed and signed. Firebreaks should be cleared of debris and overhanging branches or vegetation. Firelines may be cut where necessary. Range Control and Explosive Ordnance Disposal personnel must be notified prior to the burn if a UXO sweep is necessary to comply with the CWAP ESR memo.

On the day of the burn, the Burn Boss must inspect the burn site and review burn conditions with the NSFDL Fire Chief. Notifications will, at a minimum, include the NSFDL Natural Resources Program, F&EMS, Command Duty Officer, NSFDL Police, the Air Program Manager, the Northern Virginia VDEQ Air Compliance Manager, the VDOF regional office, King George County Fire and Rescue, Charles County Board of County Commissioners, Colonial Beach Volunteer Fire Department, NSF Indian Head and Fort A.P. Hill F&EMS, Cultural Resources

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Program Manager, and the local NWS office. Internal and external notifications and media releases may be completed prior to and immediately after the prescribed burns. The Burn Boss will notify the NSFDL F&EMS for assistance if the prescribed fire escapes and is declared a wildfire. The Burn Boss will then notify the VDOF and other resources listed in the mutual aid agreements (see Appendix E) for assistance, if needed.

#### **4.3.1.3 Smoke Management**

The Smoke Management Guide for Prescribed and Wildland Fire (NWCG 2001b) and the voluntary smoke management guidelines for Virginia (VDOF 2009) provide guidance for preventing unwanted smoke effects. Smoke management incorporates three basic strategies: avoidance, reduction, and dispersion. Avoidance requires identifying and mapping smoke sensitive areas (SSA) that may be impacted and burning under conditions that will take smoke away from these areas. SSA include hospitals, airports, schools, highways, recreation areas, non-attainment areas, populated areas, federal wilderness areas, and other special cases. Prescribed burning under favorable weather conditions, with a variety of firing techniques, will help reduce and disperse smoke in SSA, preventing smoke health and safety hazards.

Where smoke may impact SSA, the following precautions will help to minimize emissions or reduce negative impacts:

- Have defensible objectives. Be sure to have clear resource objectives, and consider the impact on the total environment, both on and off-site.
- Obtain and use weather forecasts.
- Do not burn during air quality advisories or temperature inversions.
- Burn when conditions are good for rapid dispersion (e.g., mixing height greater than 1,700 feet above ground level and transport speed greater than 9 miles per hour). The atmosphere should be such that smoke will rise and dissipate.
- Determine the direction and volume of smoke, especially near highways and populated areas.
- Notify state suppression agency, nearby residents, and adjacent landowners to inform them that it is not a wildfire and provide advance notice of any adverse public reactions.
- Use test fires to confirm fire and smoke behavior. Set the test fire in the area proposed for burning, away from roads and other “edge” effects. All pre-ignition approval steps in Element 2: Prescribed Fire Go/No-Go Checklist of the prescribed burn plan must be met before the test fire may be ignited (Appendix G).
- Use backing fires where possible. Assuming resource management objectives can be met, backing fires give more complete consumption of fuel and produce less smoke. Although they are slower, fewer pollutants are released into the air and visibility is less affected.

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- Burn in small blocks. Larger burn areas cause reduced visibility and a higher concentration of particulates in the air downwind; however, in some circumstances, waiting to burn a larger area under better smoke dispersal conditions may be preferable.
- Mop-up along roads. Burn out and start mop-up along roads as soon as possible to reduce impact on visibility.
- Avoid nighttime burning. Predicting smoke drift and visibility is more difficult at night. The wind may lessen or die out completely and smoke will tend to stay near the ground. Burning at night presents greater injury risk due to poor lighting, as well.
- Have emergency plans that specify contingencies and trigger points. Be prepared to control traffic on nearby roads if the wind direction changes. Be prepared to stop a prescribed fire if it is not burning according to plan or if weather conditions change.
- Burn when duff and soil moistures are high to prevent smoldering ground fires.
- Remove or treat snag trees and stumps with foam in advance of fire to prevent smoldering after burning. Be prepared to mop-up if necessary.
- Anticipate down-drainage smoke flow, particularly at night.

Prescribed burn plans developed for NSFDL will include a smoke management plan. The smoke management plans and activities will be coordinated with NSFDL Air Operations personnel, and comply with regulations in place at the time of the burn. In the interest of health and safety, acceptable wind directions will be included in burn prescriptions to avoid potentially hazardous areas and SSA. In a case where downwind smoke may impact SSA, the Burn Boss should coordinate with affected activities and programs to determine whether or not the burn will be conducted.

Smoke from prescribed fire is of a short duration, usually lasting only 1 day, but occasionally as much as 3 days. Wildfires typically last longer, causing more air pollution by burning more acreage at higher fire intensities than a prescribed fire typically does. Just as dangerous fire effects are more easily controlled during prescribed burns than during wildfires, smoke from a prescribed fire will likely produce fewer negative effects than wildfire smoke.

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## **5.0 FIRE EFFECTS MONITORING**

Fire effects monitoring is a process that can be used to capture the ecological effects that result from fire management. Monitoring these changes provides feedback to ensure that the actions proposed in this WFMP meet the goals of NSFDL and are in compliance with all applicable regulations and policies.

Fire effects monitoring applies to all aspects of the wildland fire management program that involve changes on the ground. The goals of fire effects monitoring are:

- To determine the natural variability of wildfires on NSFDL; including occurrence, extent, and severity;
- To better understand fire and treatment effects in different vegetation and fuel types and on cultural resources in order to develop predictive capabilities for modeling fire distribution, spread, and behavior;
- To refine vegetation and fuels maps across the installation; and
- To monitor the effectiveness of treatments to ensure they are meeting project objectives.

### **5.1 FIRE MONITORING LEVELS**

Through applied research and careful application of prescribed fire, data collected can provide managers with a better understanding of the natural ecological effects and the information needed to refine treatment types to meet resource objectives. These data, along with information gathered through research studies, will be used to improve the effectiveness of the wildland fire management program. Fire monitoring levels described in the NPS Fire Monitoring Handbook (DoI-NPS 2003), from least complex to the most elaborate, are as follows:

- Level 1: Environmental Monitoring – collect historical fuels data, weather, Fire Danger Rating, fuel conditions, resource availability, and other baseline data about particular sites that will be burned.
- Level 2: Fire Observation Monitoring – collect data during all fires and include information about ambient conditions, and fire and smoke characteristics. When combined with environmental monitoring data, these data can be used to predict fire behavior.
- Level 3: Short-term Change – changes in vegetative characteristics, affected cultural resources, and fuels should be captured in data collection efforts on permanent monitoring plots. Data can be used to quantitatively measure successfulness of objectives implementation by collecting data pre-burn, during the burn, and post-burn for up to 2 years post-burn.

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- Level 4: Long-term Change – the same data is collected in Level 4 monitoring as in Level 3, but for a longer period of time. If data are collected on a 5- to 10-year interval, trends may be identified.

**5.2 FIRE EFFECTS MONITORING OF LISTED SPECIES**

Prescribed burn units should be monitored pre- and post-burn for wildlife usage, vegetative regeneration, open bare ground coverage, post-burn weather factors, and understory shrub removal percentage. Burn units may also be monitored randomly for usage by RT&E species. When wildlife species are recorded during pre- and post-burn monitoring, at a minimum, attempts should be made to observe and record changes in presence, absence, abundances, habitat, food supply, injury, or mortality of all applicable listed species.

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**6.0 GLOSSARY**

Definitions of technical terms used in this document are available in the online NWCG glossary (PMS-205) at <http://www.nwcg.gov/pms/pubs/glossary/information.htm> (NWCG 2013a).

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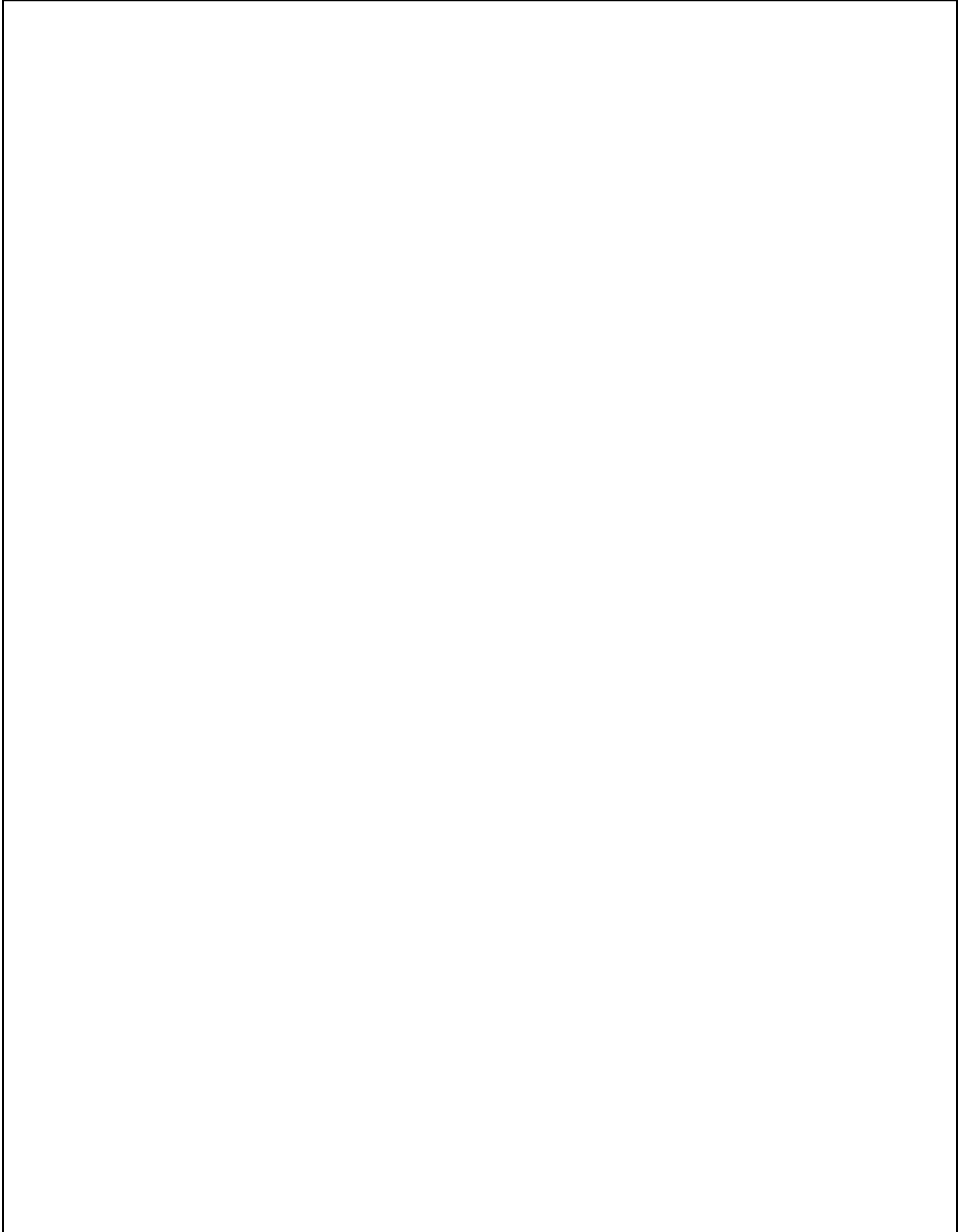
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Appendix A  
Department of Defense Instruction (DoDI) 6055.06





## Department of Defense INSTRUCTION

**NUMBER** 6055.06  
December 21, 2006

USD(AT&L)

SUBJECT: DoD Fire and Emergency Services (F&ES) Program

- References:
- (a) DoD Instruction 6055.6, "DoD Fire and Emergency Services Program," October 10, 2000 (hereby canceled)
  - (b) DoD 6055.06-M, "DoD Fire and Emergency Services Certification Program," February 23, 2006
  - (c) DoD Directive 3025.1, "Military Support to Civil Authorities (MSCA)," January 15, 1993
  - (d) DoD Directive 2000.12, "DoD Antiterrorism (AT) Program," August 18, 2003
  - (e) through (as), see Enclosure 1

### 1. PURPOSE

This Instruction:

- 1.1. Reissues Reference (a) to update policy and criteria for the allocation, assignment, operation, and administration of the DoD F&ES Program.
- 1.2. Establishes a DoD Fire and Emergency Services Working Group (F&ESWG).
- 1.3. Authorizes other publications such as guides, handbooks, and manuals to provide specific information on the DoD F&ES Program, including but not limited to:
  - 1.3.1. Reference (b).
  - 1.3.2. DoD Emergency Medical Services (EMS) Program.
  - 1.3.3. DoD F&ES Fitness and Wellness Program.
  - 1.3.4. Fire Fighter Chemical, Biological, Radiological, Nuclear, or High-Yield Explosive (CBRNE) and Weapons of Mass Destruction (WMD).
  - 1.3.5. DoD F&ES Standards of Response Coverage.
  - 1.3.6. DoD Wildland Fire Management Program.

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## 2. APPLICABILITY

This Instruction applies to:

2.1. The Office of the Secretary of Defense (OSD), the Military Departments, Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components"). The term "Military Services," as used herein, refers to the Army, the Navy, the Air Force, and the Marine Corps.

2.2. DoD operations, activities, and installations worldwide, including Government-owned, contractor-operated facilities and non-DoD activities operating on DoD installations.

## 3. DEFINITIONS

Terms used in this Instruction are defined in Enclosure 2.

## 4. POLICY

It is DoD policy to:

4.1. Establish and maintain a comprehensive F&ES Program as an element of the overall DoD Environmental, Safety, and Occupational Health Program.

4.2. Protect DoD personnel and the public from risk of death, injury, illness, or property damage as a result of DoD activities.

4.3. Prevent and minimize loss of DoD lives and damage to property and the environment occurring in periods of peace, war, homeland security/defense, military operations other than war, and humanitarian operations.

4.4. When called upon and approved by appropriate authority, make DoD F&ES capabilities available to assist civil authorities under mutual aid agreements, host nation support agreements, and Defense Support of Civil Authorities (DSCA).

4.5. Enhance DoD mission capability by protecting the U.S. homeland and critical bases of operation through preventive risk management, education, emergency response, and risk communication.

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5. RESPONSIBILITIES

5.1. The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) shall:

5.1.1. Oversee implementation of this Instruction.

5.1.2. Represent the Secretary of Defense on both internal and interagency matters on the F&ES Program.

5.1.3. Establish the F&ESWG, comprised of members from OSD, the Military Services, and the Defense Logistics Agency (DLA) to provide technical advice on F&ES matters.

5.1.4. Provide criteria, guidance, and instructions to incorporate fire suppression, fire prevention, and emergency service elements in appropriate DoD program and budget documents.

5.2. The Deputy Under Secretary of Defense (Installations and Environment) (DUSD(I&E), under the USD(AT&L), shall:

5.2.1. Prepare DoD publications as needed to provide specific policy and standards for the DoD F&ES Program.

5.2.2. Advocate for resources and support planning, programming, and budgeting processes for the F&ES Program.

5.2.3. Advise USD(AT&L) on appropriate DoD-wide goals, objectives, and performance measures for F&ES performance.

5.2.4. Conduct a formal management review at least annually and, as a minimum, include an assessment of the DoD Component programs and F&ESWG activities.

5.2.5. Provide an information copy of the management review to the Under Secretary of Defense for Policy (USD(P)) through the Assistant Secretary of Defense for Homeland Defense (ASD(HD)) and the Assistant Secretary of Defense for International Security Policy (ASD(ISP)).

5.2.6. Participate with the ASD(HD), ASD(ISP), Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs, and Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict to represent F&ES aspects related to installation protection and emergency response issues.

5.2.7. Request focused program evaluations of aspects of the F&ES Program from the DoD Inspector General as needed.

5.2.8. Issue guidance to the DoD Components on the annual DoD F&ES Awards Program.

5.2.9. Appoint an OSD representative to the F&ESWG.

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5.3. The Under Secretary of Defense (Personnel and Readiness), through the Assistant Secretary of Defense for Health Affairs (ASD(HA)), shall:

5.3.1. Serve as the principal advocate for EMS programs within the Department of Defense.

5.3.2. Promote language in the Defense Planning Guidance and the Defense Health Program (DHP) Medical Planning Guidance in consultation with DUSD(I&E) to ensure sufficient resources are allocated in the DoD Components' budgets to carry out the provisions of this Instruction.

5.3.3. Review the DoD Components' planning, programming, budgeting, and execution of the EMS programs within available fiscal guidance and overall DHP priorities to comply with subparagraph 5.3.2., above.

5.3.4. Provide technical and medical expertise to DUSD(I&E) for EMS.

5.3.5. Advise each Military Department to appoint a medical EMS consultant who should directly advise the Military Department consultant to the F&ESWG on all relevant medical issues.

5.4. Under the USD(P):

5.4.1. The ASD(HD), as the focal point for DSCA, shall:

5.4.1.1. Consult with DUSD(I&E) on matters involving F&ES aspects such as first response.

5.4.1.2. Provide advice to DUSD(I&E) on DSCA policy as it relates F&ES.

5.4.1.3. Consult with DUSD(I&E) on developing F&ES requirements for installation preparedness such as CBRNE/WMD response and assistance to civil authorities during contingencies.

5.4.2. The ASD(ISP), as the focal point for CBRNE foreign consequence management (FCM), shall:

5.4.2.1. Consult with DUSD(I&E) on matters involving F&ES FCM aspects in CONUS environments.

5.4.2.2. Provide advice to DUSD(I&E) on FCM activities related to F&ES for the Secretary of Defense.

5.4.2.3. Consult with DUSD(I&E) on developing F&ES requirements for outside the Continental United States (OCONUS) installation preparedness such as CBRNE/WMD response and assistance to host nation civil authorities during contingencies.



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5.5. The Heads of the DoD Components maintaining organized F&ES programs shall:

5.5.1. Establish and maintain programs that conform to the requirements and procedures in this Instruction.

5.5.2. Plan, program, and budget for F&ES requirements, and execute F&ES programs.

5.5.3. Emphasize prevention as a means to enhance the total F&ES effort and other fire prevention techniques to eliminate the causes of fires and to prevent death, injuries, and property damage if fire occurs.

5.5.4. Provide management support, resources, and professionally qualified F&ES staff sufficient to ensure effective implementation of F&ES programs at all organizational levels.

5.5.5. Annually review the deviations from this Instruction ensuring that the risk of deviation is accepted at the proper management level.

5.5.6. Annually provide DUSD(I&E) a summary of deviations from policy.

5.5.7. Assess F&ES programs for compliance with requirements and effectiveness of execution.

5.5.8. Participate in management reviews conducted by DUSD(I&E).

5.5.9. Recognize and encourage F&ES excellence through participation in the annual DoD F&ES Awards Program.

5.5.10. Appoint representatives to the F&ESWG, including a medical consultant for EMS.

5.5.11. Implement procedures to report F&ES activities using the National Fire Incident Reporting System (NFIRS).

5.5.12. Encourage all DoD Component fire departments to achieve and maintain the Commission on Fire Accreditation International (CFAI) accreditation.

5.5.13. Implement the procedures in paragraph 6 to organize, train, and equip F&ES for each installation, site, or operation.

5.5.14. Implement procedures to ensure that an installation commander may provide aid to the local community under immediate response authorities (to save lives, prevent human suffering, and mitigate great property damage), defined in DoD Directive 3025.1 (Reference (c)).

5.5.15. Implement procedures to report all requests from the National Interagency Fire Center (NIFC), National Incident Coordination Center, and subordinate Geographic Area Coordination Centers for certified DoD civilian fire fighters to support Type I Incident Management Teams to the appropriate supported Combatant Commander.

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5.5.16. Implement procedures to sustain and recapitalize F&ES apparatus.

5.5.17. Establish and maintain emergency plans for the F&ES response to natural and man-made disasters, including acts of terrorism per the requirements of DoD Directive 2000.12 (Reference (d)), and ensure that operational procedures are developed for sustained emergency operations.

5.6. The Secretary of the Navy shall:

5.6.1. Administer and maintain the NFIRS for the DoD Components, including summarization and analysis of F&ES response data.

5.6.2. Administer and maintain the CFAI Self-Assessment and Accreditation Program for all the DoD Components.

5.6.3. Provide CFAI self-assessment, peer assessment, and peer assessor team leader training for all the DoD Components. Any DoD Component deviating from the requirements for CFAI accreditation shall provide for its own training.

5.7. The Secretary of the Air Force shall:

5.7.1. Administer and maintain the DoD Fire and Emergency Services Certification Program (F&ESCP) for all DoD Components.

5.7.2. Establish and maintain the DoD Fire Academy and provide technical training to DoD fire fighters.

5.7.3. Administer and maintain the DoD F&ES Fitness and Wellness Program for all the DoD Components.

5.8. The Combatant Commanders, through Chairman of the Joint Chiefs of Staff, shall use the procedures in paragraph 6 and operational risk management (ORM) in operational planning and execution to ensure F&ES protection of personnel, equipment, and facilities.

5.9. The DoD F&ESWG shall:

5.9.1. Consist of representatives from each of the Military Services, DLA, the DoD Fire Academy, and OSD. OSD will be represented by DUSD(I&E) and membership will be augmented as necessary based on current issues at hand to include but not limited to ASD(HD), ASD(HA), and ASD(ISP).

5.9.2. Recommend new and revised strategic planning guidance for all aspects of F&ES.

5.9.3. Establish guidelines to govern operation of the working group.

5.9.4. Establish procedures to rotate the working group chair annually among the DoD Components.

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5.9.5. Meet at the call of the chair to share information, discuss items of mutual interest, and recommend policies and priorities to OSD related to all aspects of F&ES.

5.9.6. Recommend new and revised DoD policy for all aspects of F&ES.

5.9.7. Provide technical review of F&ES issues at the request of OSD.

5.9.8. Provide an annual report to DUSD(I&E).

5.9.9. Recommend guidance on the DoD F&ES Awards Program.

## 6. PROCEDURES

6.1. Standards. Comply with the relevant standards promulgated by the Department of Labor-Occupational Safety and Health Administration, National Fire Protection Association (NFPA) National Fire Codes (Reference (e)), Unified Facilities Criteria (UFC) 3-600-01 (Reference (f)), and other fire safety criteria published by the Department of Defense.

### 6.2. Fire Department Organizational Statement

6.2.1. Develop and maintain a written statement or policy that establishes the F&ES organization, the scope of services, and the level of service objectives described in Enclosure 3.

6.2.2. Specifically determine, document, and provide the response capability required for CBRNE and other hazardous material (HAZMAT) incidents at each installation based on mission needs, installation protection considerations, and defense priorities using requirements in Enclosure 4.

6.3. Staffing Requirements. Determine, document, and provide staffing required to meet the level of service objectives using the tools and guidance in Enclosure 5.

6.4. Apparatus Requirements. Determine, document, and provide apparatus, including backup apparatus, needed to meet the level of service objectives established in paragraph 6.2 and using requirements in Enclosure 6.

6.5. Fire Prevention. Implement fire prevention programs consisting of the minimum elements described in Enclosure 7.

6.6. Telecommunication Capability. Implement around-the-clock capability to conduct dedicated F&ES communications using the requirements in Enclosure 8.

6.7. Fitness and Wellness. Implement an F&ES Fitness and Wellness Program based on the current DoD requirements and guidance from NFPA 1500, 1582, and 1583 (References (g), (h), and (i)), and the International Association of Fire Chiefs/International Association of Fire Fighters Wellness Initiative (Reference (j)).

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6.8. Immediately Dangerous to Life or Health (IDLH). Implement procedures to plan for and respond to emergencies to IDLH atmospheres using established standards, local conditions' risk considerations, and the requirements of Part 1910.134 of 29 CFR (Reference (k)), including the two-in/two-out provisions for interior structure and aircraft fires.

6.9. Safety and Occupational Health. Continuously improve fire fighter safety and health using established standards and the following:

6.9.1. Monitor fire fighter injury and illness trends, analyze data to focus prevention efforts, and implement mishap prevention initiatives.

6.9.2. Analyze work processes to identify fire fighter injury and illness risk. Using ORM, implement initiatives to reduce risk by the greatest extent possible thereby preventing illness and injury.

6.9.3. Implement health promotion, disease and injury prevention, and population health programs, as required by DoD Directive 1010.10 (Reference (l)), with special emphasis on smoking cessation.

6.9.4. Implement medical surveillance programs according to DoD 6055.5-M (Reference (m)).

6.10. Training and Equipment. Ensure fire departments are prepared, by virtue of appropriate training and equipment, to respond (both on and off the installation) to emergencies involving facilities, structures, aircraft, transportation equipment, HAZMAT, and both natural and man-made disasters (including acts of terrorism).

6.11. F&ESCP. Implement and monitor the F&ESCP as described in Reference (b).

6.12. Fire Department Uniforms. Establish and implement policies stating that workstation uniforms worn by F&ES personnel will conform to NFPA 1975 (Reference (n)).

6.13. Personal Protective Clothing and Protective Equipment (PPC&PE). Establish and implement policies that ensure:

6.13.1. Use of PPC&PE for F&ES personnel during emergency operations is designed for the purpose for which they are used, and is certified to meet the appropriate NFPA standard.

6.13.2. Use of commercial off-the-shelf PPC&PE, when available.

6.13.3. Issuance of PPC&PE to all DoD F&ES personnel is commensurate with their assigned tasks. Do not assign DoD F&ES to emergency response duties until they are provided with and properly trained to use a complete set of PPC&PE.

6.13.4. Serviceability of F&ES personnel PPC&PE.

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6.14. Fire Incident and Emergency Services Investigation and Reporting

6.14.1. Complete NFIRS reports for all F&ES incidents (emergency or non-emergency) where the fire department responds.

6.14.1.1. All NFIRS reporting modules are mandatory for use by DoD fire departments and shall be completed in accordance with the current version of the NFIRS Complete Reference Guide (available at [http://www.nfirs.fema.gov/download/nfirs50crg2006\\_0328.pdf](http://www.nfirs.fema.gov/download/nfirs50crg2006_0328.pdf) (Reference (o))).

6.14.1.2. DoD is recognized within NFIRS by the state designation "DD."

6.14.1.3. Contact the DoD NFIRS Program Manager at the Naval Safety Center, 375 A Street, Norfolk, VA 23511-4399 or at <http://www.safetycenter.navy.mil> for technical assistance.

6.14.2. Investigate all fire losses to real property, wildland areas, and personal property (excluding military aircraft flight-related operations and Navy ships underway) to determine point of origin and fire cause before initiating other safety or legal investigations.

6.14.3. Provide point of origin and fire cause determination for subsequent safety or legal investigations.

6.14.4. Provide an independent fire investigation and report for fire losses meeting the Class A accident threshold defined by DoD Instruction 6055.7 (Reference (p)).

6.15. Program Evaluation and Improvement

6.15.1. Implement procedures to evaluate and improve all aspects of the F&ES Program at all management levels.

6.15.2. Implement procedures to compile DoD Component F&ES Program status in an annual management review to the DUSD(I&E) that addresses, at a minimum, the following categories as described in the CFAI F&ES Self-Assessment Manual (Reference (q)):

6.15.2.1. Governance and Administration

6.15.2.2. Assessment and Planning

6.15.2.3. Goals and Objectives

6.15.2.4. Financial Resources

6.15.2.5. Programs

6.15.2.6. Physical Resources

6.15.2.7. Human Resources

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6.15.2.8. Training and Competency

6.15.2.9. Essential Resources

6.15.2.10. External Systems Relations

6.15.3. Implement procedures for self-assessment of F&ES using Reference (q) or equivalent program.

6.15.4. Implement procedures to validate F&ES self-evaluation and improvement through achieving CFAI certification (preferred) or equivalent program that at a minimum contains an evaluation performed by external F&ES personnel and addresses the categories in paragraph 6.15.2.

6.15.5. Update annually all program evaluation and improvement procedures.

6.16. Deviation from Minimum Requirements. Deviation from minimum requirements increases risk. Conscious, informed decisions must be made to accept the risk posed by the deviation at an appropriate leadership level. Use the following to develop DoD Component-specific risk management procedures to address deviations from requirements in this Instruction.

6.16.1. Short-Term Deviations. Short-term deviations from requirements are those caused by immediate circumstances resulting in reduced capability for less than 90 days. Short-term deviations should be addressed internal to the installation through normal management options.

6.16.2. Temporary Deviations. Temporary deviations are those deviations from minimum requirements that result in capability loss for more than 90 days but less than 1 year. Temporary deviations shall be documented in a "get-well" plan that at a minimum contains the following. The get-well period in the plan shall not exceed 3 years.

6.16.2.1. An assessment of the risk caused by the deviation.

6.16.2.2. A description of measures to minimize increased risk caused by the deviation.

6.16.2.3. Detailed steps and timelines planned to meet the requirements.

6.16.2.4. Communication strategy for informing those affected by the deviation (e.g., housing residents, building occupants) that a deviation has occurred and the plan to remedy that deviation.

6.16.2.5. Strategy to update the installation commander regularly of the increased risk and the status of the get-well plan to meet the requirements.

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6.16.2.6. Formal approval of the installation commander acknowledging acceptance of increased risk, commitment to carry out provisions in the plan, and the expiration date of the approval.

6.16.2.7. Formal review by the management level with line authority at least one level higher than the installation commander (e.g., Major Command). The reviewer shall be in the direct chain of command of the approver.

6.16.3. Long-Term Deviations. Long-term deviations are not expected to be remedied. Essentially long-term deviations waive the requirements of this Instruction. Document long-term deviations from minimum requirements in a document that contains:

6.16.3.1. An assessment of the risk caused by the deviation.

6.16.3.2. A description of measures to address the increased risk caused by the deviation.

6.16.3.3. A communication strategy for informing those affected (e.g., housing residents, building occupants) that a deviation has occurred and the measures being taken to minimize the risk of the deviation.

6.16.3.4. Approval by the applicable DoD component head. The approval shall contain clear statements that the approver has accepted the increased risk caused by the deviation and that the approval is not valid for more than 3 years. If the approval authority changes, deviation shall be briefed to the new approval authority. Expiring approval may be reviewed provided all steps in the approval process are reaccomplished or revalidated.

6.16.4. All Temporary and Long-Term Deviations. Copies of all temporary and long-term deviations from standards shall be forwarded to the DUSD(I&E).

## 7. INFORMATION REQUIREMENTS

The NFIRS has been assigned Report Control Symbol DD-AT&L(AR)1765 in accordance with DoD 8910.1-M (Reference (r)).

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8. EFFECTIVE DATE

This Instruction is effective immediately.



Kenneth Krieg  
Under Secretary of Defense for  
Acquisition, Technology and Logistics

Enclosures – 9

- E1. References, continued
- E2. Definitions
- E3. F&ES Standards of Response Coverage
- E4. HAZMAT/CBRNE Response Capability
- E5. Staffing Requirements
- E6. Apparatus Requirements
- E7. Fire Prevention
- E8. Telecommunication
- E9. Sample Worksheet for Fire Department Staffing



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E1. ENCLOSURE 1

REFERENCES, continued

- (e) National Fire Protection Association (NFPA), "National Fire Codes," 2006<sup>1</sup>
- (f) Unified Facility Criteria (UFC) 3-600-01, "Design: Fire Protection Engineering for Facilities," April 17, 2003<sup>2</sup>
- (g) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, latest edition adopted<sup>1</sup>
- (h) NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments, latest edition adopted<sup>1</sup>
- (i) NFPA 1583, Standard on Health-Related Fitness Programs for Fire Fighters, latest edition adopted<sup>1</sup>
- (j) International Association of Fire Chiefs Guide to Implementing the IAFC/IAFF Fire Service Joint Labor Management Wellness/Fitness Initiative, current edition<sup>3</sup>
- (k) Title 29, Code of Federal Regulations, Part 1910.134, "Respiratory protection," current edition
- (l) DoD Directive 1010.10, "Health Promotion and Disease/Injury Prevention," August 22, 2003
- (m) DoD 6055.5-M, "Occupational Medical Surveillance Manual," May 4, 1998
- (n) NFPA 1975, "Standard on Station/Work Uniforms for Fire and Emergency Services," latest edition adopted<sup>1</sup>
- (o) Federal Emergency Management Agency, United States Fire Administration, National Fire Incident Reporting System, Version 5.0, July 25, 2002<sup>4</sup>
- (p) DoD Instruction 6055.7, "Accident Investigation, Reporting, and Record Keeping," October 3, 2000
- (q) Commission on Fire Accreditation International, "Fire & Emergency Services Self-Assessment Manual," latest edition adopted<sup>5</sup>
- (r) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
- (s) Title 29, Code of Federal Regulations, Part 1910.156, "Fire brigades," current edition
- (t) NFPA 600, "Standard on Industrial Fire Brigades," latest edition adopted<sup>1</sup>
- (u) NFPA 403, "Standard for Aircraft Rescue and Fire-Fighting Services at Airports," latest edition adopted<sup>1</sup>
- (v) Title 29, Code of Federal Regulations, Part 1910.146, "Permit-required confined spaces," current edition
- (w) Federal Wildland Fire Management Policy, January 2001<sup>6</sup>

<sup>1</sup> Available at <http://www.nfpa.org>

<sup>2</sup> Available at [http://www.wbdg.org/references/pa\\_dod.php](http://www.wbdg.org/references/pa_dod.php)

<sup>3</sup> Available at [http://www.iafc.org/associations/4685/files/wellness\\_fitness\\_smfd.pdf](http://www.iafc.org/associations/4685/files/wellness_fitness_smfd.pdf)

<sup>4</sup> Available at <http://csfm.fire.ca.gov/pdf/cfirs/NFIRSquickreferenceguide072502.pdf>

<sup>5</sup> Available at <http://www.cfainet.org/home/index.asp>

<sup>6</sup> Available at [http://www.nifc.gov/fire\\_policy/history/index.htm](http://www.nifc.gov/fire_policy/history/index.htm)

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- (x) NFPA Standard 1710, "Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments," latest edition adopted<sup>1</sup>
- (y) National Wildfire Coordinating Group, PMS 310-1, "Wildland Fire Qualification System Guide," April 2006<sup>7</sup>
- (z) NFPA Standard 1051, "Standard for Wildland Fire Fighter Professional Qualifications," latest edition adopted<sup>1</sup>
- (aa) NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, latest edition adopted<sup>1</sup>
- (ab) US Department of Homeland Security, "National Incident Management System," March 1, 2004<sup>8</sup>
- (ac) DoD Instruction 2000.18, "DoD Installation Chemical, Biological, Radiological, Nuclear and High-Yield Explosive Emergency Response Guidelines," December 4, 2002
- (ad) DoD Instruction 2000.21, "Foreign Consequence Management (FCM)," March 10, 2006
- (ae) Title 29, Code of Federal Regulations, Part 1910.120(q), "Emergency response to hazardous substances releases," current edition
- (af) Section 2465 of title 10, United States Code, "Prohibition on contracts for performance of fire fighting or security-guard functions," current edition
- (ag) "Defense Base Closure and Realignment Act of 1990," as amended (Public Law 101-510)<sup>9</sup>
- (ah) DoD Instruction 4100.33, "Commercial Activities Program Procedures," September 9, 1985
- (ai) Sections 5121-5206 of title 42, United States Code, "Robert T. Stafford Disaster Relief and Emergency Assistance Act," current edition
- (aj) Section 2210 of title 15, United States Code, "Reimbursement for costs of fire fighting on Federal property," current edition<sup>10</sup>
- (ak) Section 1856b of title 42, United States Code, "Emergency assistance," current edition
- (al) NFPA 1901, "Standard for Automotive Fire Apparatus," latest edition adopted<sup>1</sup>
- (am) NFPA 414, "Standard for Aircraft Rescue and Fire-Fighting Vehicles," latest edition adopted<sup>1</sup>
- (an) General Services Administration Federal Specification for the Star-of-Life Ambulance, KKK-A-1822E, June 1, 2002<sup>10</sup>
- (ao) NFPA 1906, "Standard for Wildland Fire Apparatus," latest edition adopted<sup>1</sup>
- (ap) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
- (aq) Unified Facility Criteria (UFC) 3-600-02, "Inspection, Testing, and Maintenance of Fire Protection Systems," January 1, 2001<sup>2</sup>
- (ar) NFPA 1061, "Standard for Professional Qualifications for Public Safety Telecommunicator," latest edition adopted<sup>1</sup>
- (as) NFPA Standard 1221, "Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems," latest edition adopted<sup>1</sup>

<sup>7</sup> Available at <http://www.nwccg.org>

<sup>8</sup> Available at [http://www.fema.gov/pdf/nims/nims\\_doc\\_full.pdf](http://www.fema.gov/pdf/nims/nims_doc_full.pdf)

<sup>9</sup> Available at <http://www.acq.osd.mil/installation/reinvest/manual/dbera90.html>

<sup>10</sup> Available at <http://gsa.gov/vehiclestandards>

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E2. ENCLOSURE 2

DEFINITIONS

E2.1. Advanced Life Support (ALS). Functional provision of advanced airway management, advanced cardiac monitoring, manual defibrillation, establishment and maintenance of intravenous access, and drug therapy.

E2.2. Aerial Fire Apparatus. A vehicle equipped with an aerial ladder, elevating platform, aerial ladder platform, or water tower that is designed and equipped to support fire fighting and rescue operations by positioning personnel, handling materials, providing continuous egress, or discharging water at positions elevated from the ground.

E2.3. Aero-Medical Ambulance. A fixed- or rotary-wing aircraft designed for or configured to transport victims or patients from an emergency scene or staging area to a Medical Treatment Facility (MTF).

E2.4. Aggregate Response Time (ART). Total of dispatch time, turnout time, and travel time (defined below). The time elapsed from the receipt of the emergency alarm to when the units arrive on the scene.

E2.5. Aircraft Rescue and Fire Fighting (ARFF). The fire-fighting actions taken to rescue persons and to control or extinguish fire involving or adjacent to aircraft on the ground.

E2.6. ARFF Vehicle. A vehicle intended to carry rescue and fire-fighting equipment for rescuing occupants and combating fires in aircraft at, or in the vicinity of, an airport.

E2.7. Alarm. A signal or message from a person or device indicating the existence of a fire, medical emergency, or other situation that requires fire department action.

E2.8. Ambulance. See Ground Ambulance and/or Aero-Medical Ambulance.

E2.9. Authority Having Jurisdiction. The organization, office, or individual responsible, designated by the DoD Component for approving equipment, materials, and procedures for DoD Component fire departments.

E2.10. Automatic Aid. A legally binding agreement for the automatic response by installation/base fire departments to prearranged areas outside the installation/base and, conversely, an automatic response by the outside municipality/government to prearranged areas inside the installation/base.

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E2.11. Basic Life Support (BLS). Functional provision of patient assessment, including basic airway management; oxygen therapy; stabilization of spinal, musculoskeletal, soft tissue, and shock injuries; stabilization of bleeding; and stabilization and intervention for sudden illness, poisoning, heat/cold injuries, childbirth, cardiopulmonary resuscitation (CPR), and automatic external defibrillator (AED) capability.

E2.12. Company. A group of members: (1) under the direct supervision of an officer; (2) trained and equipped to perform assigned tasks; (3) usually organized and identified as ARFF, engine companies, ladder companies, rescue companies, squad companies, or multifunctional companies; and (4) operating with one piece of fire apparatus, except where multiple apparatus are assigned that are dispatched and arrive together, continuously operate together, and are managed by a single company officer.

E2.13. Defensive Operations. Actions taken by a HAZMAT responder during an incident where there is no intentional contact with the material involved. These actions include elimination of ignition sources, vapor suppression, and diking or diverting to keep a release in a confined area. Defensive operations require notification and possible evacuation, but do not involve plugging, patching, or cleanup of spilled or leaking materials.

E2.14. Dispatch Time. The point of receipt of the emergency alarm at the public safety answering point to the point where sufficient information is known to the dispatcher and applicable units are notified of the emergency.

E2.15. Emergency Medical Care. The provision of treatment to patients, including first aid, CPR, BLS (emergency medical technician (EMT) level), advanced life support (paramedic level), and other medical procedures that occur prior to arrival at a hospital or other health care facility.

E2.16. Emergency Medical Services (EMS). Services provided to patients facing immediate medical emergencies that occur outside of MTFs.

E2.17. Engine Companies. Fire companies whose primary functions are to pump and deliver water and perform basic fire fighting, including search and rescue.

E2.18. Fire Apparatus. A fire department emergency vehicle used for rescue, fire suppression, or other specialized functions.

E2.19. Fire Brigade. An organized group of employees who are knowledgeable, trained, and skilled in at least basic fire-fighting operations, and whose full-time occupation might or might not be the provision of fire suppression and related activities for their employer.

E2.20. Fire-Fighting Operations. Operations including rescue, fire suppression, and property conservation in buildings, enclosed structures, aircraft interiors, vehicles, vessels, aircraft, or like properties that are involved in a fire or emergency situation.

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- E2.21. Fire Prevention. Measures such as, but not limited to, training, public education, plans reviews, surveys/inspections, engineering reviews, and life safety code enforcement directed toward avoiding the inception of fire and minimizing consequences if a fire occurs.
- E2.22. Fire Suppression. The activities involved in controlling and extinguishing fires.
- E2.23. Foreign Consequence Management (FCM). Assistance provided by the U.S. Government to a host nation to mitigate the effects of a deliberate or inadvertent CBRNE attack or event and to restore essential operations and services.
- E2.24. Ground Ambulance. A wheeled road vehicle designed for emergency medical care that provides a driver's compartment and a patient compartment to accommodate an EMT/paramedic and two litter patients.
- E2.25. HAZMAT First Responders at the Awareness Level. Those persons who, in the course of their normal duties, could be the first on the scene of an emergency involving HAZMAT and who are expected to recognize the presence of HAZMAT, and who have been trained to initiate an emergency response sequence by notifying the proper authorities, and to protect themselves, and secure the area.
- E2.26. HAZMAT First Responders at the Operational Level. Those persons who respond to releases or potential releases of HAZMAT as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release, and who are expected to respond in a defensive fashion to control the release from a safe distance without actually trying to stop the release, and keep it from spreading.
- E2.27. HAZMAT First Responders at the Technician Level. Those persons who respond to releases or potential releases of HAZMAT for the purpose of controlling the release using specialized protective clothing and control equipment.
- E2.28. Immediate Response. For the purpose of this Instruction, immediate response is any form of immediate action taken by a DoD Component or military commander to assist civil authorities or the public to save lives, prevent human suffering, or mitigate great property damage under imminently serious conditions occurring where there has not been any declaration of major disaster or emergency by the President, or there is an attack.
- E2.29. Initial Full Alarm Assignment. Those personnel, equipment, and resources ordinarily dispatched upon notification of a structural fire.
- E2.30. Installation. For the purpose of this Instruction, an installation is a base, camp, post, station, yard, center, homeport facility for any ship, or other activity under the jurisdiction of the Department of Defense, including any leased facility.
- E2.31. Ladder/Truck Companies. Fire companies whose primary functions are to perform the variety of services associated with truck work, such as forcible entry, ventilation, search and rescue, aerial operations for water delivery and rescue, utility control, illumination, overhaul, and salvage work.

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E2.32. Mutual Aid. Reciprocal assistance by emergency services under a prearranged agreement or plan.

E2.33. Offensive Operations. Actions taken by a HAZMAT responder, in appropriate chemical-protective clothing, to handle an incident in such a manner that contact with the released material may result. These actions include approaching the point of release for patching or plugging to slow or stop a leak, containing a material in its own package or container, and cleanup operations that may require overpacking or transfer of a product to another container.

E2.34. Operational Risk Management (ORM). The process of identifying, assessing, and controlling risks and making operational decisions that balance risk with mission benefit.

E2.35. Personal Protective Clothing and Protective Equipment (PPC&PE). Equipment or clothing worn by a person to provide protection from hazards to which the person is likely to be exposed while performing duties.

E2.36. Quint. Fire apparatus with a permanently mounted fire pump, a water tank, a hose storage area, an aerial ladder or elevating platform with a permanently mounted waterway, and a complement of ground ladders.

E2.37. Rescue. Those activities directed at locating endangered persons at an emergency incident, removing those persons from danger, treating the injured, and ensuring the victims are transported to an appropriate health care facility.

E2.38. Risk Communication. An interactive process or exchange of information and opinions among interested parties or stakeholders concerning a risk, potential risk, or perceived risk to human health, safety, or the environment.

E2.39. Special Operations. For the purpose of this Instruction, special operations are emergency operations that require specialized or advanced equipment or training. Examples include, but are not limited to, HAZMAT/CBRNE mitigation operations; technical rescue such as rescue from heights, water, or confined spaces; and response to medical emergencies.

E2.40. Standards of Response Coverage. Level of service policies that establish the distribution and concentration of F&ES resources for an installation or region.

E2.41. Team. Two or more individuals who have been assigned a common task and are in communication with each other, coordinate their activities as a work group, and support the safety of one another.

E2.42. Travel Time. The time that begins when units are enroute to the emergency incident and ends when units arrive at the scene.

E2.43. Turnout Time. The time beginning when units are notified of the emergency to the beginning point of travel time.

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E3. ENCLOSURE 3

F&ES STANDARDS OF RESPONSE COVERAGE

E3.1. ORGANIZATION

E3.1.1. Document the establishment of organized, dedicated fire departments on installations and sites and for operations based on mission needs. Divide installations (including multiple activities serviced by a consolidated fire department) into Fire and Emergency Services Demand Zones (F&ESDZ), which are smaller areas that represent a single demand for fire services. Base ART criteria within given F&ESDZ.

E3.1.2. On DoD installations, sites, and facilities, and for operations where an organized, dedicated fire department is not justified and external assistance is not readily available, organize, train, and equip fire brigades in accordance with Part 1910.156 of 29 CFR (Reference (s) and NFPA 600 (Reference (1))). Include the brigade's functions and workplace in the written statement or policy. Personnel expected to do interior structural fire suppression shall be physically capable, certified, and trained to perform the required tasks.

E3.1.3. On DoD installations where external assistance is readily available and is incorporated into the response, develop a memorandum of understanding with the external agency that addresses the response services and permits the external agencies to visit for preplanning purposes.

E3.2. SCOPE OF SERVICES

Define and document the scope of services the fire department is expected to provide based on a review of the mission and unique characteristics of the installation. The scope of services shall consider, at a minimum, provisions for the following (even if the fire department is not expected to deliver the service):

E3.2.1. First response to HAZMAT incidents, including CBRNE and WMD

E3.2.2. EMS

E3.2.3. Fire prevention

E3.2.4. Fire suppression

E3.2.5. Response to ARFF emergencies

E3.2.6. Wildland fire protection and prevention

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E3.2.7. Response to natural as well as man-made catastrophic events (e.g., hurricanes and floods)

E3.2.8. Confined space and technical rescue

E3.2.9. Response to nearby Federal Agency facilities in the event normal F&ES are inhibited

E3.2.10. Other significant service delivery

### E3.3. LEVEL OF SERVICE OBJECTIVES

Define and document level of service objectives based on mission needs and the minimum requirements for:

E3.3.1. Operations in Table E3.T1.

E3.3.2. Prevention in Table E3.T2.

E3.3.3. Management in Table E3.T3.

### E3.4. STRUCTURAL FIRE RESPONSE

Plan for and respond to structural fires using standards in Table E3.T1 and local conditions' risk considerations.

### E3.5. ARFF RESPONSE

Use NFPA 403 (Reference (u)) as the baseline for agent quantities for ARFF response based on the mission assigned aircraft, with a service objective of conforming to the requirement 90 percent of the time. DoD Components may base agent quantity on larger nonassigned aircraft that are present more than 50 percent of the time. Due to variation in ARFF vehicle agent quantity, DoD Components may round to the nearest 500 gallons of agent required by Reference (u).

E3.5.1. DoD Components may incorporate technology or agent combinations that provide equivalent quantities of agent to that required by Reference (u), when such technology and agent combinations are validated by recognized scientific/research laboratories using recognized study methodology and published in reports available for scientific review.



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E3.5.2. ARFF services shall be provided 24 hours per day when aircraft are present, even when no aircraft movement or maintenance activities are in progress. Use operational risk assessment procedures to determine the appropriate amount of resources needed during periods of inactivity.

E3.5.3. When available, include structural fire suppression forces to provide additional rescue and fire suppression personnel to establish agent resupply for sustained operations.

#### E3.6. EMERGENCY MEDICAL SERVICES RESPONSE

E3.6.1. DoD Components shall plan for situations requiring EMS using standards in Table E3.T1, requirements of local jurisdictions, and local risk conditions.

E3.6.2. Where fire departments provide first responder or higher level EMS, establish and maintain emergency medical response programs that are staffed with appropriately certified emergency medical personnel and equipment.

E3.6.3. EMS shall be provided in accordance with installation or local medical protocols.

E3.6.4. The DoD Component medical community shall provide medical guidance for EMS programs.

#### E3.7. RESCUE RESPONSE

Plan for and respond to situations requiring rescue using established standards and the following:

E3.7.1. For confined space rescue, refer to Part 1910.146 of 29 CFR (Reference (v)).

E3.7.2. Where fire departments provide rescue services, establish and maintain a rescue response capability staffed with appropriately trained and equipped rescue personnel.

E3.7.3. Use Military Department rescue response requirements.

#### E3.8. WILDLAND FIRE RESPONSE

Plan for and respond to wildland fires on installations using 2001 Federal Wildland Fire Management Policy (Reference (w)), established standards, local conditions' risk considerations, and the following:

E3.8.1. For installations with burnable acreage or bordered by burnable acreage, prepare an Installation Wildland Fire Management Plan that identifies:

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E3.8.1.1. All wildland fire management strategies including military training availability, ecosystem sustainability, and protection of F&ES personnel and the public.

E3.8.1.2. Wildland fire preparedness, preplanned dispatch for both initial and extended attack, and prescribed fire and prevention per NFPA Standard 1710 (Reference (x)). If required, the minimum level of service for wildfire suppression shall consist of a direct wildland attack capability within 10 minutes of arrival of the initial wildland fire company at the fire scene.

E3.8.2. Train all personnel involved in wildland fire management activities to the appropriate Publication Management System (PMS) 310-1 (Reference (y)) or NFPA Standard 1051 (Reference (z)), and all personnel shall be outfitted with protective clothing and equipment per NFPA 1977 (Reference (aa)).

### E3.9. DISASTER RESPONSE

Plan for and respond to natural and man-made disasters including acts of terrorism using established standards, local conditions' risk considerations, and the following:

E3.9.1. Establish and maintain Disaster Preparedness Plans for F&ES response to natural and man-made disasters, including acts of terrorism, as described in Reference (d).

E3.9.2. Ensure F&ES operational procedures are developed for sustained emergency operations.

E3.9.3. Appoint an F&ES officer who, in addition to any other duties, maintains the F&ES Disaster Preparedness Plan at all DoD installations having fire departments.

E3.9.4. Coordinate F&ES Disaster Preparedness Plans with Fire Department Disaster Preparedness Plans of all local jurisdictions of civil government (e.g., city, county, fire district that adjoin the installation).

E3.9.5. Test or exercise Disaster Preparedness Plans at least once in each fiscal year.

E3.9.6. Integrate and coordinate F&ES Emergency Response Plans with installation Emergency Response and Risk Communication Plans.

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**TABLE E3.T1. MINIMUM LEVEL OF SERVICE OBJECTIVES – OPERATIONS<sup>1</sup>**

PROGRAM ELEMENT	ART (minutes) <sup>2</sup>	RATE (%) <sup>3</sup>	COMPANIES <sup>4</sup>	STAFF <sup>4</sup>
Structural Fire				
First Arriving Company	7	90	1	4
Initial Full Alarm Assignment	12	90	3	13
Other Fire Response/Investigative Response				
First Arriving Company	7	90	1	4
HAZMAT/CBRNE				
First Arriving Company (Defensive Operations) <sup>5</sup>	7	90	1	4
Full Alarm Assignment (Offensive Operations) <sup>5</sup>	22	90	3	15
Emergency Medical				
First Arriving Company (BLS with AED)	7	90	1	2
Transport Unit (BLS with AED)	12	90	1	2
ALS Capability	12	90	1	2
ARFF				
Unannounced First Arriving Company	5	90	1	3
Announced First Arriving Company <sup>6</sup>	1	90	1	3
Additional Units – should arrive at 30-second intervals	-	-	-	-
Technical Rescue				
First Arriving Company	7	90	1	4
Full Alarm Assignment	22	90	3	13
Wildfire				
As required to meet Installation Wildland Fire Management Plan	-	-	-	-
Other Response				
As required to meet NFPA standard, other consensus standard, or installation standard of cover	-	-	-	-

<sup>1</sup>This table deviates from NFPA standards based on historical risk profile of DoD installations.

<sup>2</sup>Consists of dispatch time, turnout time, and the remainder travel time.

<sup>3</sup>Fractile response rate indicates the percentage of responses that are equal to or less than the ART.

<sup>4</sup>Indicates the minimum number of companies and personnel required to safely and effectively perform initial operations for the respective program element. These minimum requirements do not provide sustainment capability and will not provide sufficient resources for major incidents.

<sup>5</sup>See Enclosure 4.

<sup>6</sup>Assumes pre-positioned units for an announced emergency; ARFF apparatus will be capable of responding to any incident on the runways within 1 minute.

**NOTE:** During actual emergency operations the incident commander determines the deployment of available resources using ORM principles.

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**TABLE E3.T2. MINIMUM LEVEL OF SERVICE OBJECTIVES – PREVENTION**

<b>PROGRAM ELEMENT</b>	<b>REQUIREMENT</b>	<b>FREQUENCY</b>
Fire Risk Management Surveys/Inspections	Survey/inspect all facilities. <sup>1</sup> (including areas such as piers, open storage locations, etc.)	Annual
Plan Review	Review all military construction, sustainment/restoration and modernization, and self-help projects.	As required
Public Fire Education Programs	Provide programs that inform and motivate all installation personnel on individual fire prevention responsibilities.	Quarterly

<sup>1</sup>Family housing is excluded except for common areas in multifamily units.

**TABLE E3.T3. MINIMUM LEVEL OF SERVICE OBJECTIVES – MANAGEMENT**

<b>PROGRAM ELEMENT</b>	<b>REQUIREMENT</b>
Incident Command	Provide command and control of all incidents consistent with the National Incident Management System (see Reference (aa)).
Supervision	Provide effective direction and oversight for subordinate personnel.
Planning	Provide required strategic and operational plans.
Budget	Provide budget requirements and manage program costs.
Program Management	Provide effective and efficient F&ES programs to the installation.

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E4. ENCLOSURE 4

HAZMAT/CBRNE RESPONSE CAPABILITY

E4.1. RESPONSE

Plan for and respond to HAZMAT/CBRNE incidents using established standards, local conditions' risk considerations, and the following:

E4.1.1. Determine and establish the appropriate HAZMAT/CBRNE response capability for each installation fire department and emergency service using the guidelines in DoD Instruction 2000.18 (Reference (ac)) and DoD Instruction 2000.21 (Reference (ad)) at overseas locations. The response capability shall be defined in terms of capability organic to the installation and capability provided through mutual aid.

E4.1.2. Meet the requirements of Part 1910.120(q) of 29 CFR (Reference (ac)).

E4.2. OFFENSIVE OPERATIONS

E4.2.1. Capability.

E4.2.1.1. Perform initial risk assessment, perform limited rescues, select and provide decontamination procedures, and mitigate releases of HAZMAT/CBRNE incidents that require entry into the hot zone. Offensive operations require the use of personnel trained and certified to the HAZMAT Technician level.

E4.2.1.2. Determine whether the capability will be delivered by the installation fire department, the installation fire department with mutual aid from the surrounding community, or solely from the surrounding community.

E4.2.2. Requirements. Provide staff for the appropriate level of HAZMAT/CBRNE capability.

E4.2.2.1. A minimum of 15 personnel is required on scene. Responding personnel are not required to be F&ES personnel, but may be assigned to other installation organizations such as environmental engineering. However, responding personnel must meet the training and certification requirements specified below and be available for immediate response (24/7).

E4.2.2.2. At least seven personnel on scene shall be trained and certified to the HAZMAT Technician level.

E4.2.2.3. At least one person on scene shall be trained and certified to the HAZMAT Incident Commander level.

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E4.2.2.4. At least five personnel on scene shall be trained and certified to at least the HAZMAT Operations level.

E4.2.2.5. At least two personnel on scene shall be trained and certified to at least the EMT BLS level and shall have on-scene medical transport capability.

E4.2.3. Limitations

E4.2.3.1. The fire department's ability to perform offensive operations may be limited due to the following:

E4.2.3.1.1. The nature of the incident including, but not limited to, the product, substance, or agent; the incident complexity, and expected duration.

E4.2.3.1.2. The number of casualties or persons exposed.

E4.2.3.1.3. The actual number and qualifications of the required responding personnel.

E4.2.3.2. CBRNE terrorist incidents may present extraordinary challenges such as mass contamination, secondary devices/attacks, and large multiple victim extractions. These challenges are well beyond the minimum response requirement and will significantly limit the ability to perform offensive operations until additional resources are available. Local commanders should be kept informed of the fire department's capability and notified of any changes regarding CBRNE capability.

E4.2.3.3. In the event the fire department's offensive operations are limited, every effort shall be made to conduct defensive operations.

E4.3. DEFENSIVE OPERATIONS

E4.3.1. Capability. The fire department's capability is determined by its ability to perform initial risk assessment, emergency decontamination, and confinement and mitigation of HAZMAT/CBRNE releases that do not require entry into the hot zone.

E4.3.2. Requirements. A minimum of a single engine company consisting of four personnel is required on-scene. All personnel shall be trained and certified to at least the HAZMAT Operations level.

E4.3.3. Limitations. The fire department may not perform defensive operations when the risks of intervening are greater than the risks of allowing the incident to conclude naturally.

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E5. ENCLOSURE 5

STAFFING REQUIREMENTS

E5.1. REQUIREMENTS

Determine and document staffing required to meet level of service objectives using the sample worksheet at Enclosure 9 and contracting, cross-staffing, and mutual aid considerations.

E5.1.1. Assumptions. When completing the sample worksheet at Enclosure 9, assume “one major response” at any given time.

E5.1.2. Contracting

E5.1.2.1. Funds shall not be obligated or expended for entering into a contract for the performance of fire-fighting functions at any military installation or facility within the continental United States (CONUS) unless specifically exempted by law (e.g., see 10 U.S.C. 2465 (Reference (af))).

E5.1.2.2. The DoD Components may contract with local governments for the provision of fire protection services at military installations to be closed under the Defense Base Realignment and Closure Act of 1990 (Reference (ag)).

E5.1.2.3. When contract F&ES are permitted, statements of work shall be performance oriented and meet the intent of this Instruction and DoD Instruction 4100.33 (Reference (ah)).

E5.1.3. Cross-Staffing. The Military Departments shall establish policy on cross-staffing F&ES apparatus consistent with staffing requirements. This policy shall identify minimum staffing levels to ensure that a sufficient number of members are assigned, on duty, and available to safely and effectively respond. Use of cross-staffing reduces the capability to meet the minimum level of service objectives for multiple incidents.

E5.1.4. Mutual Aid. If practical, a portion of the required F&ES for a DoD installation may be provided for under a mutual aid agreement.

E5.1.4.1. Mutual aid is specifically authorized by sections 5121-5206 of 42 U.S.C. (Reference (ai)) and permits routine assistance to and from local jurisdictions as defined in a mutual aid agreement. Fire chiefs, through the installation commander, may also provide aid under the Immediate Response Authority per Reference (c).

E5.1.4.2. Mutual aid agreements do not change DoD response requirements (ART criteria or number of companies for level of service objectives). DoD fire companies shall be properly staffed in accordance with Enclosure 3, Table E3.T1.

*DoDI 6055.06, December 21, 2006*

E5.1.4.3. Mutual aid shall conform to section 2210 of 15 U.S.C. (Reference (aj)), which provides for compensation to municipalities for direct costs and losses (over and above normal operating costs) sustained while fighting fire on Federal property. Each agreement shall provide the terms for reimbursement of each party for all or any part of the costs incurred in furnishing F&ES to the other party.

E5.1.4.4. In accordance with section 1856b of 42 U.S.C. (Reference (ak)), in the absence of any agreement, installation commanders are authorized to render emergency assistance to preserve life and property in the vicinity of a DoD installation when, in their opinion, such assistance is in the best interest of the United States, under immediate response authorities described in DoD Directive 3025.1 (Reference (c)).

E5.1.4.5. In connection with mutual aid F&ES assistance agreements, any service performed by DoD personnel, civilian or military, shall constitute service rendered in the line of duty. The performance of such service by any other individual shall not constitute such individual as an officer or employee of the United States.

E5.1.4.6. Any continuing or additional aid provided to the local community outside of immediate response authorities shall follow procedures in Reference (c) and be approved by the USD(AT&L).



DoDI 6055.06, December 21, 2006

## E6. ENCLOSURE 6

### APPARATUS REQUIREMENTS

#### E6.1. FRONTLINE APPARATUS REQUIREMENTS

E6.1.1. Determine, document, and procure apparatus required to meet the level of service objectives established in Enclosure 3 and the following:

E6.1.1.1. Structural Apparatus. Provide structural apparatus to meet the ART in Enclosure 3, Table E3.T1. New structural apparatus shall comply with the provisions of NFPA 1901 (Reference (al)). Provide aerials and quints for multiple high-rise buildings or where fixed aerial operations are required. Specific requirements for aerials and quints shall be determined by the DoD Component based on local conditions' risk considerations.

E6.1.1.2. ARFF Vehicles. Provide ARFF vehicles per Reference (u) as adjusted for military aircraft hazards. New ARFF vehicles shall comply with the provisions of NFPA 414 (Reference (am)) except ARFF apparatus assigned to rapid deployment forces shall be transportable by military airlift (e.g., C-130, C-17).

E6.1.1.3. Ambulances. Where fire departments provide EMS transport service, provide ambulances to meet ART in Enclosure 3, Table E3.T1. New ambulances shall comply with the provisions of General Services Administration's Federal Specification KKK-A-1822E (Reference (an)).

E6.1.1.4. Wildland. Where fire departments provide wildland fire suppression that cannot be accessed via structural fire apparatus, provide wildland fire apparatus to meet the Installation Fire Management Plan. New wildland fire apparatus shall comply with the provisions of NFPA 1906 (Reference (ao)).

E6.1.1.5. Other Specialized Apparatus. Provide where required to meet level of service objectives that cannot be addressed by structural or ARFF apparatus above. Other specialized apparatus shall comply with the provisions of the applicable NFPA standard.

E6.1.2. Develop and implement sustainment and recapitalization plans for apparatus as part of planning, programming, and budgeting efforts.

#### E6.2. BACKUP APPARATUS REQUIREMENTS

Determine and document apparatus needed to replace front-line apparatus that is out of service and to provide surge capability for major incidents. Apparatus may be placed in service and staffed by recalled F&ES personnel during major incidents. Obtain apparatus by retaining apparatus that became excess through normal replacement programs. Do not procure new

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apparatus to meet these requirements. Recommended allowances for backup apparatus are listed in Table E6.T1.

**TABLE E6.T1. BACKUP APPARATUS, RECOMMENDED ALLOWANCE<sup>1,2</sup>**

<b>IN-SERVICE, STAFFED/CROSS-STAFFED ENGINE, ARFF, OR AMBULANCE COMPANIES</b>	<b>RECOMMENDED BACKUP APPARATUS</b>
One to Four	1
Five to Nine	2
Ten or More	3

<sup>1</sup>The DoD Components may provide additional backup apparatus to include aerial, rescue, and specialized apparatus at large installations or regional departments that have multiple units of these types.

<sup>2</sup>The DoD Components may increase or decrease according to specific requirements.

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E7. ENCLOSURE 7

FIRE PREVENTION

E7.1. PROGRAM ELEMENTS

Implement fire prevention programs that cover, as a minimum, the following:

E7.1.1. Engineering and Plans Review. The plans for all military construction projects, facility modernization, rehabilitation programs, or self-help projects shall be reviewed by a certified fire inspector to ensure that all construction contains the fire protection and life safety features required by Reference (f) and applicable NFPA codes. The UFC requires a registered fire protection engineer to conduct a technical design review. Fire inspectors do not conduct technical design reviews (hydraulic calculations, occupant load/exit calculations, etc.), but review plans to ensure all required features are present and local emergency response elements are incorporated.

E7.1.2. Fire Risk Management Surveys/Inspections. Certified fire inspection personnel shall conduct fire risk management surveys of facilities. Hazardous conditions shall be reported as specified in DoD Instruction 6055.1 (Reference (ap)) and promptly corrected or incorporated into the DoD installation's hazard abatement plan. See Enclosure 3, Table E3.T2.

E7.1.3. Smoke Detectors. Smoke detection systems shall be installed and maintained per UFC 3-600-02 (Reference (aq)) in buildings where safety to life is a principal concern. This includes all buildings used for sleeping purposes. Additionally, programs shall be established to:

E7.1.3.1. Require the installation of smoke detectors in all DoD owned, leased, and public/private venture housing and in all mobile homes on DoD property, and recurring inspection of smoke detectors as a prerequisite for assignment to mobile home space on DoD property.

E7.1.3.2. Require carbon monoxide detectors as appropriate in those homes that use fossil fuel.

E7.1.4. Residential Sprinkler Systems. Provide residential sprinkler systems per Reference (f).

E7.1.5. Public Fire and Injury Prevention Education Promotion.

E7.1.5.1. Public Fire and Injury Prevention Education programs shall be developed to inform and motivate DoD personnel and families of DoD personnel, who reside or work on DoD installations or in Government-leased facilities, as to their individual responsibilities in fire prevention.

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E7.1.5.2. Fire prevention and/or safety materials, including nominal value incentive and educational items, are an authorized expenditure of funds in promoting fire prevention and safety as an integral part of the Public Fire Education Program.

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E8. ENCLOSURE 8  
TELECOMMUNICATION

E8.1. CAPABILITY

Maintain around-the-clock capability to conduct essential F&ES communications.

E8.1.1. When provided by the fire department, F&ES telecommunicators shall be:

E8.1.1.1. Trained in the proper use of communications equipment including telephone, radio, and other electrical or electronic alarm signal receiving systems.

E8.1.1.2. Trained for dispatching fire apparatus and for requesting medical, police, or other fire department assistance, as necessary.

E8.1.1.3. Dedicated public safety or equivalent telecommunicators.

E8.1.1.4. Certified as Telecommunicator I or II per Reference (b).

E8.1.1.5. Capable of speaking bilingually when required at OCONUS locations and some CONUS locations.

E8.1.2. The DoD Components shall implement the installation F&ES alarm and communication function where feasible.

E8.1.2.1. Consolidate with an established continuously manned emergency communications center for all emergency services (fire, police, ARFF, medical, explosive ordnance disposal, etc.). Telecommunicators employed at the consolidated communications center shall meet the requirements of NFPA Standard 1061 (Reference (ar)).

E8.1.2.2. F&ES communications center staffing shall be in addition to the requirement for a fully staffed structural and ARFF response. Where F&ES personnel can be assigned on a rotational basis to operate the alarm receiving and communications equipment, F&ES personnel shall meet the requirements of Reference (ar) in fire alarm communications.

E8.1.2.3. Where fire suppression is provided by other than DoD fire departments, F&ES fire alarm communications shall be consolidated with other continuously staffed functions such as military police or security. Telecommunicators employed at the consolidated facility shall meet the requirements of Reference (ar).

E8.1.2.4. DoD F&ES communications and dispatch functions may be provided by municipal F&ES or other outside agencies when those agencies compare favorably with DoD standards and can meet the prescribed communications criteria.

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E9. ENCLOSURE 9

SAMPLE WORKSHEET FOR FIRE DEPARTMENT STAFFING

LINE	LEVEL OF SERVICE OBJECTIVE	MINIMUM STAFFING
	OPERATIONS (The total operational staffing reflects the minimum fire department staffing needed to perform the specified service-level objectives safely and effectively. The total operational staffing provides the capability to handle only one major incident at a time.)	
1	Fire department daily staffing required to meet most demanding service level objectives (Enclosure 3, Table E3.T1) <sup>1</sup>	
2	Additional daily staffing required to meet installation ART standards, not included in Line 1	
3	Additional daily staffing required to meet airfield ARFF requirements, not included in Line 1	
4	Total Organic Daily Staffing [Line 1+ Line 2 + Line 3]	
5	Automatic/mutual aid daily staffing that meets service-level objectives	
6	Allowable daily cross-staffing (per paragraph E5.1.3)	
7	Adjusted Daily Staffing [Line 4 – (Line 5 + Line 6)]	
8	Personnel Staffing Factor (Service factor used to provide complete coverage 24 hours per day, 365 days per year for a single position. The factor includes leave, non-available training, and excused absences.)	
9	Total Operational Staffing (Line 7 x Line 8)	
	PREVENTION (These baseline requirements may be increased or decreased depending on the DoD Component's assessment of the need for full-time personnel.)	
10	Area requiring Fire Prevention Surveys in thousands of square feet = prevention personnel required < 1,000 = 1 ≥ 1,000 and < 3,000 = 2 ≥ 3,000 and < 5,000 = 3 ≥ 5,000 and < 8,000 = 4 ≥ 8,000 and < 11,000 = 5 ≥ 11,000 and < 14,000 = 6 ≥ 14,000 and < 17,000 = 7 ≥ 17,000 and < 20,000 = 8 ≥ 20,000 = Determined by the DoD Component	

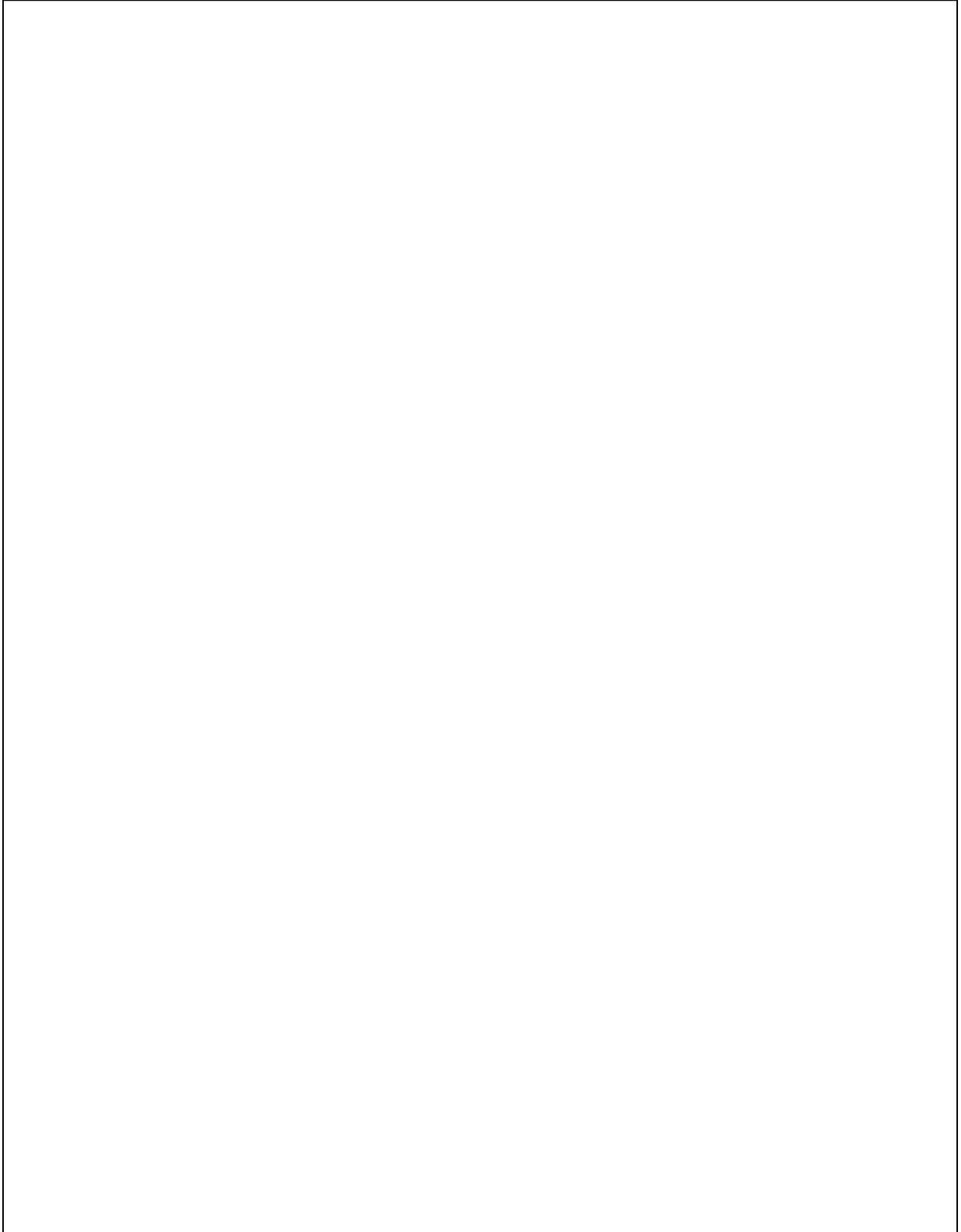
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E9. ENCLOSURE 9

SAMPLE WORKSHEET FOR FIRE DEPARTMENT STAFFING, continued

LINE	LEVEL OF SERVICE OBJECTIVE	MINIMUM STAFFING
	MANAGEMENT (These requirements only reflect management staffing required for operations and prevention objectives. These baseline requirements may be increased or decreased depending on the DoD Component's assessment of the need for full-time personnel. Additional personnel may be required for public fire education, fire alarm communications, emergency medical, program management, administration, and maintenance of fire protection systems.)	
11	Fire Chief for fire departments with 10 or more personnel = 1	
12	Deputy Fire Chief for fire departments with 40 or more personnel = 1	
13	Assistant Fire Chief (Shift Supervisor) for fire departments with 20 or more personnel = 2	
14	Assistant Fire Chief (Fire Prevention) for fire departments with 4 or more personnel = 1	
15	Assistant Fire Chief (Training) for fire departments with 30 or more personnel = 1	
16	Battalion/District/Station Chief (Supervisory Fire Fighter). At large or consolidated installations, additional shift supervisors are warranted where physical dispersion of fire stations makes it unmanageable for one shift supervisor to provide immediate direction of day-to-day operations.	
17	Total Management Staffing (Line 11 + Line 12 + Line 13 + Line 14 + Line 15 + Line 16)	
	TELECOMMUNICATIONS (These performance requirements for telecommunicator personnel are based on NFPA 1221 (Reference (as)) requirements. For exceptions to dedicated telecommunicator personnel, see Enclosure 8.)	
18	Personnel required to answer 95% of alarms within 15 seconds and 99% of alarms within 40 seconds. Communications centers that provide emergency medical dispatching protocols shall have at least two telecommunicators on duty at all times. At least one supervisor shall be on duty and available to the telecommunicators when more than two telecommunicators are on duty.	
	TOTAL FIRE DEPARTMENT STAFFING (Line 9 + Line 10 + Line 17 + Line 18)	

<sup>1</sup>Do not include incident commanders who are covered under the management staffing.





Appendix B  
NDW INST 11320 10E - Fire Bill





**DEPARTMENT OF THE NAVY**  
NAVAL DISTRICT WASHINGTON  
1343 DAHLGREN AVE. SE WASHINGTON  
NAVY YARD DC 20374-51761

NDWINST 11320.10E  
N3  
MAR 29 ZU11

NDW INSTRUCTION 11320.10E

From: Commandant, Naval District Washington

Subj: FIRE BILL, FIRE PREVENTION AND FIRE PROTECTION PROGRAM

Ref: (a) UFC-3-600-01  
(b) OPNAVINST 11320.23E  
(c) NFPA CODES  
(d) NAVSEA OP 5 Volume 1, 7th Edition  
(e) OSHA REGULATIONS CFR 1910  
(f) NFPA-1  
(g) UFC -3-600-02

Encl: (1) Fire Bill, Fire Prevention and Fire Protection Manual

1. Purpose. To establish Fire Bill, Fire Prevention and Fire Protection Manual for Naval District Washington (NDW) and Tenant activities.

2. Cancellation. NDWINST 11320.10D, NASPAXREV INST 11320.1N, CARDEEROCKINST 11320.1E, IHDIVNAVSUREFWARCENINST 11320.8D, NSWCDCI INST 11320.1.

3. Background. The National Board of Fire Underwriters, the National Fire Protection Association, references (a) through (g), advocate practices to be followed regarding fire prevention. Enclosure (1) establishes the fire prevention regulations and policies that govern all installations within NDW, and additionally includes procedures to be taken in case of fire.

4. Action. N-Code directors and special assistants must ensure that sound fire prevention procedures are established and practiced in accordance with enclosure (1).

5. Records Management. Records created as a result of this instruction, regardless of media and format, shall be managed per SECNAV M-5210.1.

A handwritten signature in cursive script, reading "T. L. Reese".

T. L. REESE  
Chief of Staff

Distribution:  
Electronic only, via CNIC Gateway Directives  
<https://cnicgateway.cnic.navy.mil/Regions/NDW/R1/NDW%20Instructions/Forms/NDW%20Instructions.aspx>

NDWINST 11320.10E  
MAR 29 2011

**Fire Bill,  
Fire Prevention and Fire  
Protection Manual**

**September 2010**

■

Enclosure (1)

NDWINST 11320.10E  
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CHAPTER ■

INTRODUCTION

1. Objective. To set forth basic policy and procedures concerning fire prevention and fire protection programs at Naval District Washington (NDW) per current Navy instructions and other applicable regulations.
2. Responsibility. All personnel attached or assigned to NDW, including subordinate and tenant personnel, will strictly adhere to these regulations.
3. Support. Full cooperation of all personnel is required.
4. Changes. Request for changes to these regulations will be submitted to the NDW Regional Fire Chief for consideration.
5. Effective Date. These regulations supersede existing orders and regulations and are effective upon receipt.

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CHAPTER II

FIRE BILL

1. Discover of Fire

a. Upon discovery of fire:

- (1) Notify all occupants.
- (2) Evacuate the building immediately.
- (3) Notify the Fire Department by phone from a nearby building.

b. Notification. The Fire Department must be notified immediately in the event of fire by Dispatch. The time factor involved in response is crucial to saving lives and property. When notifying the Fire Department, use the nearest available phone. Fire/Medical emergency numbers are:

Washington Navy Yard	202-433-3333
Naval Research Laboratory-De	202-433-3333
Bolling Air Force Base	202-433-3333
Anacostia Annex	202-433-3333
Arlington Service Center	202-433-3333
Bellevue Housing	202-433-3333
Washington Navy Yard	202-433-3333
US Naval Observatory	202-433-3333
Potomac Annex	202-433-3333
NSF Carderock	301-227-1333
NSF Indian Head / Stump Neck	301-744-4333
NSF Dahlgren	911
NAS Patuxent River	911 or 301-342-3911
NSA Annapolis	911 or 3-3333
Chesapeake Bay Detachment	911

c. Evacuation. Evacuation of the occupants of the buildings is the foremost consideration. Successful evacuation depends upon the occupants' awareness of the situation and knowledge of the exits available. Plan more than one way out of all areas; any visitors in the area should be informed of the locations of the nearest exits.

d. Extinguish or Control. Attempts to extinguish the fire should be made only after notifying the Fire Department or after directing another person to do so. Any attempt to fight fires should not be made at the risk of life or injury. Should the fire extend beyond the early stages, leave all fire-fighting efforts to the Fire Department.

2. Posted Fire Bill. Fire Bills (NAVFAC 11320/9) shall be posted conspicuously in all buildings throughout NDW. Building occupants



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should locate and be familiar with their contents. A sample fire bill has been provided as Enclosure 1.

### 3. Building Occupants

a. Occupants of buildings should be familiar with the location of the Fire Department emergency telephone number, portable fire extinguishers and their operations, and emergency exit routes.

b. Occupants and tenants of all NDW buildings are required to receive annual training on use of portable fire extinguishers and Fire safety. It shall be the responsibility of the occupants to make requests to the fire prevention office for said training or this annual training may be met via ESAMS.

### 4. Responsibilities of Heads of Departments and Heads of Tenant Activities

a. Ensure that assigned areas conform to Section III of this instruction. Particular attention should be made to any fire hazard, which may be unique to the department or activity such as experimental equipment, materials, procedures or combinations thereof. It will be reviewed annually thereafter.

b. Ensure employees are informed of hazardous conditions and specific fire prevention procedures applicable to their areas. As a minimum, all employees should know the location of the nearest fire extinguishers, fire alarm pull stations, and closest exit from building.

c. Develop evacuation procedures to ensure the safety of personnel and security of classified material. In establishing priorities, prime consideration should be given to speed up action. Additionally, the volume of material, accessibility of safe storage, and hazardous nature of surroundings should be considered.

d. Report to the NDW Fire Department (Code N3), any fire hazard or abuse of fire equipment within the departments or tenant activities area of cognizance.

e. Security boxes for key access control shall be mandatory on most buildings within NDW, including all new facilities and major renovations to existing buildings. These boxes allow quicker access to buildings, especially after normal work hours. This feature allows firefighters to access buildings when the fire alarm is activated to take corrective measures without causing property damage to gain entry. Request for new security boxes will be coordinated by the local Fire Prevention Office. Once boxes are obtained, the local Fire Prevention Office will determine with the activity, the best location to mount the box. After the box is installed on your facility, a set of keys and/or

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key cards will be kept in this box for fire department entry in the event of a fire or an emergency.

f. The Fire Department will review all new construction plans, upgrades, and renovations and approve all plan reviews, before any modifications begin. The following are examples:

(1) Workplace egress routes.

(2) Moving of walls or doors.

(3) Anything relating to fire alarms or sprinkler systems only certified authorized persons are allowed to work on fire alarms or sprinkler systems.

(4) Any upgrades and/or renovation will comply with the UFC 3-600-01 and UFC 3-600-02 (Unified facilities criteria) as appropriate, and all applicable National Fire Protection Agency (NFPA) Codes.

(5) All drawings must be on auto-cad and a copy of the prints must be provided. Jobs cannot be started without approval signature of Fire Department representative and NAVFAC Fire Protection Engineer (as applicable) visible on prints.

#### 5. Fire Alarm System

##### a. Fire Alarms

(1) Fire alarms are sounded from fire alarm pull stations in buildings or by persons calling the Fire Department.

(2) Alert other personnel by sounding an evacuation alarm verbally, or by other appropriate means.

##### b. To operate a building fire alarm:

(1) Fire alarm pull stations are located by building entrances and exits wherever possible.

(2) Follow the directions on the face of the pull station. When activated, the box automatically sounds the evacuation alarm and reports the location of the fire to the Fire Department. After activating the alarm, go to a safe location outside and wait for the arrival of Fire Department personnel, then direct them to the fire.

##### c. To report a fire or medical emergency by telephone:

(1) Contact the nearest Fire Department: Refer to page 12 for emergency numbers by respective location.

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(2) Provide the following information:

(a) Your identification (Name).

(b) Exact location of fire or Medical Emergency and base on which you are located, building number and location of fire in building.

(c) What is burning, if known?

(3) Do not hang up until the emergency dispatcher has all required information.

d. False Alarms. All false alarms will be investigated immediately to determine cause of alarm. Persons found to have maliciously caused a false alarm will be prosecuted under the Uniform Code of Military Justice and applicable civil laws.

6. Duties in the event of fire

a. Fire Department

(1) District Fire Chief. The District Fire Chief is responsible for the efficient operation of the Fire Department within his/her respective district. The District Fire Chief or ranking fire officer present will be in charge of fire fighting operations, including responsibility for disposition and deployment of personnel and apparatus equipment engaged in, or necessary for the preservation of life and property through prevention and extinguishing of fires. They may, in case of an emergency, call mutual aid companies for assistance needed in connection with fire fighting or eliminating a serious fire hazard.

(2) Equipment and personnel of the Fire Department may be used, where emergencies justify, assisting in fire fighting outside of NDW boundaries. Authority for such use is delegated to the Regional Fire Chief.

b. Emergency Medical Services (EMS). Fire Department will dispatch ambulance and personnel with necessary first-aid equipment to the scene of a fire or emergency when requested.

c. Police Forces

(1) First Line. The Police Officer, or their responsible assistant, will dispatch security personnel to the scene of a fire or other emergencies. Upon arrival, police personnel will take charge of traffic and crowd control.

(2) Gate Sentries. Mutual Aid Companies that are called upon for assistance will be granted access through the gates and further directed to the scene of the fire by gate sentries.

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(3) Police Patrols will respond and be prepared to direct and control traffic as required.

d. Waterfront Personnel. NDW waterfront personnel, i.e., contractors and/or civil service, must be prepared to move or utilize vessels as directed by the District Fire Chief or senior officer present. Those personnel assigned to fire detail will report to the scene of the fire and act as back up for the Fire Department.

e. Security Considerations. In the event of a fire or detection of smoke of undetermined origin, personnel assigned responsibilities under the provisions of this Fire Bill will be granted full access to any affected space or building aboard the command or activity without regard to their security clearance or access authorization. For purposes of this instruction, any member of requested mutual aid Fire Department, Emergency Medical Service, or any other department called upon for help in responding to a fire or medical emergency at the NDW command or activity will be granted full access.

f. Safety Officer. The respective NDW Safety Officer will report directly to the Fire Department Chief Officer.

**NOTE:** No person assigned to duty at the command or activity will delay, deny access to, hinder, or restrict in any manner or for any reason (including security) civilian or military fire fighting personnel or other personnel whose presence is required in connection with an emergency (e.g., medical, first aid, and rescue personnel) from carrying out their duties.

#### 7. Responsibilities

a. The Regional Fire Chief is responsible for all fire prevention programs per reference (b).

b. Fire Department personnel will do the following:

(1) Conduct fire prevention inspections of grounds and structures, automatic fire detecting and extinguishing equipment and systems, control valves in the fire mains and exit facilities.

(2) Post-standby fire watches at places of public assembly on special occasions.

(3) Issue permits for and supervises from a fire prevention standpoint, transient operations that involve fire hazards such as open fires, cutting, welding and fueling, and request qualified personnel with necessary fire-fighting equipment at the scene of such operations.

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8. Evacuation and Fire Drills

a. Fire and evacuation drills will be conducted annually unless applicable instructions state otherwise in all buildings where personnel are assigned. The Installation District Fire Chief (IPD) will have direct responsibility for such drills. The Installation District Fire Chief may delegate authority to the fire inspectors to conduct fire drills. A set time of three minutes is considered satisfactory for complete evacuation of any building. This time may change according to building size and exit access. An evacuation report for each building will be submitted to the building file after drills are completed.

b. Evacuation drills will serve as an incident drill for the Fire Department. A smoke-generating machine may be used during these drills. Smoke bombs or candles will not be used.

c. Fire monitors and alternates will supervise the evacuation of their assigned areas and ensure the provisions of this manual are carried out in their entirety.

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### CHAPTER III

#### FIRE PREVENTION

##### 1. Reporting of Fire Hazards

a. Activities controlling or occupying government buildings or areas will promptly report to the Fire Department any hazardous condition and exercise vigilance in guarding against creating fire hazards.

b. The concept of fire prevention inspections is to have professional fire inspectors observe spaces from an impartial, safety-conscious viewpoint. The results of these inspections will inform occupants of potentially unsafe conditions. It is the responsibility of the controlling authority of a space to report potentially unsafe conditions and to swiftly take the required corrective action necessary to correct all unsafe conditions. Rapid corrective action is required to protect life and property.

c. Upon receipt of a Hazard/Deficiency Inspection Report, the concerned activity will reply in writing or through ESAMS within 10 working days to the fire inspector who issued the report and the corrective action taken.

##### 2. Care of Buildings

a. Housekeeping. "A clean house seldom burns" is a Fire Department axiom. Good housekeeping, more than any other effort will reduce the number and severity of fires.

b. Inspection. The Fire Department will inspect all buildings for fire hazards on a regular schedule.

(1) Working and storage spaces, new construction, and repair areas will be cleaned daily to reduce fire hazards.

(2) Rubbish and scrap material will be placed in properly identified noncombustible cans, receptacles, or bins. All rubbish will be cleared from buildings at the end of each workday and hauled to locations approved for rubbish disposal. Work areas will be kept free of combustible debris.

(3) Open-top wastebaskets will be constructed of metal material.

(4) Trash cans will be provided with metal covers and will be utilized for their intended purpose.

(5) Fiberboard containers will not be used as trash receptacles. Plastic resin containers must be listed by a nationally recognized testing agency and have fire resistive ratings.

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c. Storage of Combustibles

(1) Metal containers with automatic or self-closing covers will be used for storing supplies of clean rags, waste, or packing materials such as excelsior or shredded paper and other combustible materials.

(2) Plainly-marked, labeled, self-closing containers will be used for the following:

(a) All used waste.

(b) All oil, paints and chemicals, and rags.

(c) Other extra-hazardous materials.

(d) The above materials must comply with Occupational Safety and Health Administration (OSHA) standards and have proper Material Safety Data Sheets (MSDS).

(3) Metal covers will be kept closed. Never wedge or block them open. These containers will be emptied and contents removed from buildings as required during the workday and prior to securing buildings after working hours.

d. Personnel Service Rooms

(1) Covered metal trash receptacles or wall mounts with self-closing lids are required in all washrooms and heads.

(2) Clothing lockers should be adequately ventilated, constructed of metal, and maintained in a clean orderly manner. Material will not be stored on top of or underneath lockers. Working clothes kept in lockers will be aired and cleaned regularly. Flammable liquids, chemicals, paint-soaked rags, and similar material will not be kept in clothes lockers.

(3) Combustible materials must be at least 48 inches from radiators, heaters, or steam pipes.

e. Attics and Concealed Spaces

(1) Attics and concealed spaces will be kept clean. Attics will not be used for storage.

(2) Scuttle holes and other openings leading to attics or concealed spaces will be fitted with doors equivalent in fire resistance to ceiling construction, and will be kept closed. This does not apply to grills provided for passage of heat into spaces protected by wet pipe automatic sprinkler systems. Such openings will be equipped with automatic closing traps having a fire resistance equal to that of the ceiling.

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f. Exhaust Systems. Exhaust systems and ductwork will be kept free of grease or other combustible accumulations. Filters will be cleaned or changed as often as required to maintain adequate cleanliness. Filters and ducts will be constructed of non-combustible materials. Switches to all exhaust systems will be clearly marked to provide easy identification. In case of fire, the exhaust system will be automatically shut off when fire detection occurs.

g. Decorations

(1) Only non-combustible or approved flame retardant materials will be used for decorations or window coverings.

(2) All draperies and carpets will be non-combustible or treated with an approved flame retardant solution, and documentation will be provided to the Fire Department prior to installation of the carpet and draperies. The District Fire Chief, or qualified fire protection personnel, will approve such materials before installation. Where flame resistant materials are used, periodic re-treatment is necessary as recommended by the manufacturer.

(3) The location of a Christmas tree or any other temporary decoration shall not hinder safe evacuation of the building or block fire protection equipment. All lights will bear the approval label from a nationally recognized testing agency and must be in good condition. Only non-flammable ornaments and decorations are permitted. **No live Christmas trees will be used in any building except on a case-by-case exception within the region.** If a live tree is used it will have no lights and will have the butt end diagonally cut to permit maximum absorption of water. Live trees shall be checked/watered daily. The trees will remain in the building no longer than 14 days total (OR EARLIER UPON EVIDENCE OF DRYNESS) and be disposed of properly at an MWR disposal site.

h. Parking in Buildings

(1) No motor vehicle will be parked in any building unless that building is designated as a parking garage. Some test laboratories or hangars may accommodate special vehicles or test vehicles for unique projects.

(2) The only exception will be the Public Works motor pool garage where vehicles are routinely repaired and Fire Stations where fire apparatus is housed.



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1. Exits

(1) Exit facilities will be in compliance with the requirements of NFPA 101, Life Safety Code, the Uniform Federal Accessibility Standards, and the Americans with Disabilities Act Public Law 101-336.

(2) No restrictive hardware such as hasp and padlock, chain and padlock, throw bolts, crossbars, dead bolts, etc., will be installed on any emergency exit door. Exit doors will not be rigged in any manner, which will restrict their proper and intended use.

(3) Stairways, aisles, hallways, and other means of emergency egress will be unobstructed at all times.

(a) Stairways may not be used for storage.

(b) Aisles may not be used for storage or for file cabinets or copy machines.

(c) Hallways may not be used for storage, or for file cabinets or copy machines.

(4) All exit doors must be unlocked when the building is occupied.

(5) Locking devices on doors and exits must conform to the requirements set forth in subparagraph j of this section.

(6) A door leading to a stairwell may not be blocked or wedged open at any time.

(7) Exit doors and their related hardware may not be altered in any manner.

(8) Exit lights will be installed and maintained per requirements set forth in subparagraph i of this section.

(9) Emergency lighting will be installed and maintained per requirements set forth in subparagraph i of this section.

**j. Fire Doors**

(1) Fire doors will not be obstructed, blocked, or wedged open in any manner. The Fire Department has the authority to remove any items that are blocking or wedging - shutters, fire doors, or exit doors.

(2) Fire doors will be clearly and plainly marked. All exit doors shall be unlocked during periods of occupancy.

(3) To ensure the proper fire door rating, the manufacturer must install windows in the fire door.

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k. Fumigation

- (1) The respective Installation Fire Department will be notified of any fumigation.
- (2) Notices must include type of fumigation and areas involved.
- (3) All areas involved will be posted with proper signs.

1. Interior Finishes

- (1) Walls must be kept intact and in good repair. Any penetrations will be closed and must meet requirements of fire ratings.
- (2) Ceiling assemblies will be kept intact and in good repair. Any penetrations will be closed and must meet requirements of ceiling fire ratings.
- (3) In a fire rated area the drop ceiling will meet the sidewall rating, which will include the wire to hold up the track. The ceiling tile must have a Class "A" fire rating.

m. Floor & wall coverings will be non-combustible or treated with an approved flame retardant solution. Documentation must be provided to the Fire Department prior to installation of flooring and/or wall coverings. The District Fire Chief or qualified fire protection personnel will approve materials before installation. Where flame resistant materials are used, periodic re-treatment will be completed as recommended by the manufacturer.

3. Securing of Buildings

- a. All doors, including fire doors, will be properly secured at the end of the workday.
- b. All windows will be properly secured at the end of the workday.
- c. All coffee makers will be turned off at end of working hours.
- d. The Fire Department must be notified of special recreational functions planned for any building or area, so that extra equipment or standby personnel can be provided.
- e. The respective installations Dispatch Center will be notified 30 minutes prior to securing all places of public assembly. Managers will inspect the buildings or areas after all necessary cleaning has been completed and immediately before the area is secured. The Dispatch Center (Communications Center) will assign the proper code to the club manager for closing purposes as applicable. This will be done at the end of each day.

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f. No exit doors will be permanently secured without advance approval of the District Fire Chief. All such doors will be identified by a sign, approved by the Fire Chief, placed on both sides of the door, or such door will be removed and the opening filled to eliminate appearances of a doorway. Exit doors will not be secured in a manner that will prevent their use as exits.

g. Swabs, cleaning gear, and other material subject to spontaneous ignition will be kept outside of buildings or stored in a tight flammable container in a proper location.

h. All used paint, used brushes, used drop cloths, used rags, etc. must be removed from buildings at the close of the workday. If materials are left on the job, they will be placed in a metal container at least 15 feet away from the building and sources of flame.

i. Electric-powered fork lifts and hand pallet trucks may be left in buildings, provided they are in a vented area, located a safe distance from combustible materials and electrical connecting plugs from the batteries to the power units are disconnected.

j. Gasoline or liquefied gas-powered equipment will be listed by the Underwriters Laboratory (UL). They must be refueled outside of buildings, no less than 50 feet from buildings.

#### 4. Vacant Buildings

a. All combustible trash will be removed from buildings. Floors will be swept clean and furniture neatly stacked, preferably in the center of rooms.

b. All cleaning gear will be removed from the premises. All gear lockers or closets will be thoroughly cleaned, and the doors left in an open position.

c. All points of entry will be locked and preferably boarded up.

d. In securing unoccupied buildings, the building sprinkler systems will be left on. If the sprinkler system is a wet pipe system, heat must remain on in the building to prevent freezing. The Fire Department will be notified 48 hours prior to securing all utilities.

e. The District Fire Chief will be notified when a building is to be vacated, has the occupancy modified, or building is scheduled to be demolished.

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5. Smoking Regulations

a. Smoking, for the purpose of these regulations, includes the carrying of a lighted pipe, cigar, or cigarette.

b. Areas where smoking is prohibited:

(1) All buildings

(2) In all government vehicles

(3) Within 50 feet of:

(a) Gasoline dispensing operations

(b) Where bituminous plastic coatings are being applied.

(c) Flammable liquid and gas handling or storage areas.

(4) Within 200 feet of a ship engaged in gasoline or explosive transfer operations or any high-speed refueling area.

(5) In any location where conditions may create a smoking hazard. In these areas, the District Fire Chief is hereby authorized to erect or order the erection of "NO SMOKING" signs and to halt smoking in these areas as long as said conditions remain.

(6) There shall be NO SMOKING in explosive areas, buildings, or magazine areas per reference (d).

c. Smoking Areas

(1) The Commandant or Installation Commander makes final determination of designated smoking areas.

(2) Suitable receptacles for discarded smoking materials will be provided in adequate numbers at all assigned smoking areas. Only smoking tobacco remnants, i.e., cigarette or cigar butts and pipe tobacco will be placed in appropriate receptacles.

d. Matches. The use of matches other than safety matches is prohibited.

6. Heating Systems - Buildings

a. General

(1) All heating equipment will be labeled and or listed by the American Gas Association and a nationally recognized testing agency. Additionally, it will be installed, maintained and operated in accordance with manufacturer specifications.

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(2) Adequate clearance will be maintained between combustible material, steam pipes, and furnaces. Exposed surfaces that are potentially too hot for the bare hand should be considered hazardous.

(3) General storage in rooms designed for housing heating and air conditioning equipment is prohibited. Steam radiators and piping will not be used for drying purposes.

(4) The use of open flame type heating devices and open flame lighting devices (such as oil lamps and candles) shall be prohibited except in family housing, for ceremonial/religious purposes, and in use in clubs/dining facilities. All open flame lighting devices must be approved prior to use in clubs/dining facilities.

(5) Portable heating equipment shall not be used to circumvent the federally imposed 68-degree Fahrenheit office temperature during winter months. Use of portable heating shall be limited to only those spaces, which do not have heating capability, or in cases where documented medical conditions require additional heat. Only oil filled radiator type heaters shall be used and shall be purchased by said organization and at no time will space heaters be used except those specifically approved by Public Works and the Fire Department for emergency use only.

(a) All heating equipment shall be:

- 1 Government issued (metal type).
- 2 Approved by a nationally recognized testing agency.
- 3 Thermostatically controlled.
- 4 Equipped with tip-over (automatic shutoff) feature.
- 5 Routinely checked for safe operation by Fire Dept.
- 6 Annually inspected by a qualified electrician.

(b) Extension cords shall not be used when connecting heating equipment. This equipment shall be located with adequate clearance to preclude heat buildup and shall not be placed under or near combustible materials. To eliminate electrical overloads; a qualified electrician will inspect areas.

b. Standards. All heating and air conditioning equipment will be installed and operated in accordance with the standards specified by the manufacturer and as follows:

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(1) Requirements for oil-fired equipment in NFPA,  
standard 31.

(2) Requirements for gas-fired equipment in NFPA,  
standard 54.

(3) Requirements for liquefied petroleum heaters in NFPA,  
standard 58.

(4) Pulverized fuel system heaters (coal) in NFPA,  
standard 85.

7. Heating System- Industrial

a. Industrial heating equipment:

(1) Encompasses furnaces, ovens, dryers, steam  
generators, and process devices other than those used solely for  
building heating.

(2) Requirements are the standards set forth in NFPA.  
Manufacturer's specifications will be followed.

8. Electrical Hazards

a. Wiring

(1) All electrical wiring and equipment will be in  
compliance with National Electrical Code, (NFPA 70).

(2) Changes in electric wiring, fitting or attachments  
for electrical appliances will not be made unless by a master  
electrician.

(3) Defective electric cords, light fixtures, appliances  
and switches will be repaired or removed. All defective  
electrical equipment will be reported immediately and repaired by  
a certified electrician.

(4) Extension cords may only be used for an immediate  
temporary necessity not to exceed one working shift - usually 8-  
12 hours. Extension cords will not be tacked in position nor  
shall they be laid across the deck in any passageway or regular  
walkway. It is prohibited to transfer electrical current by the  
way of an extension cord from one room or space to another.  
Cords shall not extend through doors, windows, holes in floors,  
walls, or ceilings, or in any other way leave the space in which  
it is plugged. The use of octopus plugs is strictly forbidden,  
i.e. 3-way, 4-way, etc. Multi-outlet circuit breaker strips are  
approved for use if labeled by a nationally recognized testing  
agency; however these devices shall not be connected in series.

(5) Surge protectors may be used for computers, printers,  
and monitors. Also, a separate unit may be used for copy

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machines or fax machines only. Only nationally recognized testing agency listed surge protectors may be used.

(6) Surge protectors shall not be plugged into other surge protectors to provide multiple outlets.

(7) The use of multiple socket plugs is not permitted.

b. Appliances

(1) No electric appliance or device will be installed or used unless it bears the approval label of a nationally recognized testing agency.

(2) The use of appliances such as coffee pots and microwaves is authorized. Such appliances will be located with adequate clearance from combustible materials and will not be operated in storage rooms, closets, or any other out of site places. Automatic timers are prohibited.

(3) Toaster ovens, toasters, hot plates, turkey fryers, etc. are prohibited unless approved by a nationally recognized testing agency.

(4) Fixed and non-portable outlets for electrical heating devices such as flat irons, soldering irons and glue pots will be provided with a readily visible pilot light to indicate when the power is on.

(5) Gas and charcoal fired grills are prohibited within structures, not allowed closer than 25' from any building when in use, and will not be used on combustible surfaces such as balconies, decks, or porches. Used coals from grills shall be cold (which could take up to 4 hours) before dumping them into trash receptacles.

c. Circuits

(1) Electrical circuits should not be overloaded or overused. Overload protection must be in accordance with the National Electric Code and completed by a master electrician.

(2) Fuse or breaker panels will be locked and marked properly to permit access by authorized persons only. All fire alarm panel breakers will be locked in the open position.

(3) Fuse or breaker panels will have a three-foot clearance around and in front of said panel, as well as a clear path of travel to the front.

(4) No device will be installed that will interfere with the normal operation of the circuit breaker or fuse. When a blown fuse has interrupted a circuit or tripped breaker, the source of the disturbance must be located and eliminated by a

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master electrician before power to the interrupted circuit is restored.

(5) All electrical switches in light and power panels will be correctly labeled to indicate the circuits and or devices, which they control.

(6) All energized parts will be properly protected to prevent personnel from making contact with these parts.

d. Grounding

(1) Substantial conductors having low resistance to ground will be used to ground all stationary and portable machines, equipment, and other devices in which static charges may be generated.

(2) Portable lights and electronically operated tools or devices, together with their connections and fittings, will be of a grounded type inspected frequently and maintained in a safe condition.

(3) All vending machines using electrical power will be properly grounded and kept free from accumulations of grease and lint, particularly motors and compressors.

(4) Grounding and Bonding in explosive areas will meet guidelines set in reference (d).

e. Motors

(1) An 18-inch clearance will be maintained around electric motors.

(2) Motors will not be located in excessively damp areas or areas where they may be subject to corrosive vapors, unless specifically designed for such installations.

(3) Motors will be kept clean and free from accumulations of grease, dust and or lint, and will be provided with proper over-current protection.

(4) All motor-starting equipment such as rheostats will be located away from combustible materials.

**f.** Air Conditioning. All air conditioning equipment will be listed by a nationally recognized testing agency. Installation of air conditioning equipment must be per NFPA standards.



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9. Storage

a. Storage areas will be secure in order to prohibit access by unauthorized personnel.

b. Access. An identification card will be posted at the storage area stating the following information:

(1) Controlling department or activity (including code numbers)

(2) Custodian.

(3) Telephone numbers.

(3) Office location and point of contact in case of an emergency involving the space.

EXAMPLE:

NORDIC, CODE MAC  
MS. SMITH, 202-433-0000  
BUILDING 99, ROOM 99

AFTER HOURS  
CALL 202-666-0000

c. Office and Daily Work Area

(1) Bulk paper is the most common type of readily combustible material kept in offices and daily work areas. The following rules should be applied to reduce the fire load available to feed a fire:

(a) Reproduction paper - Bulk supplies of copier paper will be kept in a closed metal locker. No more than three reams may be kept loose at the copy machine.

(b) Computer supplies - Bulk supplies of paper and cards will be stored in secured areas and in an enclosed metal locker. The area should be protected by a sprinkler system.

(c) Computer printouts - Computer printouts that must be kept for records and reference work will be stored in closed metal lockers in offices and work areas.

(d) Mandatory records - Records for long-term storage must be stored in secured areas that have functioning sprinkler systems. Records may not be kept in loose form or stored on tables stacked in corridors or corners of work areas.

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d. Warehouses

(1) Commodities, which may be hazardous when combined, must be stored in order to prevent possible contact with said commodities.

(2) Aisle spaces 60 inches in width at intervals not exceeding 20 feet will be maintained within all stock areas.

e. Storing of materials

(1) Below. sprinkler deflectors:

(a) 18 inches when stacked height is less than 15 feet.

(b) 36 inches when stacked height exceeds 15 feet.

(c) 48 inches when hazardous materials are stored.

(2) Below joist, rafters, beams or roof trusses:

(a) 18 inches when stack height is less than 18 feet.

(b) 36 inches when stack height exceeds 15 feet.

(c) 48 inches for any stack height **if** building has no sprinkler system.

(3) In rack sprinkler for the following:

(a) When stack of 12 feet or more.

(b) Rack storage any height.

(4) From walls:

(a) 24 inches from all walls.

(b) 60 inches when hazardous materials are stored in general-purpose buildings.

(5) Near light or heating fixtures

(a) A 36-inch clearance will be maintained around all lighting.

(b) A 60-inch clearance will be maintained around all heating.

(6) Fire Doors

(a) A 48-inch clearance will be maintained along the path of travel to fire doors.

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(b) Material will not be stored within 36 inches of fire door openings.

(c) All fire doors (marked/labeled) will be kept closed at all times.

10. Storage and Handling of Hazardous Materials

a. General

(1) Hazardous materials for the purpose of these regulations include dangerous chemicals, compressed gases and flammable/combustible liquids. The storage, handling and use of hazardous materials will be per OSHA, NFPA and NAVSEA OP 5 standards.

(2) All MSDS sheets must be close to the storage or handling area and readily available.

b. Accidental Hazards. Dangerous chemicals and compressed gases will be stored in such a manner as to prevent accidental breakage, leakage, rupture of containers, as well as exposure to fire, heat, and other substances which might produce explosive or flammable gases, toxic fumes, or jeopardize the safety of personnel and material.

c. Chemicals that React with Water. The storage of chemicals, which react violently with water such as calcium carbide, unsalted lime, sodium and potassium peroxide, will be stored in accordance with recognized standards. All areas where such materials are stored will be clearly marked to advise the Fire Department of the nature of the material.

d. Compressed Gas Cylinders

(1) Compressed gas cylinders showing evidence of excessive rust, corrosion, dents or other surface defects will be considered hazardous and will be bled down to 100 psi above atmospheric pressure.

(2) Compressed gas cylinders will be hydrostatically tested after the first recharge and after a 5-year period since previous hydrostatic test, per U.S. Department of Transportation (DOT) and Title 49 of the Code of Federal Regulations (CFR). Any cylinder not recharged within a 12-year period will have its contents discharged, be retested, refilled, and remarked.

(a) Non-compatible or reactive gases will be stored in the open. Cylinders of such gases will be separated by a well-ventilated clear space of at least 50 feet.

(b) Gas cylinders stored in the open will be protected from the sun by a noncombustible cover or roof.

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(c) Cylinders will be stored away from radiators and other sources of heat. Storage area will be cool, dry, and well ventilated.

(d) All locations or areas used for cylinder storage of flammable gases will be provided with natural cross ventilation.

(e) Cylinders in storage or use will be secured to prevent movement or falling that could damage the cylinder head. This can be accomplished by the use of a safety chain, strap or baseplate. This does not mean that cylinders can be tied together.

(f) All compressed gas cylinders not in use will be tightly capped (hand tight) with valves tightly closed.

(g) All cylinders will be stored and used in an upright position.

(h) Cylinders will not be used as rollers, supports, or for any other purpose than to store the gas for which they are designed and identified. Cylinders will not be handled with lifting magnets, rope slings, or chain slings. A crane may be used when a safe cradle or platform is provided to hold the cylinders.

(i) Oxygen cylinders, fuel gas cylinders and toxic gas cylinders will be stored in an open area with a non-combustible roof and will be secured to prevent movement or falling that could damage the cylinder head.

(j) The temporary storage of all inert (non-reactive) gas cylinders requires the approval of the Fire Department.

(k) When laboratory equipment is to be routinely and frequently operated with flammable gases supplied from compressed gas cylinders, the containers will be located outside the building and connected to the laboratory equipment by a permanently installed piping system. This piping system will be purged and tested annually.

e. Explosives

(1) Explosives will be stored and handled as stipulated by Naval Sea Ordnance Publication 5 (NAVSEA OP 5) standards.

(2) Storage area will be secured and have a clear area of 50 feet from buildings.

(3) The District Fire Chief will be kept informed of type and quantity of products at all times.

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(4) Fireworks will not be stored or discharged without prior approval of the Commandant.

f. General Storage Areas

(1) Flammable/combustible liquids will be stored in a metal flammable liquid locker.

(2) Precautions should be taken as follows:

(a) Have a clear area from flammable liquid locker of 25 feet.

(b) If container is found to be leaking, call the Fire Department, have MSDS sheets of all products in locker, and provide to Fire Department upon arrival.

(c) Maintain accessibility to stack interior for fire-fighting purposes.

(d) Ensure proper ventilation for materials, which emit flammable vapors.

(e) Use only fork trucks approved or listed by a nationally recognized testing agency for use in hazardous areas.

g. Daily Use of Flammable Liquids

(1) The presence of flammable or combustible liquids inside any facility creates unusual problems when attempting to provide safe escape routes, limit flame spreading and suppress rapid fire. The only effective method when dealing with flammable liquids involves the user developing a safety-conscious attitude when dealing with these potentially hazardous materials.

(2) Storage of flammable/combustible liquids:

(a) Outside storage facilities should be used whenever possible.

(b) When interior storage is essential for the unit operation, the following will be adhered to:

1 Storage in hallways, stairways, equipment rooms, and mechanical rooms is prohibited. Locations of all interior storage facilities will be approved by the Fire Department and clearly marked "FLAMMABLE - KEEP FLAME AWAY."

2 When not being used, containers will be secured in an approved cabinet or storage room.

3 The quantity stored will be limited to a three-day work supply.

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(3) Authorized containers for Flammable/Combustible liquids:

(a) Glass containers are prohibited except when used in laboratories where liquid purity is essential. The maximum capacity of any individual container is one gallon.

(b) Approved safety cans used inside facilities will not exceed a one-gallon capacity for flammable or combustible liquids.

(c) DOT-approved containers are for laboratory use only and will not exceed a five-gallon capacity for flammable or combustible liquids.

h. Dispensing Flammable Liquids

(1) Flammable liquids will not be dispensed in any building.

(2) Flammable liquids being dispensed must be 25 feet from any building.

(3) Gas stations will have no less than two fire extinguishers on site at all times.

(4) Gas stations will have an attendant present when open. They will be trained in the proper use of fire extinguishers and use of the emergency shut off switch.

(5) Gas stations will have emergency shut off switches at proper locations to help control the flow of product in the event of an emergency.

(6) Gas stations will have a visible sign showing the emergency phone number for the installation fire department.

(7) All dispensing units will be bonded and grounded to prevent static electricity.

(8) Transfer of flammable liquids by compressed air or gas is prohibited.

i. Used Flammable Liquids. Used flammable liquids will be collected in steel drums, cans, or other designated receptacles within hazardous waste requirements.

11. Liquefied Gases. The storage and handling of liquefied petroleum and liquid oxygen will conform to OSHA and NFPA standards.

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12. Transferring Hazardous Materials

a. The Fire Department will be notified of proposed transfers of explosives or other hazardous materials. Such transfers will be subject to provisions of appropriate standards. The carrying of gasoline in government and privately owned vehicles is prohibited, unless transported in approved safety cans not to exceed five gallons.

b. All contractors that require gasoline on government property will only use approved safety cans not exceeding five gallons capacity.

13. Fueling Operations

a. Off-Loading (Unloading of Gasoline Tank Trucks)

(1) Drivers will remain with vehicle during all unloading operations. Only qualified and authorized persons will be permitted to operate equipment.

(2) All vehicles will have a wheel chock in place when vehicle is parked for off-loading.

(3) The Fire Department will exercise control of operations in the event of an emergency or unusual condition.

(4) All radios and electrical equipment within a distance of 100 feet will be turned off while unloading.

(5) Tank vehicles will not be operated unless they are in good repair and devoid of accumulations of grease, oil, and other flammable materials.

(6) Only non-ferrous tools will be used on valves and hose fittings.

(7) Emergency shut-off valves will be tested and kept in good operating condition.

(8) Manhole covers on gasoline tankers will be closed during vehicle unloading and while the vehicle is entering or leaving government installations.

(9) Vehicle and tank will be properly bonded and the unit grounded in an approved manner.

(10) Personnel will not be permitted on top of tanks while wearing boots or shoes with ferrous metal cleats or taps.

(11) Smoking is prohibited at all times within 100 feet of the unloading or storage area.

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(12) Wedges, locking devices, etc., which restrict instant shut-off of fuel lines during loading and unloading operations are prohibited.

b. Filling Stations

(1) Only authorized qualified personnel will be permitted to operate gasoline and pumping equipment, except for self-service pumps.

(2) Personnel engaged in dispensing gasoline will be familiar with electrical gasoline pumps, pumping equipment, and:

(a) Proper procedure to follow when reporting a fire.

(b) Location and proper operation of the nearest fire extinguisher.

(c) Emergency shut down procedures.

(3) Operators of vehicles or equipment will turn off engines, vehicle lights, radios, and personal cell phones prior to dispensing fuel.

(4) No gasoline will be dispensed into a vehicle unless it is equipped with the proper gasoline tank cap.

(5) Gasoline will not be dispensed to personnel carrying vehicles (buses, trucks, etc.,) while passengers are on board.

(6) Gasoline will not be dispensed from pumps during off-loading operations.

(7) During severe electrical storms, dispensing of gasoline will be discontinued.

(8) The gasoline tank of a vehicle will not be refueled while explosives are in the vehicle except in an emergency, and only after static grounding devices are properly connected.

(9) Nozzles used in connection with gasoline dispensing apparatus will be labeled by a nationally recognized testing agency and meet NFPA and OSHA standards.

(10) The exhaust pipes of operating internal combustion engines will be kept at least 10 feet from any vehicles being refueled.

(11) Small amounts of gasoline for emergency use only may be dispensed at the direction of the filling station supervisor, but only in approved safety cans.



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(12) Engines or other spark-producing equipment will not be operated within 50 feet of a gasoline spill until the exposed area has been thoroughly cleared of flammable vapors.

(13) Portable fuel cans shall be removed from the vehicle and placed on the ground before filling.

c. Exchange Self-service Lanes: Self-service lanes will be constantly monitored by a qualified member of the service station staff who is familiar with the above requirements.

#### 14. Hazardous Activities

a. Includes Welding, Cutting, soldering, brazing and other hazardous operation that produces heat or open flame.

(1) Welding or cutting that produce heat includes gas or electric arc welding, cutting, soldering, brazing and any other "Hot Work" exceeding 400 degrees (F).

##### (2) Equipment

(a) Approved equipment will be used and maintained in a safe operating condition. Backflow preventers must be present on all torch equipment.

(b) A cylinder or cylinder manifold for oxygen will be provided with a pressure regulation device installed for use with oxygen and clearly marked.

(c) Fuel gas will not be used from cylinders through torches or other devices equipped with shut-off valves, without reducing the pressure through a suitable regulator attached to the cylinder or manifold.

(d) Cylinders, valves, regulators, hose and other apparatus and fittings containing or using oxygen cylinders may not be handled with oily hands, oily gloves, greasy tools or greasy equipment.

(e) Acetylene and oxygen cylinders on portable welding rigs must be chained in an upright position.

(f) Where welding cable or hose is in the path of traffic, it must be protected from chafing and damage and properly secured to prevent undue strain.

(g) Welding and cutting outfits used outside of specifically designed areas must be equipped with two 10-pound ABC type fire extinguishers and flame retardant blankets.

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b. Permits

(1) For all welding or open flame heat producing cutting operations performed aboard an installation, a permit is required. If at all possible, a one day notice shall be given to the Fire Department requesting a hazardous operations permit.

(a) A permit may be issued daily or for greater periods of time depending on the nature of the hazardous operation, but not to exceed more than a 30 day period.

(b) Persons performing the operation must have two 10-pound ABC type fire extinguishers at a minimum.

(c) An additional person is required to conduct fire watch.

(d) The person performing the operation must be able to speak and understand English language.

(2) Permits must be kept on job site at all times and the site will be subject to inspection by authorized Fire Department personnel.

(3) In areas where contractors have been issued permits for heat producing operations, it is the Contract Inspector's responsibility to ensure all provisions of the permit are adhered to.

(4) Fire Department may at any time shut down the operation for violation of these requirements or unsafe operations.

c. Fire Prevention

(1) General operation of a welding shop will be conducted in approved and specially prepared shops only.

(2) When operations are conducted outside approved shops:

(a) Remove all combustible materials to a safe distance.

(b) Clean and wet down wooden decks.

(c) Do not cut, weld, solder, and braze, etc., metal attached or adjacent to any combustible surface.

(d) Establish and properly instruct a fire watch and furnish the scene with appropriate fire extinguishers.

(e) When welding or cutting is to be performed in any confined space, the entry permit must be on site and proven

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gas free before open flame permit will be issued by the Fire Department. A confined space permit from the OSH Gas Free Engineer is also required.

(f) Wharf and Pier operations. Welding and cutting aboard barges, tugs, or other vessels will be restricted to the side of the vessel away from the wharf or pier.

d. Preparing Equipment for Periods of Non-use

(1) When welding or cutting equipment is disconnected or transported for a substantial amount of time, (lunch-hour or overnight), all electrodes will be removed from the holders so that accidental contact cannot occur. Machine is also to be disconnected from the power source.

(2) When gas welding or cutting is discontinued for a substantial period of time, (lunch hour or overnight), the torch valves will be closed. The gas supply to the torch must be completely shut off and removed along with the gages and bottle caps will be put in place.

e. Painting

(1) Spray painting will not be conducted within a building unless standard spray booths and exhaust systems are provided. Spray booths must be designed, installed, and maintained. Interior spraying of buildings may be permitted if all required safeguards are implemented.

(2) Tarpaulins and drop cloths used in painting operations, other than water-thinned paint, may not be folded or stored within buildings. Such cloths may be folded if they are stored in metal lockers that are separated 25 feet from any possible source of spontaneous ignition.

f. Battery Charging

(1) Battery charging equipment and shops must be installed, maintained, and operated by proper codes and standards.

(2) Smoking, open type (unprotected) lights and switches, or flame and spark producing devices will not be allowed within 50 feet of battery while charging.

g. Open Fires

(1) Open fires will not be started at any location without obtaining an open flame permit from the Fire Department.

(2) The District Fire Chief must approve incinerators maintained by departments for disposal of classified material or contaminated matter.

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h. Cleaning and Refinishing of Floors or Bowling Alleys. Whenever floors are to be cleaned in preparation for refinishing, the Fire Department must be notified before operations begin. Flammable liquids with a flash point below 140F degrees shall not be used to clean and/or refinish floors or decks. All operations must be in compliance with precautions required by the District Fire Chief.

i. Disposal of Hazardous Materials. Disposal of flammable liquids, chemicals, and other hazardous materials will be under the direct supervision of the safety officer.

j. Tar Pots, Applications of Tar, Asphalt and Similar Materials

(1) A permit must be obtained from the Fire Inspector prior to operating a tar pot or similar heating unit. A one working day notice is required.

(2) Tar pots may not be operated inside, on the roof of or within 25 feet of any building. A competent operator with two 10 pound ABC type fire extinguishers at the tar kettle and two similar extinguishers at the application site must attend them.

(3) Kettles for heating materials must be equipped with proper heat controls and will be properly designed to ensure controlled uniform temperature throughout the contents to prevent spot heating. Heating units and kettles must be maintained in good working order and lids must be free to close properly.

(4) The material may not be heated above the temperature necessary to produce workable fluidity and may never rise above the 550F-degree mark.

(5) The surface on which the material is to be flooded mopped, or otherwise applied must be free of any foreign substance.

(6) When the material is applied within buildings or other enclosed areas, the atmosphere must be free of dust and adequate ventilation will be provided to remove smoke and fumes.

(7) Flame devices and other sources of ignition are prohibited in or near the area of application.

(8) Mops, brushes and other applicators must be stored in a safe isolated location away from roof when not in use.

(9) Tar pots must be shut down and stored after normal working hours.

(10) The operator of the tar pot must be able to speak and understand English.

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15. Outdoor Area

a. Dry weeds, grass and brush.

(1) These may not be permitted to accumulate around buildings, open storage areas, fuel storage tanks, and railroad properties. Such growth should be cut frequently and disposed of in a safe manner or chemically controlled.

b. Areas beneath or within 50 feet of buildings must be regularly policed to keep them free from accumulation of debris and combustible vegetation.

c. Outdoor Storage

(1) Must be kept clean and neat.

(2) Storage must meet all rules, regulations, standards, codes, and instructions.

d. Excavating. Extra care will be taken in excavating around gas mains, oil pipelines, etc. Smoking or open flames of any kind are prohibited in areas where flammable gas may be present. In such places, if gases are detected, portable blowers or other satisfactory methods must provide ventilation. Electrical equipment used in these areas will meet the requirements of a nationally recognized testing agency for hazardous locations.

e. Storm Drains, Sewers and Water Areas

(1) Dumpsters and other central ash units must be spaced a minimum of 15 feet from all buildings.

(2) The doors or hatches of these units must be kept closed.

(3) These units will not be placed where they obstruct or interfere with the exit or entrance of any building or prevent evacuation from fire escapes.

16. Fireworks

a. Except for command controlled displays, the possession of fireworks (for sale, storage, or use) is prohibited within NDW to include housing areas aboard navy property.

b. Fireworks do not include paper caps or highway flares.

c. The term fireworks also refer to all types of sparklers and black powder. Black powder shall be prohibited in family housing and other occupancies not approved for storing Class B explosives. Up to 20 pounds of smokeless powder may be permitted

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in family housing if stored per NFPA requirements and approved by the Fire Department.

17. Radioactive Material

a. The District Fire Chief or Senior Fire Officer on duty must be notified immediately of the transportation, storage, handling, or use of any radioactive material, including weapons, which come into the confines of this activity.

b. The department controlling or using the material will make the above notification and will provide the following information:

(1) The general types of radioactive materials and possible emission hazard, if any.

(2) The specific location where radioactive materials will be used or stored.

(3) Specific information on the physical properties and characteristics of radioactive material.

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## CHAPTER IV FIRE

### DEPARTMENT

1. General. Fire-fighting equipment may not be moved from its assigned location except for fire fighting, repair, or maintenance. This includes fire-fighting equipment accessories.

#### 2. Fire-fighting Equipment

a. The District Fire Chief's office must be notified of any possible impairment in fire protection that involves water systems, pumps, sprinkler systems, fire detection and alarm systems, and or similar installed equipment. Restoration to service must be reported promptly to the District Fire Chief's office.

(1) Inspection, maintenance and location of all first aid fire-fighting equipment is a function of the Fire Department.

(2) In case of fire, select and use the appropriate fire extinguisher:

(a) Water on Class "A" combustibles, which require wetting to lower the temperature such as wood, cloth, rubbish, etc.

(b) Carbon Dioxide (CO<sub>2</sub>) or Dry Chemical on Class "B" combustibles such as: oils, paints, thinners, solvents, etc., to smother or shut off the oxygen.

(c) Carbon Dioxide (CO<sub>2</sub>) on Class "C" ENERGIZED electrical equipment, which requires an extinguishing agent that is a non-conductor.

(d) ABC Triple Class Dry Chemical on Class "A", "B", or "C" types of fires such as: wood, paper, gasoline, oil, or electrical.

(e) Metal X or GI Power on Class "D" fire of combustible metals (e.g., magnesium, titanium, zirconium, sodium, and potassium).

(f) Extinguishing agent "K" on fires involving cooking greases or cooking oils.

#### 3. Fire Hydrants, Fire Department Connections, and Post Indicator Valves

a. Fire Hydrants may not be used for purposes other than fire fighting unless approved by the District Fire Chief. In these instances, a Fire Department representative may issue a permit for use of a hydrant. The Fire Department will be notified prior to their use and again following their use or

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repair. At NSA Patuxent River, a yard type hydrant is located at Fire House #1, Building 103 for non-fire protection use. Likewise, a fire hydrant is located in front of Building P-5 (Fire Station) aboard Bolling Air Force Base for similar purposes.

b. Clearance. NO PARKING of vehicles or equipment within 15 feet of any fire hydrant. Adequate clearance as determined by the District Fire Chief shall be provided for all sprinkler control valves and Siamese pumper connections. Fire hydrants, fire department connections, post indicators, and other water control valves shall be clearly visible and free of all obstructions.

c. Marking. Fire hydrants and other fire protection equipment will be marked in accordance with NFPA 291 and have prior approval from the District Fire Chief.

#### 4. Sprinklers

a. Shutting off Sprinklers at Fires. In case of fire in a structure protected by a sprinkler system, the sprinkler system may be shut off ONLY by permission of the Fire Department Officer in Charge.

b. Testing and Maintenance. Testing and maintenance will be accomplished per NFPA, Code of Federal Regulations, and manufacturer's standards.

c. No object such as ductwork, conduit piping, etc., will be hung from or supported by sprinkler system piping.

d. Sprinkler Connection. There will be no parking within 15 feet of sprinkler connection. At NSA Patuxent River, all exterior fire department connections shall be equipped with a durable locking cap that prevents cap removal and vandalism. In an emergency situation, Fire Department personnel can remove the cap with a special key wrench.

5. Fire Detection and Alarm Systems. Only Fire Department and Public Works (PW) Fire Alarm Technicians shall be authorized access to fire alarm control panels (FACP). Fire detection devices shall not be tampered with. Prior to performing any work under raised flooring in areas where fire detection equipment exist, the local Fire Prevention Office or PW Service Desk shall be contacted to de-activate the fire protection systems. Upon completion of work, PW and Fire Department shall be contacted to reactivate the systems. Fire Protection Systems shall not be left out of service overnight, over weekends, or other times when the structure is not occupied. In emergency situations, the fire protection systems may be left out of service for extended periods of time, but only after alternate emergency action plans are coordinated with the Fire Department.



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6. Aisle Space

a. Distances

(1) Shall meet all requirements of NFPA 101 "Life Safety Code" for respective occupancy types.

b. Adequate access shall be maintained as stated in the Life Safety Code, with proper identification signs posted, will be maintained at all times to: fire alarm boxes, evacuation pull station, standpipe connections, fire extinguishers, fire escape, sprinkler system valves, and utility cutoffs, i.e., electrical panels, gas, water and steam controls.

7. Traffic Controls

a. Right of Way. Upon approach of fire-fighting apparatus or emergency vehicles displaying warning lights and sounding sirens, all traffic must immediately pull to the curb and give complete right of way until all such vehicles have passed, and may not follow apparatus within 500 feet.

b. Parking. No vehicle will park in such a manner as to obstruct the passage or operation of emergency vehicles.

c. Fire Hose. No vehicle may drive over any fire hose.

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**CHAPTER V PIERS**

**AND SHIPS**

1. Alarms. Fire or suspected fire on any vessel at a pier will be reported immediately to the Fire Department. In the event of fire or other emergency, any vessel berthed at the pier may be ordered to move.
2. Smoking. There will be no smoking on piers.
3. Housekeeping
  - a. Cleanliness. The crew of any ship or vessel berthed at the pier is responsible for policing the pier adjacent to the ship or vessel, maintaining ship's equipment on the pier in an orderly manner, and preventing littering of other sections on the piers.
  - b. Access. The ship's crew will make certain that adequate space is available on the pier for free passage of fire apparatus.
4. Vehicles. No vehicles may be parked or operated on the piers.
5. Fueling. Fueling operations may not be conducted at the pier prior to an inspection by the Fire Department. The Fire Department must be notified at least eight hours before securing operations in order that the Fire Department representative may be present during the breaking of the fuel line.

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**CHAPTER VI**

**SALVAGE**

1. Records. In case of fire or other emergency requiring evacuation, and time permitting, records and documents will be secured and classified material stowed in accordance with pertinent instructions. If time does not permit, each person who has classified material in his or her possession will ensure that such material is properly safeguarded.

2. Equipment. The head of department or their designee to ensure adequate measures are taken to prevent further damage will supervise the salvage of equipment after a fire.

3. Security

a. Security guards will be posted during salvage operations to ensure proper security of classified material and to safeguard any evidence of fire origin. In the event classified material is part of the evidence, the material will not be removed unless approved by the District Fire Chief.

b. It should be understood that security guards are not in charge but under the direction of the District Fire Chief during fire operations.

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## CHAPTER VII

### HANGARS AND HANDLING OF AIRCRAFT

1. General. It shall be the responsibility of the Unit Maintenance Officer to instruct and train all personnel concerned in fire prevention and safety around aircraft and related operations. Maintenance operations will be supervised by competent authority.

2. Fire Lanes. Suitable fire lanes for firefighting equipment will be designated, marked, and kept clean. With reference to precise width or length of fire lanes, the Fire Department will be consulted. At a minimum, fire lanes:

- a. Shall be designated along all perimeter walls of hangar decks.
- b. Shall not be changed or established without permission of the District Fire Chief.
- c. Shall be five feet wide starting from the equipment lane, i.e. sprinkler valves, motors, generators, etc.
- d. Shall be marked with a four inch red line painted on the deck.

(1) Smoking. No smoking or open flames will be permitted within 50 feet of parked aircraft, hangars, shops, or other buildings in which highly flammable materials are stored or being used. During refueling or defueling operations, this distance shall be extended to 100 feet. These no smoking areas will be placarded.

(2) Aircraft Parked in Hangars. All available tow bars shall be attached to aircraft parked in hangars. The only exception to this shall be when it is necessary to do maintenance work or inspection work on the gear which the bar is attached. Aircraft will be parked in such a manner as to facilitate free aisle spacing, and in such a position that in the event of fire no aircraft could block removal of the remaining aircraft in the hangar. Aircraft parked in hangars for repair or maintenance work shall be grounded appropriately.

3. Aircraft Fueling and Starting. In all aircraft fueling operations, reference I shall be consulted and complied with.

- a. Aircraft shall be headed into the wind whenever possible.
- b. During fueling, there shall be a three-way ground (aircraft, fuel truck, ground).

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c. Fuel trucks must be parked far enough away to use full length of fuel hose. Trucks, shall not enter, nor be stored in hangars under any circumstance. The truck must be parked in such a way that the driver could move the truck away from aircraft in the event of a fire. The fuel hose must be equipped with a dry, break-away coupling. Trucks will not be left standing and/or parked in front of hangar doors.

d. A fire watch is required with flight line fire extinguisher, along with fuel operator and auxiliary power operator (three personnel minimum).

e. Whenever an engine is started, personnel with portable fire extinguishers approved for the purpose shall always be maintained in the immediate vicinity of the engine.

(1) Passageways. Passageways in aircraft hangars will be clearly defined and kept free of hazardous obstructions. Clear passageways will be maintained as approach ways for firefighters and for easy access to firefighting equipment, sprinkler control valves, electrical and switch panels.

(2) Stacking Materials. Materials in the hangar will be securely stacked and maintained in an orderly manner. In no event will materials be stacked higher than 18" below sprinkler heads.

(3) Vending Machines. Electrically operated vending machines will be properly grounded. These machines will not be located in areas where concentration of explosives, gases, or vapors may exist. Suitable approved containers will be provided for waste from vending machines to prevent foreign object damage (FOD) to aircraft.

(4) Paint Spraying. Paint spraying in hangars shall be done in the properly equipped paint spray booths designated for such purpose. Minor painting such as the incidental touch-up spray work on large aircraft that cannot be moved into a paint shop area is permitted. This includes lettering, emblems, touch-up repair of control surfaces, small signs and markings. This work is subject to the following precautions:

(a) Quantity of flammable materials in any spray gun shall not exceed one quart.

(b) The hangar shall be fully ventilated.

(c) No other work operations shall be conducted or be in progress within 50'.

(d) The total quantity of flammable liquids available to the painters in the hangar at any given time shall not exceed five gallons total.

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4. Storage of Vehicles. The storage of passenger automobiles or trucks within hangars housing aircraft is prohibited. The entry of such vehicles into hangars in connection with cargo or delivery operations shall be under restricted conditions.

5. Internal Combustion Engines. All internal combustion engine powered equipment operating inside hangars shall be operated at least 20' from any part of any aircraft, and shall be equipped with the following safeguards: spark arresting mufflers; flame arrester on carburetor intakes; metal sediment bowl in fuel line; shielded spark plugs; and high tension wires.

# FIRE BILL

BUILDING NO. \_\_\_\_\_

## IN CASE OF FIRE

1. USE NEAREST FIRE ALARM BOX OR TELEPHONE EXT. \_\_\_\_\_

Know the location of the nearest Fire Alarm Box and the nearest telephone in your area. When using the telephone, REPORT BUILDING NUMBER. Upon arrival, direct Fire Department to the scene of fire.

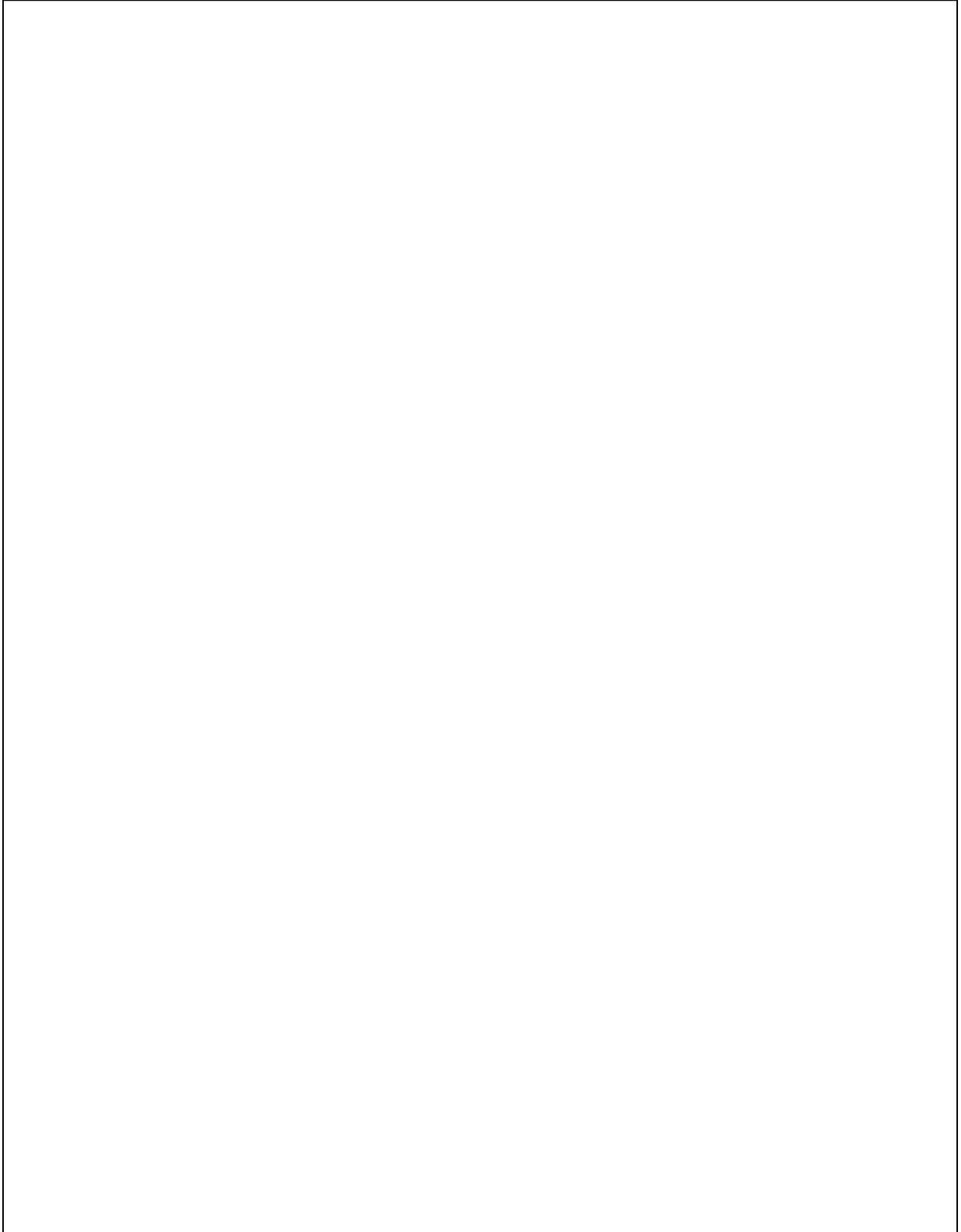
2. SPREAD THE ALARM-PASS THE WORD

All personnel except fire parties clear the area.

3. IF TIME PERMITS, CLOSE ALL DOORS AND WINDOWS TO CONFINE THE FIRE AND PREVENT DRAFTS. DO NOT ENDANGER YOURSELF OR OTHERS IN THIS EFFORT.

4. USE PROPER EQUIPMENT AT HAND TO EXTINGUISH THE FIRE, PENDING ARRIVAL OF THE FIRE DEPARTMENT.

Enclosure (1)





Appendix C  
Comprehensive Work Approval Planning: Naval Support Activity South Potomac  
Instruction 11010.45



DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY  
SOUTH POTOMAC  
6509 SAMPSON ROAD  
DAHLGREN, VIRGINIA 22448-5106

NSASPINST 11010.45  
PRDH40  
NOV 23 2010

NAVAL SUPPORT ACTIVITY SOUTH POTOMAC INSTRUCTION 11010.45

From: Commanding Officer, Naval Support Activity, South Potomac

Subj: COMPREHENSIVE WORK APPROVAL PLANNING INSTRUCTION

- Ref:
- (a) 42 U.S.C. 4321-4347, National Environmental Policy Act of 1969, as amended
  - (b) 40 CFR Parts 1500-1508, Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act of 1969
  - (c) 32 CFR Part 775, Procedures for Implementing the National Environmental Policy Act of 23 Feb 04
  - (d) NAVSEA OP5, Volume 1 Seventh Revision, Ammunition and Explosives Safety Ashore of Jul 08
  - (e) DoD Instruction 4715.9, Environmental Planning and Analysis of 3 May 96
  - (f) OPNAVINST 5090.1C, Navy Environmental and Natural Resources Program Manual of 30 Oct 07
  - (g) SECNAVINST 5090.6A, Environmental Planning for Department of the Navy Actions of 26 Apr 04
  - (h) Navy Supplemental Environmental Planning Policy of 23 Sep 04
  - (i) NAVFACINST 11010.45, Regional Planning Instruction Overview of Sep 00
  - (j) NAVFACINST 11010.45, Regional Planning Instruction Site Approval Process of May 01
  - (k) NDW Regionally Integrated Master Program, Land Use Analysis Update
  - (l) Naval Support Activity South Potomac Installation Appearance Plan

- Encl:
- (1) Comprehensive Work Approval Planning Process Flow Diagram
  - (2) Comprehensive Work Approval Application Package
  - (3) Guidance for Preparation of Detailed Record of Categorical Exclusion (CATEX)

1. Purpose. To establish policies, procedures, and responsibilities to facilitate the inter-organizational evaluation and approval of proposed actions within Naval Support Activity South Potomac (NSASP). This instruction shall ensure proposed actions are evaluated, planned, designed, and executed in compliance with the Installation's land uses and development

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standards (e.g., Regionally Integrated Master Program (RIMP), Installation Master Plan), as well as all applicable federal, state, and local regulations, and Navy policies and instructions. NSASP comprehensive work approval planning process documents are included as enclosures (1), (2), and (3).

2. Scope. This instruction applies to proposed actions within NSASP, including actions initiated by supported and supporting commands and lessees within NSASP that impact infrastructure (e.g., structures, utilities, roads), the environment, explosives safety, safety (e.g., occupational, community, operational, traffic), security, anti-terrorism and force protection (AT/FP), land use planning and development, and supported and supporting commands missions and objectives.

3. Background.

a. The potential exists that actions may be performed without adequately considering impacts to the environment, infrastructure, explosives safety, safety (e.g., occupational, community, operational, traffic), security, anti-terrorism and force protection (AT/FP), land use planning goals, and supported and supporting commands missions and objectives. References (e) through (l) set forth the policy and guidance for actions on Navy facilities to ensure that all impacts are assessed during initial planning. Early evaluation reduces potential project delays, minimizes costs to the Navy, and ensures actions are in compliance with applicable laws and regulations, thereby, minimizing the risk to employee safety, violations and potential fines.

b. The National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321-4347, reference (a), requires federal agencies to integrate environmental planning into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. NEPA requires that federal agencies "utilize a systematic, interdisciplinary approach that shall insure the agency integrates use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment."

4. Definitions.

a. Administrative Records. All documents, emails and materials directly or indirectly considered by the agency decision maker relevant to the agency's decision-making process and the basis for the agency's decision.

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b. Action Proponent. The command, organization, or individual acting on behalf of the command or organization that is responsible for initiating and obligating resources for a proposed action. In general, the action proponent or designee should be at the lowest level in the organization that "owns" the action being proposed. The proponent has the responsibility to obtain endorsement from their organization and from NSASP, if applicable for the purpose and need of the action during the project scoping phase; and to prepare or ensure sufficient funding for the preparation of the appropriate planning and environmental documentation (e.g., Environmental Assessment (EA), Categorical Exclusion (CATEX), explosives safety submission (ESS) determination request, explosives safety site approval request (SAR)). The designation of the action proponent may be elevated to a person higher in the organization if warranted by the significance of the proposed action.

c. Categorical Exclusion (CATEX). A published category of actions that do not have, under normal circumstances, individually or cumulatively, a significant impact to the environment; or, that have been previously found to have no such effect as a result of procedures adopted by the Navy for implementing the Council on Environmental Quality (CEQ) regulations and for which, therefore, neither require an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). Department of the Navy (DoN) approved CATEXs are listed in reference (f) and reference (g).

d. Conditions of Approval. Stipulations to be adopted by the action proponent that are part of the basis for the final decision to ensure consistency with the Installation's land uses and development standards and to mitigate potential environmental, human health and safety, operational safety, regulatory or other concerns associated with a proposed action.

e. CWAP Coordinator. Site specific Public Works Department (PWD) representative responsible for initiating the proper review of proposed actions through CWAP, preparing proposed action documentation, coordinating CWAP review and approval of proposed actions with the Action Proponent and Interdisciplinary Review Team (IRT), and maintaining all applicable administrative records.

f. Emergency Action. Any action that must be performed immediately to safeguard property, stop hazardous substance or pollutant discharges, or address immediate human life/health endangerment conditions including major natural disasters or an imminent threat to national security.

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g. Environmental Assessment (EA). A concise public document prepared according to the requirements of reference (c) that provides an analysis of the potential environmental impact of a proposed action. Action proponents must prepare an EA when they do not know beforehand whether or not the proposed action shall significantly affect the environment or be controversial regarding environmental effects. An EA shall result in a Finding of No Significant Impact (FONSI), or, if a significant impact is expected, preparation of an Environmental Impact Statement (EIS) shall be warranted.

h. Environmental Impact Statement (EIS). An environmental document prepared according to the requirements of reference (c) for an action that is anticipated to have a significant effect on the quality of the human environment. An EIS discusses the environmental consequences of the action and proposes measures that the action proponent shall undertake to minimize adverse effects of the proposed action.

i. Explosives Safety. The summation of all actions conducted at DON activities, ashore, and afloat, designed to manage and control the risks and hazards inherent with ammunition and explosives operations. Explosives safety is the process used to prevent premature unintentional, or unauthorized initiation of explosives and devices containing explosives; and with minimizing the effects of explosions, combustion, toxicity, and any other deleterious effects. Explosives safety includes all mechanical, chemical, biological, electrical, and environmental hazards associated with explosives, hazards of electromagnetic radiation to ordnance, and combinations of the foregoing. Equipment, systems, or procedures and processes whose malfunction would hazard the safe manufacturing, handling, maintenance, storage, transfer, release, testing, delivery, firing, or disposal of explosives are also included.

j. Finding of No Significant Impact (FONSI). A document prepared by a federal agency showing why a proposed action would not have a significant impact to the environment and thus would not require preparation of an environmental impact statement. A FONSI is based on the results of an environmental assessment.

k. Interdisciplinary Review Team (IRT). A group comprised of individuals responsible for the review and critique of proposed actions in accordance with their specific area of expertise and mission applicability. Areas of expertise include, but are not limited to cultural and natural resources, air and water compliance requirements, hazardous waste management, facilities design and construction, sediment/erosion control, stormwater management, land use planning and

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development, explosives safety, security, AT/FP, and safety (e.g., occupational, community, operational, traffic). Supported and supporting command representatives are included in the IRT, as appropriate.

l. Lessee. An entity to whom Navy property is leased (e.g., Public-Private Venture (PPV) housing where the Navy leases land to a private company for the purposes of building and managing residences and other amenities for Navy personnel).

m. Proposed Action. Any action that has the potential for physical impact to the environment, community, infrastructure, explosives safety, safety (e.g., occupational, community, operational, traffic), or land use planning and development. Actions include, but are not limited to: new activities or processes, changes in existing operations, change in land use, change in facility use or in methodology/equipment, construction (e.g., Military Construction (MILCON) projects), sustainment, restoration, demolition, public/private venture projects, unspecified minor construction projects, land acquisition, and locally funded projects), or actions that are intended to meet a specific supported or supporting command objective.

n. Subject Matter Expert (SME). An individual with specialized knowledge of the sensitivities and applicable regulatory requirements as they relate to a proposed action. Subject matter experts review action parameters relevant to their specific discipline to evaluate the potential effects of a proposed action. SMEs are added to the IRT at their request, as appropriate.

o. Record of Decision (ROD). A document required by NEPA that is separate from, but associated with, an EIS. The ROD publicly and officially discloses the responsible official's decision on which alternative assessed in the EIS shall be implemented.

5. Policy. Proposed actions within NSASP that impact infrastructure (e.g., buildings, structures, utilities, roads), the environment, explosives safety, safety (e.g., occupational, community, operational, traffic), security, anti-terrorism and force protection (AT/FP), land use planning and development, and supported and supporting commands missions and objectives shall be adequately evaluated through the Comprehensive Work Approval Planning (CWAP) process. While action proponent commands have the inherent responsibility to ensure certain aspects of an action (e.g., employee safety), NSASP also must ensure those aspects while also ensuring actions are consistent with NSASP land use policies and development standards, environmental

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regulatory requirements and supported and supporting commands missions and objectives. Proposed actions shall be evaluated through CWAP to ensure this consistency is applied across the Installation.

a. The Action Proponent shall submit, in the earliest conceptual planning stage prior to the commitment of resources, a CWAP application to the site specific PWD CWAP Coordinator for the evaluation of a proposed action.

6. Procedures. Enclosure (1) illustrates the action review and approval process. The following procedures shall apply for all supported and supporting commands and lessees within NSASP. An example NSASP CWAP application is included as enclosure (2).

a. The PWD CWAP Coordinator representative shall serve as the process coordinator at each Naval Support Facility. The PWD CWAP Coordinator shall review the sufficiency of the CWAP application and shall initiate the evaluation of proposed actions. The PWD CWAP Coordinator shall perform a preliminary review of the proposed action to identify affected resources and land use planning considerations, prepare proposed action documentation, initiate a concurrent interdisciplinary review of proposed action supporting documentation, consult with SMEs, and maintain all records of review and decisions as the administrative record in conjunction with the site specific Environmental Program Office.

b. The IRT, comprised of SMEs, shall review action parameters relevant to their specific discipline to evaluate the potential effect and all applicable regulatory requirements as they relate to a proposed action and provide a reasonable range of alternatives or mitigation requirements for achieving the purpose(s) of a proposed action.

c. The degree to which a proposed action is evaluated shall depend on the potential impact to infrastructure (e.g., buildings, structures, utilities), environment, explosives safety, safety (e.g., occupational, community, operational, traffic), and consistency with NSASP land use planning and development (e.g., Regionally Integrated Master Program (RIMP)) and supported and supporting commands missions and objectives.

d. The Facilities Management Division Director or designee shall determine if the proposed action needs to be reviewed and approved by the appropriate NDW Mission Integration Group (e.g., Installation Mission Integration Group (IMIG), Regional Mission Integration Group-Working Group (RMIG-WG), Regional Mission Integration Group (RMIG)).

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e. SMEs shall determine if additional documentation (e.g., explosives site approval request, State Historic Preservation Office (SHPO) approval) is required for the execution of the action.

f. The appropriate level of NEPA documentation required shall be determined through CWAP and shall be endorsed by the NSASP Installation Environmental Program Director or designee, in accordance with ref (f) or applicable regulations. The determining factors for selecting the appropriate level depend on the type of action proposed and the anticipated significance of the cumulative environmental effects associated with the action.

g. The NSASP Installation Environmental Program Director or designee may determine that an EA or EIS is not required, but a detailed record of CATEX shall be prepared to determine the level of NEPA documentation required to support the proposed action and otherwise demonstrate compliance with reference (f) and reference (g). Enclosure (3) provides guidance for the preparation of a detailed record of CATEX. The detailed record of CATEX shall be part of the administrative record and included in the CWAP documentation package for the proposed action, if applicable.

h. Supported commands and lessees developing an EA or EIS, which affects resources within NSASP shall coordinate with NSASP to obtain endorsement. Prior to commencing an EA or an EIS, the action proponent shall submit a brief NEPA notification letter for review and endorsement to the NSASP Commanding Officer. The notification letter shall include the following: a concise and focused description of the proposed action, purpose and need statement, discussion of alternatives to be considered, and endorsement from the action proponent.

i. Prior to NSASP's endorsement of a proposed action, the Facilities Management Division Director or designee shall ensure that proposed actions have been adequately evaluated through CWAP for land use affect and are consistent with NSASP land uses and development standards and supported and supporting commands missions and objectives, and meets Navy planning criteria (e.g., Installation Appearance Plan (IAP), NAVFAC P-80).

j. The action proponent may appeal the decision of the Installation Environmental Program Director and/or the Facilities Management Division Director to the NSASP Public Works Officer and NSASP Commanding Officer.



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k. NSASP has the authority to declare an emergency circumstance. For any emergency that requires immediate action and has the potential for significant impacts (e.g., infrastructure, environment, explosives safety), the action proponent shall, as soon as practicable, facilitate appropriate consultation with the respective PWD CWAP.

l. The NSASP Commanding Officer has the authority to review requests from Commanders of supporting commands or their representative and determine whether unusual circumstances may warrant expedited review and approval outside of the CWAP process.

#### 7. Responsibilities

a. Action Proponent shall:

(1) Submit a CWAP application for proposed actions for review and approval during the initial planning stages to determine the level of impact and if this impact can be minimized;

(2) Possess a thorough understanding of the purpose and need for the proposed action and ensure the purpose and need of the proposed action meets their command objectives and has been endorsed by their command prior to submission of a CWAP application;

(3) Designate a command representative for the proposed action to be included in the IRT that shall be available for technical consultation and provide assistance during the evaluation process;

(4) Prepare the appropriate documentation or ensure funding is available for document preparation (e.g., NEPA, explosives site approval request) related to the proposed action;

(5) Ensure funding is available for applicable permit applications and modifications, and implementation of mitigating or protective measures required by regulatory agencies due to unavoidable impacts;

(6) Ensure compliance with the proposed action conditions of approval including all mitigation measures or protective measures required by regulatory agencies prior and during the course of executing the action.

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b. PWD CWAP Coordinator shall:

- (1) Receive CWAP application from the action proponent;
- (2) Review the sufficiency of the CWAP application and perform an initial review of the proposed action to identify affected resources;
- (3) Initiate evaluation of the CWAP application by consulting with appropriate SME's and the action proponent;
- (4) Notify action proponent and provide guidance for the completion of additional documentation (e.g., the direction provided by the Explosives Safety Requirements (ESR) memorandum, State Historic Preservation Office (SHPO) approval);
- (5) Prepare final CWAP documentation package including conditions of approval for final endorsement or approval; and
- (6) Maintain all administrative records.

c. NSASP Installation Environmental Program Director or designee shall:

- (1) Designate the appropriate Environmental Division IRT members;
- (2) Determine and endorse the appropriate level of NEPA documentation associated with the proposed action;
- (3) Determine and endorse the appropriate state and federal agency coordination;
- (4) Ensure appropriate documentation is prepared to address consequences, alternatives, costs, and mitigation factors for actions that have the potential to impact the environment; and
- (5) Review and endorse or approve the proposed action for environmental compliance.

d. NSASP PWD Facilities Management Division Director or designee shall:

- (1) Designate the appropriate Facilities Management Division IRT members;
- (2) Determine and endorse the appropriate level of planning documentation associated with the proposed action;

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(3) Determine if the proposed action is of appropriate magnitude and scope to be reviewed and endorsed by the IMIG, RMIG-WG, and RMIG, if applicable;

(4) Ensure proposed action is compatible with NSASP land use plans and development standards (e.g., IAP, RIMP) and supported and supporting commands missions and objectives and meets Navy planning criteria (e.g., IAP, NAVFAC P80); and

(5) Review and endorse or approve the proposed action for compliance with land use policies and development standards.

e. Interdisciplinary Review Team (IRT) shall:

(1) Review the proposed action and evaluate for compliance within their area of expertise; and

(2) Provide conditions of approval or alternatives/mitigation to the proposed action, if necessary.

f. NDW Mission Integration Groups shall:

(1) Execute the NDW RMIG vision relative to shore investment strategy, and processes pertaining to facilities management and maintenance, while aligning with the strategic elements of the Regionally Integrated Master Program (RIMP).

(2) Review and approve where appropriate, any regional or installation issues that will impact base mission integration from a regional or installation perspective.

#### 8. Action.

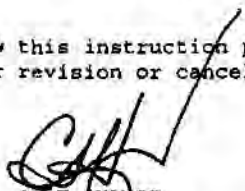
a. Proposed actions that impact infrastructure (e.g., buildings, structures, utilities, roads), the environment, explosives safety, safety (e.g., occupational, community, operational, traffic), security, anti-terrorism and force protection (AT/FP), Land use planning and development standards, and supported and supporting commands missions and objectives shall be adequately reviewed through CWAP to determine the level of impact and if this impact can be minimized or avoided in accordance with this instruction, references (a) through (1) and enclosures (1) through (3).

b. NSASP Commanding Officer, Commanders of supporting commands, and Installation Program Directors shall ensure the provisions of this instruction are made known to all appropriate

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NSASPINST #\*\*\*\*\*  
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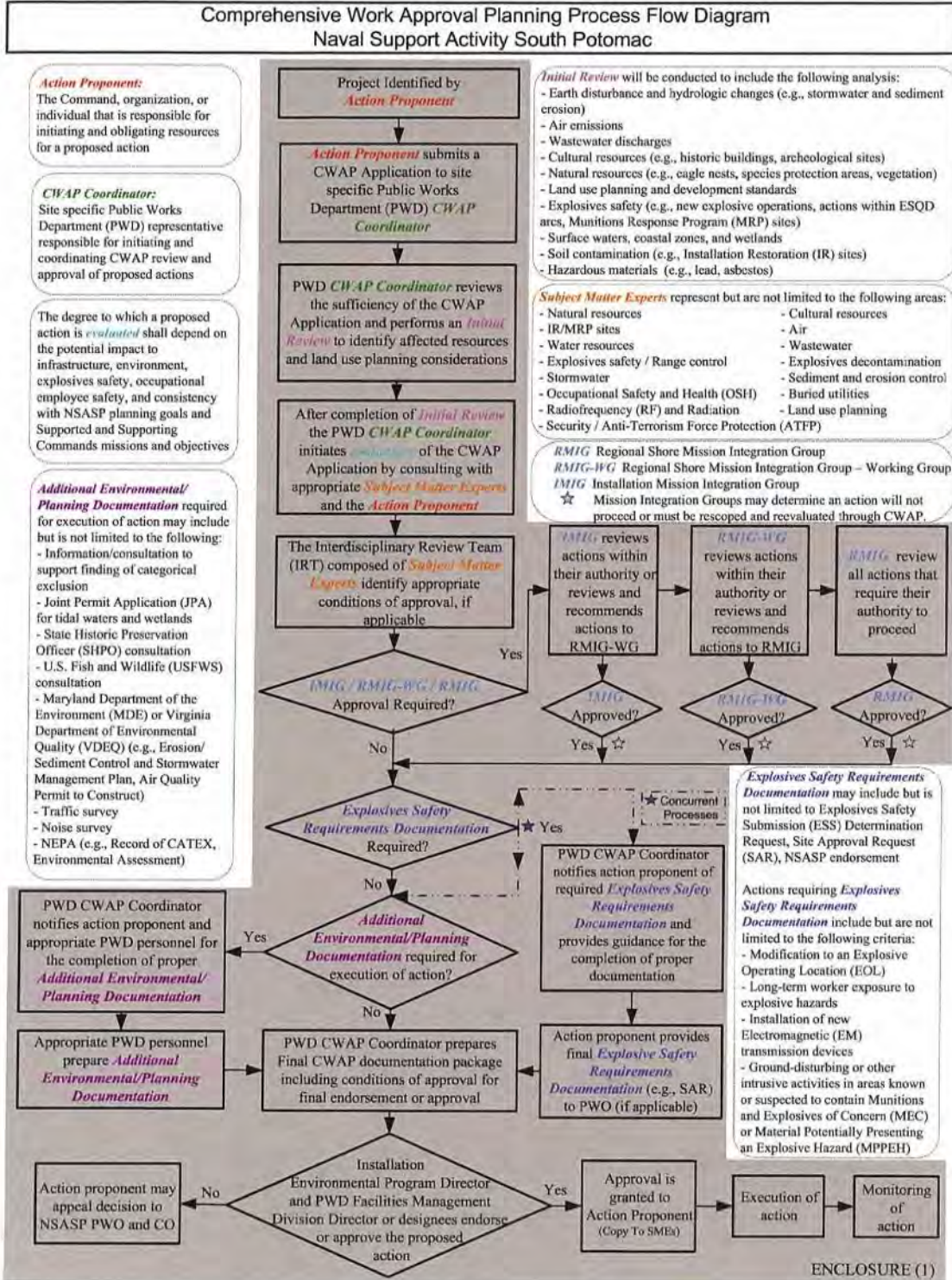
personnel and ensure compliance with the provisions contained herein.

9. Review. NSASP shall review this instruction periodically and provide recommendations for revision or cancellation to the NSASP Commanding Officer.



C. T. HANFT  
Captain, U.S. Navy  
Commanding Officer

Distribution: (NSASPINST 5216.1)  
All Lists



**Comprehensive Work Approval Application**  
Naval Support Activity South Potomac

For an overview of CWAP and a guide for determining if a CWAP approval is required for your project, reference page 2, **CWAP Overview** and the **CWAP Applicability Checklist**.

To submit a project for evaluation through CWAP, please complete the following **CWAP Application**.

\*\*\*\*\*  
Date of Application (MM/DD/YY): \_\_\_\_\_

..... <b>Applicant</b> .....	..... <b>Organization Funding Action</b> .....
<b>Applicant Name:</b> _____	<b>POC Name:</b> _____
<b>Phone Number:</b> _____	<b>Phone Number:</b> _____
<b>Email:</b> _____	<b>Email:</b> _____
<b>Organization (e.g., NAVFAC):</b> _____	<b>Organization (e.g., NSWC):</b> _____

**Requested Review Type:**     Preliminary Review         Final Approval

Note: A project can be submitted for a Preliminary Review or for a Final Approval. A project should be submitted for a Preliminary Review if the scope of the project is not clearly defined and/or additional requirements (e.g., explosives site approval, state consultations) must be met prior to project execution. A project should be submitted for a Final Approval if the project scope is defined and/or all conditions of the Preliminary Review permit have been met.

**Project Name:** \_\_\_\_\_

**Building Number (or "N/A"):** \_\_\_\_\_

**Project Description:**

Providing a thorough, accurate work description is imperative to getting your application reviewed quickly.

Please include the following information in the project description:

- Purpose of/need for the project and whether it is part of a larger project;
- Approximate area of earth disturbance and new impervious surfaces;
- Construction or other large equipment needed to complete work;
- Who is performing the work (base personnel vs. contractors), approximate number of workers, and how long they will be on-site;
- Whether work will impact any other operations (e.g., utilities, traffic flow, explosive operations); and
- Description of project phases and timeframe, if applicable.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Detailed Work Location Description:**

Please provide a site map or drawing, if possible.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Estimated Project Cost:**     Less than \$100,000     \$100,000 to \$500,000     Greater than \$500,000

**Anticipated Dates of Work (MM/DD/YY):** Start: \_\_\_\_\_ Completion: \_\_\_\_\_

ENCLOSURE (2)

**CWAP Overview**

**Purpose of CWAP**

CWAP is an official work approval procedure for all proposed actions within Naval Support Facility South Potomac.

**When Should CWAP Be Initiated?**

CWAP should be initiated as early in the project planning process as possible (before funding is allocated or a contract is awarded) to address potential project constraints (e.g., environmental, land use) and to fully define compliance requirements (e.g., explosives site approval, wetland permitting, site contamination cleanup). Addressing these issues early in the planning process will prevent delays in project execution and will assist with identifying additional project costs before major resources are obligated.

To determine if a CWAP approval is required for your project, please use the following **CWAP Applicability Checklist**. If you answer yes to any of the questions below, then a CWAP approval may be required. Please complete the application for submission to the PWD CWAP Coordinator. If you have questions or concerns about the applicability of CWAP for your project, please contact the PWD CWAP Coordinator.

**CWAP Applicability Checklist**

**Will this project:**

- Yes  No Involve outdoor earth work (digging or fill)?
- Yes  No Involve construction or demolition of infrastructures (e.g., buildings, parking lots, roads, concrete pads)? If yes, please specify what will be constructed or demolished, if not already provided in the project description: \_\_\_\_\_
- Yes  No Repair or resurface existing roads and parking areas or add new impervious or semi-pervious surface (i.e., pavement, concrete, gravel)?
- Yes  No Install new utilities or infrastructure (e.g., conduits, poles, fences, signs)? If yes, please specify new utilities or infrastructure to be installed, if not already provided in the project description: \_\_\_\_\_
- Yes  No Involve exterior building renovations?
- Yes  No Involve new outdoor testing or training operations?
- Yes  No Involve operational process changes? If yes, will these changes result in new waste, discharges or emissions? Please specify: \_\_\_\_\_
- Yes  No Involve any impact to explosives operations or explosives storage locations?
- Yes  No Involve any materials that present a risk to human health (e.g., lead based paint, asbestos, or other materials that are toxic, flammable, corrosive, or explosive)? If yes, please specify any such materials: \_\_\_\_\_
- Yes  No Involve non-routine repair, maintenance, or renovations to the interior of a building?
- Yes  No Involve relocation of personnel?
- Yes  No Involve placement of trailers, relocatable structures, or temporary structures?

## **Guidance for Preparation of Detailed Record of Categorical Exclusion (CATEX)**

Naval Support Activity South Potomac

If the determination has been made by the NSASP Installation Environmental Program Director or designee that a Detailed Record of CATEX shall be prepared to determine the level of NEPA documentation required to support the proposed action, the following guidance shall be used for preparation of the Detailed Record of CATEX.

### Section 1. Executive Summary

- States the applicable Navy Categorical Exclusion(s) (CATEX) for the proposed action and concludes that the proposed action is consistent with the Navy's NEPA procedures for CATEXs and does not require an Environmental Assessment or an Environmental Impact Statement.
- Includes a figure of the general project location with respect to the overall installation.
- Includes a signature block for the NSASP Environmental Program Director, or designee, and the Action Proponent.
  - NSASP Environmental Program Director or designee – Signature endorses that the proposed action has been reviewed in compliance with the National Environmental Policy Act of 1969, as implemented by OPNAVINST 5090.1C, and that the action has no potential for significant impact.
  - Action Proponent – Signature endorses the proposed action and ensures compliance with the conditions of the categorical exclusion prior to and during the course of executing the proposed action.
- Example text:
  - The proposed project complies with the National Environmental Policy Act of 1969. This project is not expected to meet any of the exclusion criteria listed in OPNAVINST 5090.1C, 5-5.1(a). This project falls under Categorical Exclusion number (35), "Demolition, disposal, or improvements involving buildings or structures when done in accordance with applicable regulations including those regulations applying to removal of asbestos, PCBs, and other hazardous materials," per 32 CFR Part 775 as amended in Federal Register/Vol. 69, No. 35/pg 8108. This proposed action qualifies for a Categorical Exclusion under OPNAVINST 5090.1C, 5-5.1. An environmental assessment or an environmental impact statement will not be prepared.

### Section 2. Conditions for Categorical Exclusion

- Includes all conditions identified in the Summary of Environmental Impacts (see Section 4) or otherwise identified by Environmental or Planning personnel that must be met in order for this project to proceed as a CATEX. Conditions may be presented in bullet format.

ENCLOSURE (3)



**Guidance for Preparation of Detailed Record of  
Categorical Exclusion (CATEX)**  
Naval Support Activity South Potomac

- Example conditions:
  - Acquire Maryland Department of the Environment (MDE) or Virginia Department of Environmental Quality (VDEQ) approval of stormwater management and sediment/erosion control plans
  - Avoid adverse impacts to archeological resources or historic buildings
  - Adhere to Fishery and Wildlife Management plans (e.g., bald eagle restrictions)
  - Incorporate Low Impact Development (LID) measures
  - Properly dispose of asbestos and lead-contaminated materials
  - Prevent unnecessary tree removal
  - Submit an Explosive Safety Submission (ESS) Determination Request for earthwork within Munitions Response Sites
  - Submit design drawings electronically to Environmental Office to be reviewed for consistency with approved CATEX
  - Obtain a CWAP permit prior to start of work

**Section 3. Description of the Proposed Action**

- Provides a project description of sufficient detail and scope to allow reviewers to fully assess the project's potential environmental impacts, both in the short and long term. This section should describe the purpose and need for the proposed action; the extent of any new construction or demolition and descriptions of any new facilities; any site improvements or grading/clearing associated with project execution; and any long-term activities associated with the proposed action (e.g., frequent truck deliveries, testing, or outdoor personnel training).
- Example topics to include in project description:
  - Number of personnel affected (e.g., relocated to another building)
  - Area of construction or demolition (e.g., building footprint and total floor space)
  - Extent of soil disturbance and tree removal
  - Additional site improvements (e.g., grading, landscaping, stormwater management)
  - Utility improvements
- Includes at least one figure of the site plan and any additional figures as necessary to convey the full scope of the proposed action.

**Guidance for Preparation of Detailed Record of  
Categorical Exclusion (CATEX)**  
Naval Support Activity South Potomac

Section 4. Summary of Environmental Impacts

- Discusses a range of environmental topics in sufficient scope and detail to demonstrate that the proposed action does not have the potential to result in significant impacts and falls within the scope of the Navy CATEX identified in Section 1.
- Provides background information as necessary to place the impacts discussion within the appropriate context (e.g., descriptions of applicable regulations, permit requirements, and previous agreements with federal, state, and local agencies).
- Includes figures as appropriate to show those resources affected (or potentially affected) by the proposed action.
- Example topics that may warrant discussion in all Detailed Records of CATEX:
  - Vegetation
    - Clearing or planting of trees and other vegetation
    - impacts to sensitive habitat areas
  - Stormwater (SW) and Wastewater (WW)
    - Low Impact Development
    - Changes in impervious surfaces
    - Potential sources of SW contamination (e.g., sediment, oils, hazardous materials)
    - New or eliminated discharge points (e.g., process WW, sanitary WW, etc.)
    - NPDES permit implications
  - Streams, Wetlands, and Floodplains
    - Construction within buffer zones
    - Potential SW and WW impacts
  - Effects on Coastal Use or Resources
    - Impacts to water quality within Coastal Zone (e.g., discharges to Potomac River)
    - Impacts to flora or fauna within Coastal Zone (e.g., submerged aquatic vegetation, bald eagles)

**Guidance for Preparation of Detailed Record of  
Categorical Exclusion (CATEX)**  
Naval Support Activity South Potomac

- Rare, Threatened, and Endangered Species
  - Increases in activity levels near bald eagle nesting areas during the nesting season
  - Changes in landscape (e.g., tree removal) near bald eagle nesting areas
- Air Emissions
  - Permitting implications (e.g., Permit to Construct for new emission units, Title V Operating Permits)
  - Clean Air Act General Conformity Rule (e.g., emissions from construction and demolition activities, increases in vehicular traffic, open burning)
- Installation Restoration (IR) Sites, Munitions Response Program (MRP) Sites, and Areas of Concern
  - Earthwork within areas with potential soil contamination or unexploded ordnance
- Cultural Resources
  - Demolition or renovation of historic buildings
  - Construction within a Historic District
  - Earthwork within areas with known or potential archeological resources
- In addition to the above, topics (such as the following) may also need to be assessed, depending on the project scope:
  - Solid and Hazardous Waste
  - Groundwater
  - Land Use
  - Noise
  - Explosives Safety
  - Health and Safety
  - Socioeconomic Issues

**Guidance for Preparation of Detailed Record of  
Categorical Exclusion (CATEX)**  
Naval Support Activity South Potomac

Section 5. Cumulative Impacts

- Assesses the impacts of the Proposed Action, combined with other recent, ongoing, and reasonably foreseeable projects within the vicinity of the Proposed Action, and demonstrates that the cumulative impacts of these projects do not warrant preparation of an Environmental Assessment.
- Discusses only those topics for which impacts were identified in Section 4.
- Provides quantitative discussion of impacts to the fullest extent possible.
- The following is an example discussion of the cumulative impacts on vegetation:
  - The tree removal associated with these projects will result in the loss of potential wildlife habitat and foraging areas. To mitigate these effects, MILCON P166 will replant one acre of new pine forest elsewhere on Cornwallis Neck. MILCON P191 will likely include similar mitigation measures and may also incorporate the establishment of native warm season grasses. Areas for tree replanting will be selected in conjunction with the PWD Site Indian Head Natural Resources Office to determine prime locations for expanding large contiguous forest stands capable of supporting sensitive species such as forest interior dwellers and providing formidable habitat, foraging area, and breeding area for migratory bird species or other animal and insect species. As mentioned in Section 4, the decrease in impervious surface associated with planned demolition projects DE01-07, DE04-07, DE03-07, and DE09-0863 will create new spaces which may be replanted with trees or allowed to naturally grow into successional forests.

Section 6. Interdisciplinary Team Review

- Includes a list of all subject matter experts (SMEs) (name and title) who reviewed the CATEX.

Section 7. References

- Lists any relevant documents referenced in the CATEX.

Appendix D

Standard Operating Procedure XSM-OM-002-06: Procedures for Prescribed Burning  
Program (inactive)



NO. XSM-OM-002-06  
Controlled Copy 3 of 4

NAVAL SUPPORT FACILITY DAHLGREN  
DAHLGREN, VA 22448-5106

Subj: *PROCEDURES FOR PRESCRIBED BURNING PROGRAM*

Prepared by: *Thomas Wray II* 10 Apr 07  
Thomas Wray II, Code HN2W  
NSFD Natural Resources Manager  
Date

Reviewed by: *James Pinto* 10 Apr 07  
James Pinto, Code HN2W  
NSFD Environmental Program Manager  
Date

*Edward Miedzinski* 4-25-07  
C. P. Miedzinski, Code HN3  
NSASP Fire Chief  
Date

*Mike Olup* 4-12-07  
Mike Olup, Code G604  
Range Safety Director  
Date

Edited by: *Thomas Wray II* 10 Apr 07  
Thomas Wray II  
NSFD Natural Resources Manager  
Date

Approved by: *James Pinto* 4/26/07 *[Signature]* 4/13/07  
Environmental Program Manager Date Explosives Safety Officer  
NSFD Date NSWCDL

*Dennia Tomlinson* 4/26/07 *[Signature]* 4/16/07  
Safety Installation Program Date Safety & Environmental  
Director, NSA, South Potomac Manager, NSWCDL Date

NO. XSM-OM-002-06

Approved and Released by:

<u>B. M. M. M.</u>	<u>4/30/07</u>	<u>J. H. Smith</u>	<u>5 July 07</u>
G60 Division Head	Date	<del>                    </del> Commanding	Date
Test and Evaluation Division		Officer, NSA, South Potomac	

THIS DOCUMENT SHALL NOT BE REPRODUCED WITHOUT WRITTEN  
APPROVAL FROM THE RANGE SAFETY DIRECTOR.



NO. XSM-OM-002-06

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NO. XSM-OM-002-06

**SUPERVISOR'S STATEMENT**

I have read and understand this Standard Operating Procedure (SOP). To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I hereby ensure that all persons assigned to this process are qualified and have received all appropriate training before beginning this process. I also ensure that all persons assigned to this process have read and understand the requirements of this SOP, and have signed the worker's statement for this process. I will ensure that this SOP has current procedures and, if this SOP remains active, perform an annual review. If a major change to this SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Title	Printed Name	Signature	Date
NSFD Natural Resources Manager			
NSFD Environmental Program Manager			

NO. XSM-OM-002-06

**WORKER'S STATEMENT**

Each person performing any operations under this document must sign and date this form within thirty (30) days prior to the process.

I have read this SOP and I have received adequate training to perform the process according to the SOP. I will follow the SOP unless I identify a hazard not addressed in it or encounter an operation I can not perform according to the SOP. If that occurs, I will stop the process and notify my immediate supervisor of the problem.

Printed Name	Signature	Date	Process Supervisor's Signature

NO. XSM-OM-002-06

**HAZARD CONTROL BRIEF  
(Nonperforming Personnel)**

The following are nonperforming personnel who have read or were presented the Hazard Control Brief. It is the responsibility of the Test Engineer to ensure the hazard brief is presented to all persons in the area who are not involved with the hands-on portion of the operation. Persons not performing this operation must have signed and dated this form within thirty (30) days prior to the process.

Printed Name	Signature	Date	Briefer's Signature

NO. XSM-OM-002-06

**DISTRIBUTION**

Copy	Organization	Location (Building)	Signatures Required
Original	Environmental Office HN2W	189	Approval and Annual Review Signatures
1	Explosives Safety Program Office XDC8	189	Approval and Annual Review Signatures
2	HN3 Fire Department	411	Approval and Annual Review Signatures
3 (Record)	HN2WTW	189	All Signatures
4 (Field)	HN2WTW	426A	Approval and Annual Review Signatures

Note: This is an official document and will not be altered or modified in any manner without an approved change notice attached. Upon receiving this official copy, it is the preparer's responsibility to destroy any advance or draft copies that may be in the work area.

**THIS DOCUMENT SHALL NOT BE REPRODUCED WITHOUT WRITTEN  
APPROVAL FROM THE RANGE SAFETY DIRECTOR.**

NO. XSM-OM-002-06

Subj: *PROCEDURES FOR PRESCRIBED BURNING PROGRAM*

Ref: (a) OPNAVINST 5100.23D, The Navy Occupational Safety and Health Program  
(b) OPNAVINST 5090.1B of 1 Nov 94  
(c) Virginia Regulations 120-04-4001-4005 for the Control and Abatement of Air Pollution  
(d) SOP NO. CSM-0800-003-02

Note: All references are the most current revision or change in effect at the time of the approval and release of this document.

## 1.0 GENERAL

This Standard Operating Procedure (SOP) was prepared to provide procedures for conducting prescribed burns. All personnel conducting operations under this SOP must be familiar with applicable parts of references (a) through (c) prior to commencing any work described. This SOP replaces reference (d).

This SOP meets all requirements specified in references (a) through (c), for the conduct of prescribed burns at the Naval Support Facility Dahlgren (NSFD). Reference (b) supports the use of this habitat management tool on DoD lands, while reference (c) permits this activity within the Commonwealth of Virginia. The procedures are described in Section 11. All personnel conducting operations under this SOP must read and understand this SOP prior to the commencement of the work described herein.

Prescribed burning is defined as fire applied in a skillful manner to the fuels of the forest and grasslands in a definite place, for a specific purpose, and under appropriate weather conditions to achieve management objectives. The major uses of prescribed burning are reduction of hazardous forest and grassland fuel accumulations, wildlife habitat improvement, preparation of sites for planting or seeding, and assisting with vegetation management on testing ranges. Prescribed burning can also reduce grass mowing requirements in specific areas. It is a very economical method for managing vegetation and achieving natural resources conservation objectives.


Areas to be subjected to prescribed burning to accomplish specific objectives will change annually. In general, three areas will be targeted: grasslands and shrublands, thinned pine and pine-hardwoods stands, and areas being regenerated. Annual work plans will identify areas of interest.

## 2.0 RESPONSIBILITY

The Natural Resources Program Manager (NRPM) is responsible for supervising the prescribed burn and coordinating with other cognizant organizations. More specifically, the NRPM will ensure all the necessary contacts and approvals are satisfied and that procedures outlined in this SOP are strictly followed.

NO. XSM-OM-002-06

The NRPM shall:

- a. Ensure that all applicable rules and regulations are followed and that all necessary safety precautions are taken to conduct operations in accordance with this SOP.
- b. Ensure a Hazard Control Brief is given to all employees engaged in operations under this SOP and any visitors in the work area before operations begin.
- c. Ensure that the material safety data sheets (MSDSs) for hazardous materials required to conduct this SOP are available at the worksite and that all employees conducting this operation are briefed and understand the hazards involved.
- d. Ensure that all hand-held radios (including citizen-band and ham), cellular telephones, and all equipment emitting electrical magnetic energy have been analyzed by J52 and approved by XDC8 (Radiation Safety Officer) for hazards of electro-magnetic radiation to ordnance (HERO) in accordance with OP 3565.
- e. Instruct operators and other support staff about SOP requirements and safety regulations.
- f. Instruct assistants on the use of drip torches, backpack sprayers, and other fire-control tools.
- g. Investigate or assist in the investigation of all accidents involving operators, equipment, or personnel performing work covered by this SOP.
- h. Ensure unauthorized personnel remain outside ALL controlled areas.
- i. Enforce wearing of personnel protective clothing and equipment in accordance with reference (a).
-  j. An area sweep will be conducted in areas where timbering or prescribed burns have not been conducted in the past. At least one ordnance-certified individual shall participate in the sweep. If unexploded ordnance (UXO) is found during a sweep, EOD personnel shall be notified before any further activities may proceed.

Assistants shall:

- a. Report to the NRPM any unsafe condition, personnel action, or equipment/material.
- b. Warn others whom they believe to be endangered by known hazards or by failure to observe safety precautions.
- c. Report to the NRPM any injury or evidence of impaired health to themselves or others occurring on duty.

NO. XSM-OM-002-06

d. Be prepared, in the event of an unforeseen hazardous occurrence, to give an audible warning to the other employees and to exercise appropriate reasonable caution.

e. Report the presence of unauthorized personnel in the work area to their supervisor.

### 3.0 LOCATION OF OPERATIONS

Prescribed burning shall be conducted at the Naval Support Facility Dahlgren, (NSFD), Dahlgren, Virginia on both Mainside and Pumpkin Neck.

### 4.0 PERSONNEL AND MATERIAL LIMITS

Only those directly involved in the planned process or directly supporting the effort shall be in the vicinity during prescribed burning operations. There are no known material limits associated with this effort.

### 5.0 SAFETY REQUIREMENTS

#### a. Personnel Requirements

All personnel conducting operations under this SOP must have received a Hazard Control Brief by the NRPM prior to the start of any operation, and annually thereafter.

#### b. Operational Requirements

Undesirable safety conditions will be identified and eliminated or controlled through engineering design, protective equipment, administrative controls, or a combination thereof.

#### c. Personal Protective Equipment (PPE)

All personnel participating in prescribed burning activities shall be outfitted in Nomex fireproof clothing, and wear proper shoes and headgear. The NRPM shall issue the Nomex clothing and headgear. For those operations where personnel are under shelter, Nomex is not required.

### 6.0 EMERGENCY RESPONSE AND CONTINGENCY PLANS

#### a. Emergency and Nonemergency Points of Contact

**FOR FIRE, MEDICAL, OR SPILL EMERGENCIES CALL EXT. 911**

Nonemergency or Contingency Points of Contact	Phone Number
	(540) 653- or DSN 249-
Fire (Nonemergency)	3-8726



NO. XSM-OM-002-06

Medical (Nonemergency)	3-8241
Explosives Safety Officer	3-4296, Cell Phone (540) 850-6530
Natural Resources Manager	3-4186
Range Control	3-8791
NSFD Environmental Program Manager	3-5071
Range Safety Director	3-7460, Cell Phone (540) 846-1714
Emergency Preparedness Coordinator	3-4790/3-1726
Emergency Services Dispatcher (ESD) (Security)	3-8291/3-8095
Explosive Ordnance Disposal (EOD) Team	3-7425/3-7160/3-5838

b. Contingency Plans

- (1) *Fire*—This procedure involves the use of fire to accomplish the desired objectives. Fire Department personnel will be on-site during all prescribed burns. They will be notified by the NRPM if a burn leaves the intended target area so they may contain the blaze.
- (2) *Medical Emergency*—Fire Department personnel on-site will be notified of any medical emergency that occurs during this procedure. Administer first aid if appropriate. Do not move injured persons unless absolutely necessary.
- (3) It is the responsibility of the Process Supervisor to ensure that all MSDSs required to conduct the operation are available and that all employees conducting this operation are briefed and understand the hazards involved.

**7.0 ENVIRONMENTAL PROTECTION PROCEDURES**

This operation shall be conducted in a manner that integrates sound environmental practices and complies with applicable federal, state, local, Department of Defense, and Navy regulations. Supervisors and workers understand the command's commitment to environmental protection and are aware of their responsibilities. Environmental effects and pollution prevention were considered and continuous improvements to the operation will be evaluated and implemented when possible (through change notices or rewrites).

**8.0 SECURITY REQUIREMENTS**

This procedure is unclassified and normal security measures apply. Report unauthorized persons in the area to Security (X3-8291/8095)

**9.0 HAZARD CONTROL BRIEF**

This briefing is based upon the results of the Risk Hazard Analysis.

Personnel participating in this action will be responsible for containing the fire within the specific boundaries. Fire fighting tools (i.e. backpack water pump, fire rakes, and fire swatters) will be issued to the burn crew. The Fire Department (HN3) will provide backup assistance.

NO. XSM-OM-002-06

Burn crews will be exposed to flames, smoke, and petroleum products. The action will be conducted in such a manner as to reduce the hazards of smoke and flames. Minimal amounts of petroleum products (i.e. gasoline/diesel fuel mixture) will be utilized to initiate the prescribed burn.

*Prior to burning operations at EEA, a range sweep will be conducted to determine the presence of UXO and miscellaneous range residue. The sweep shall include at least one EEA ordnance-certified individual. All identified debris will be collected prior to the burn and stored in an approved location as required. If fuzed ordnance is found, EOD will be notified and will determine disposition.*

Burning operations at EEA could result in detonation or deflagration of unreacted explosive material. Personnel should be aware that any unreacted explosive components would have been subjected to high temperatures possibly resulting in an increase in the sensitivity of the material. No attempt will be made to collect any ordnance components that were exposed during the burn operation until the following day or thereafter. Contact EOD for any ordnance exposed from the burn operation.

A thorough Hazard Control Brief will be conducted prior to all burning actions to ensure that participating personnel are aware of the hazards and understand the procedures of this SOP and the site specific burn plans.

#### 10.0 EQUIPMENT LIST

##### a. Safety Equipment

Nomex fireproof clothing
Proper shoes and headgear

##### b. Tools and Operation Equipment

Fire rakes and swatters; backpack sprayer; drip torches

##### c. Materials

Fuel mixture for drip torches

NO. XSM-OM-002-06

## 11.0 STEP-BY-STEP PROCEDURES

### A. Action

#### i. The NRPM (HN2W) shall:

- a. submit Burn Plan to Explosive Safety Officer (ESO) and HN3 for approval
- b. ensure/construct adequate firebreaks around burn sites;
- c. notify NSASP in advance of proposed burn sites;
- d. review burning conditions and burn site selection with HN3 on day of burn;
- e. ensure availability of HN3 personnel for on-site support
- f. assume primary responsibility for and coordinate proposed burning activities with Range Control and Explosive Ordnance Disposal personnel. This responsibility is assumed by the EEA Process Supervisor when prescribed burns are conducted on EEA;
- g. submit prescribed Burn Plan to Command Duty Officer (CDO) 1 day prior to burn date;
- h. provide personnel with at least one item of prescribed burning equipment (i.e. backpack water pumps, fire rakes, fire swatters, drip torches), as necessary;
- i. provide at least four personnel (i.e. coworkers and/or employee volunteers) to function as a burn crew, as necessary;
- j. notify the following before and immediately after burning:
  - (1) CDO
  - (2) Base Police (HN3)
  - (3) King George County Dispatcher; and
- k. ensure hourly inspections are conducted until considered safe.

NO. XSM-OM-002-06

2. The Fire Department (HN3) shall:

- a. review and approve Burn Plan and assist in burn site selection;
- b. ensure adequate firebreaks are in place;
- c. evaluate and approve/disapprove burning conditions on day of burn;
- d. provide standby on-site fire fighting crew; and
- e. release burn crew from site when conditions are considered safe.

B. Timing

1. The majority of prescribed burns will be conducted from January through March. Some late summer burns (i.e. August, September) may be required.
2. All prescribed burning activities shall typically be conducted on Saturdays and Sundays to eliminate conflicts with mission requirements. Burns conducted to support the mission may be scheduled during the week.
3. Prescribed burning activities will generally be initiated during the morning hours (0700-1000) to take advantage of ideal conditions.

C. Ignition Plan

1. Back, head, strip and flank fires will be utilized to accomplish program objectives.
2. The NRPM will be the burn site supervisor for all burn crew members. HN3 will assume control if any emergencies arise.
3. Ignition sequence and timing will be discussed prior to any action to ensure proper coordination.
4. For burn operations at EEA, personnel will begin the ignition sequence in a location that will allow unrestricted egress to the nearest shelter (Churchill or Harris). Once the fire has started, all personnel shall proceed directly to the designated shelter and remain there until released by the Fire Department and EEA Process Supervisor.

D. Emergency Action

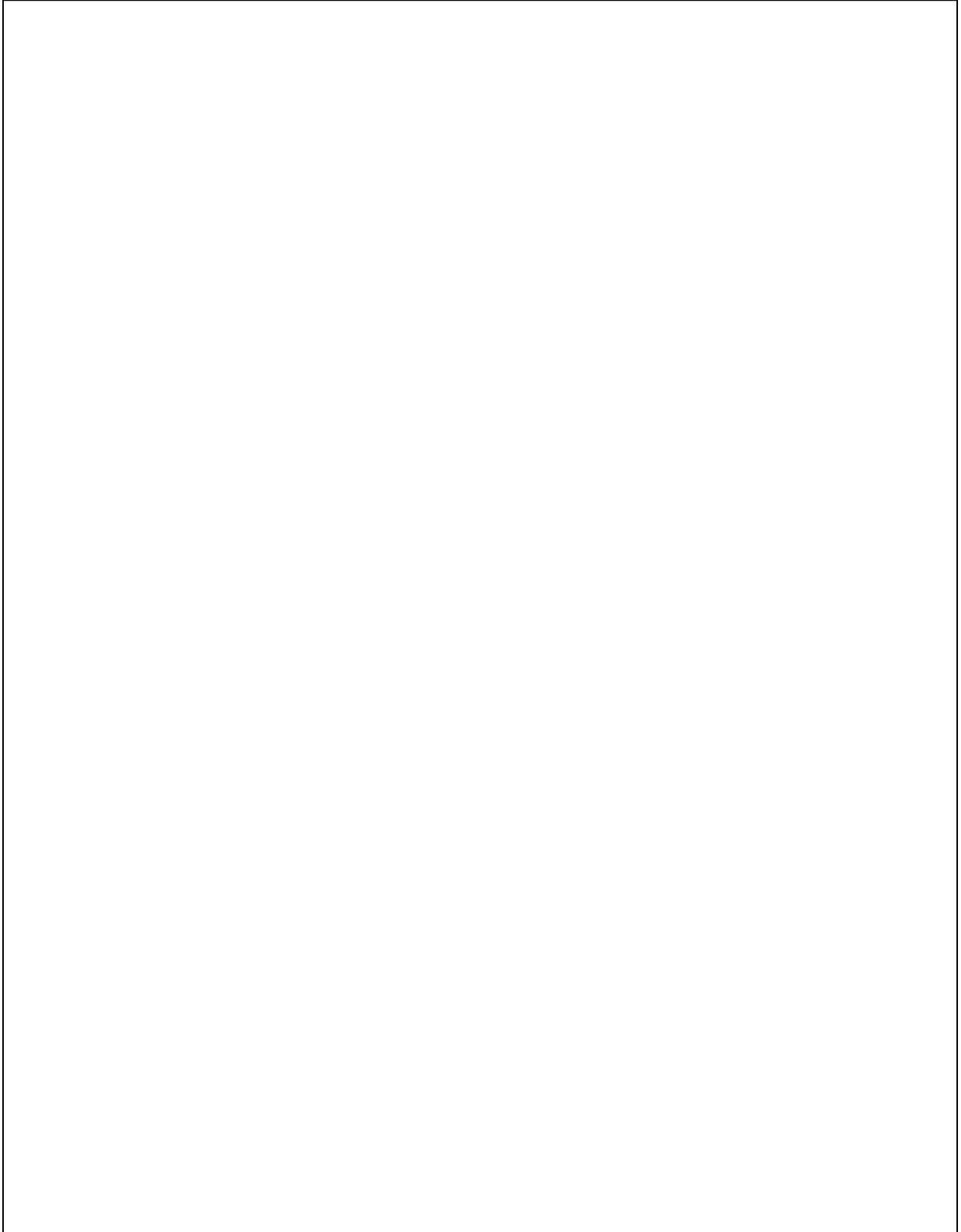
1. In the event of any emergency, such as another fire, severe weather conditions, etc., the following options will be evaluated for implementation:

NO. XSM-OM-002-06

- a. put fire out;
- b. stop lighting new sections but allow existing fire to burn; and
- c. continue normal burning procedures.



Appendix E  
County Mutual Aid Agreements





**MUTUAL AID FIREFIGHTING & EMERGENCY MEDICAL SERVICES  
ASSISTANCE AGREEMENT**

This agreement made and entered into this 18 day of May 2009, by and between King George County, and the Commanding Officer, Naval Support Facility – Dahlgren, Virginia and the Naval District Washington (NDW) in accordance with 42USC1856 which authorizes said entities to enter into such agreement.

WITNESSETH:

WHEREAS, each of the parties hereto maintains equipment and personnel for the suppression of fires, emergency medical services, response to hazardous materials incidents, and incident management within its own areas, and

WHEREAS, the parties hereto desire to augment the Fire & Emergency Medical Services (EMS) Protection available in their respective areas, and

WHEREAS, the lands or districts of the parties hereto are adjacent or contiguous so that mutual assistance in the event of a fire emergency, EMS, or hazardous material is deemed feasible, and

WHEREAS, it is the policy of the Naval District Washington and King George County to conclude such agreements whenever practicable, and

WHEREAS, it is mutually deemed sound, desirable, practicable, and beneficial for the parties to this agreement to render assistance to one another per these terms;

THEREFORE LET IT BE AGREED THAT:

1. The rendering of assistance under terms of this agreement shall be accomplished with detailed plans and procedures of operations drawn and agreed to by the technical heads of the fire departments involved (e.g. Standard Operating Procedures and/or Standard Operating Guidelines).
2. The Naval District Washington Fire & Emergency Services will respond automatically to Fire, EMS, Hazardous Materials and any other emergency alarm when dispatched by King George County, and whenever it is deemed advisable by the senior officer of the fire department belonging to a party of this agreement, or by the senior officer of such fire department actually present at a fire, to request fire fighting assistance under the terms of this agreement, he/she is authorized to do so, and the senior officer on duty of the fire department receiving the request shall forthwith take the following action:
  - a. Immediately determine if the requested apparatus and personnel are available to respond to the call.
  - b. In accordance with the terms of this agreement, forthwith dispatch such apparatus and personnel as in the judgment of the senior officer receiving the call should be sent, with instructions as to their mission.
3. The rendering of assistance under the terms of this agreement shall not be mandatory, but the party receiving the request for assistance shall immediately inform the requesting service if assistance cannot be rendered.
4. The parties hereto waive all claims against every other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

5. All equipment and personnel responding to the restricted areas of NDW will report to a staging area prior to entering the restricted areas. An escort will be provided to all equipment and personnel responding into restricted areas of Naval Support Activity - Dahlgren.
6. No firefighting personnel below the age of eighteen (18) shall be permitted within the restricted areas of Naval Support Activity - Dahlgren. It shall be the responsibility of the officer-in-charge of each responding entity to ensure adherence to this requirement.
7. Hazardous operations within all Naval Support Activity - Dahlgren restricted areas require radio transmissions to be kept to an absolute minimum. Therefore, responding personnel will report "on-the-scene" to King George County Communication Center prior to entering said restricted areas.
8. All services performed under this agreement shall be rendered without reimbursement of either party or parties with the following exceptions:
  - a. Volunteer Fire Departments shall be entitled to seek Reimbursement pursuant to Section 11 of the Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2210) and Federal regulations issued thereunder (Title 44 of the code of Federal Regulations, Part 151) for all or any part of direct expenses and losses (additional fire fighting costs over and above normal operating costs) incurred in fighting fires on property under the jurisdiction of the United States.
  - b. Special equipment carried on the NDW Fire & Emergency Services Hazardous Materials Response Unit may be used and thus expended beyond repair in the normal course of a hazardous materials incident. When this situation occurs from an incident in which the Naval District Washington Fire & Emergency Services has responded its Hazardous Materials

unit to the request for assistance under the terms of this agreement to any area included as lands or districts of King George County, the damaged or expended equipment shall be replaced with new equipment of the same type, brand and quality by King George County.

- c. It is further agreed that Naval District Washington Fire & Emergency Services may receive replacement EMS expendable supplies for those supplies consumed in response to EMS calls initiated by King George County. It is contemplated that Naval District Washington Fire & Emergency Services may receive such supplies directly from King George County and/or from health care facilities when providing EMS transport services.

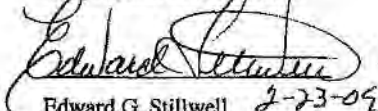
9. The senior officer of the fire department of the requesting service shall assume full charge of the operations. However, under procedures agreed to by the technical heads of the departments involved, a senior officer of the department furnishing assistance may assume responsibility for the coordination of the overall operation.

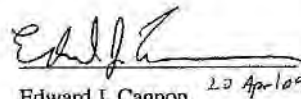
10. The Naval District Washington Fire & Emergency Services Hazardous Material Response unit will respond only to individual incidents of need and only when specifically requested under the terms previously stated by this agreement.

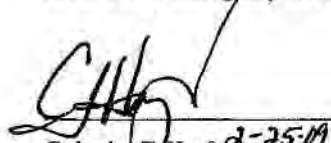
11. The various officers and personnel of the fire departments of the parties to this Agreement are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours consistent with local security requirements and as feasible to jointly conduct pre-fire planning inspections, drills, and training.


12. This agreement shall become effective upon the date hereof and shall remain in full force and effect until canceled by mutual agreement of the parties hereto or by written notice by one party to the other party with sixty (60) days notice of said cancellation.

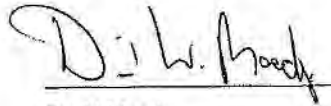
IN WITNESS WHEREOF, the parties hereto have executed this agreement on the day and year first above written.

  
Edward G. Stillwell 2-23-09  
Regional Fire Chief  
NDW Fire & Emergency Services

  
Edward J. Cannon 20 Apr 09  
Executive Director  
Naval District Washington

  
Catherine T. Hanft 2-25-09  
Captain, U.S. Navy  
Commanding Officer, NSASP

  
Joella M. Lane 17 Apr 09  
Comptroller (Acting)  
Naval District Washington



David Moody  
Fire / Rescue Chief  
King George County



County Attorney  
King George County



County Administrator  
King George County

**MUTUAL AID FIREFIGHTING & EMERGENCY MEDICAL SERVICES  
ASSISTANCE AGREEMENT**

This agreement made and entered into this 9<sup>th</sup> day of July 2009, by and between Charles County Board of County Commissioners, and the Commandant, Naval District Washington (NDW) at NSF Dahlgren, Virginia and Indian Head, Maryland in accordance with 42USC1856, which authorizes said entities to enter into such agreement.

**WITNESSETH:**

WHEREAS, each of the parties hereto maintains equipment and personnel for the suppression of fires, emergency medical services, response to hazardous materials incidents, and incident management within its own areas, and

WHEREAS, the parties hereto desire to augment the Fire & Emergency Medical Services (EMS) Protection available in their respective areas, and

WHEREAS, the lands or districts of the parties hereto are adjacent or contiguous so that mutual assistance in the event of a fire emergency, EMS, or hazardous material is deemed feasible, and

WHEREAS, it is the policy of the Navy Department and the Board of Charles County Commissioners to conclude such agreements whenever practicable, and

WHEREAS, it is mutually deemed sound, desirable, practicable, and beneficial for the parties to this agreement to render assistance to one another per these terms;

THEREFORE LET IT BE AGREED THAT:

1. The rendering of assistance under terms of this agreement shall be accomplished with detailed plans and procedures of operations drawn agreed to by the technical heads of the fire departments involved (e.g. Standard Operating Procedures and/or Standard Operating Guidelines).
2. The Naval District Washington Fire & Emergency Services will respond as requested to Fire, EMS, Hazardous Materials and any other emergency incident when dispatched by the Charles County Fire Board, and whenever it is deemed advisable by the senior officer of the fire department belonging to a party of this agreement, or by the senior officer of such fire department actually present at a fire, to request fire fighting assistance under the terms of this agreement, he/she is authorized to do so, and the senior officer on duty of the fire department receiving the request shall forthwith take the following action:
  - a. Immediately determine if the requested apparatus and personnel are available to respond to the call.
  - b. In accordance with the terms of this agreement, forthwith dispatch such apparatus and personnel as in the judgment of the senior officer receiving the call should be sent, with instructions as to their mission.
3. The rendering of assistance under the terms of this agreement shall not be mandatory, but the party receiving the request for assistance shall immediately inform the requesting service if assistance cannot be rendered.
4. The parties hereto waive all claims against every other party for compensation



- for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.
5. All equipment and personnel responding to the restricted areas of NSASP will report to a staging area prior to entering the restricted areas. An escort will be provided to all equipment and personnel responding into restricted areas of NSASP.
  6. No firefighting personnel below the age of eighteen (18) shall be permitted within the restricted areas of NSASP. It shall be the responsibility of the officer-in-charge of each responding entity to ensure adherence to this requirement.
  7. Hazardous operations within all NSASP restricted areas require radio transmissions to be kept to an absolute minimum. Therefore, responding personnel will report "on-the-scene" to Charles County Communication Center prior to entering said restricted areas.
  8. All services performed under this agreement shall be rendered without reimbursement of either party or parties with the following exceptions:
    - a. Volunteer Fire Departments shall be entitled to seek reimbursement pursuant to Section 11 of the Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2210) and Federal regulations issued thereunder (Title 44 of the code of Federal Regulations, Part 151) for all or any part of direct expenses and losses (additional fire fighting costs over and above normal operating costs) incurred in fighting fires on property under the jurisdiction of the United States.
    - b. Special equipment carried on the NDW Fire & Emergency Services Hazardous Materials Response Unit(s) may be used and thus expended beyond repair in the normal course of a hazardous materials incident. When this situation occurs from

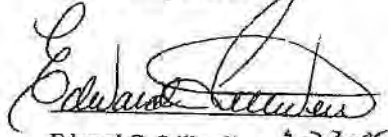
an incident in which the NSASP has responded its Hazardous Materials unit(s) to the request for assistance under the terms of this agreement to any area included as lands or districts of Charles County, the damaged or expended equipment shall be replaced with new equipment of the same type, brand and quality by the Board of Commissioners of Charles County.

- c. It is further agreed that NSASP may receive replacement EMS expendable supplies for those supplies consumed in response to EMS calls initiated by Charles County. It is contemplated that NSASP may receive such supplies directly from Charles County and/or from health care facilities while acting as Charles County's EMS transport agent.

- 9. The senior officer of the fire department of the requesting service shall assume full charge of the operations. However, under procedures agreed to by the technical heads of the departments involved, a senior officer of the department furnishing assistance may assume responsibility for the coordination of the overall operation.
- 10. The Naval District Washington Fire & Emergency Services Hazardous Material Response unit(s) will respond only to individual incidents of need and only when specifically requested under the terms previously stated by this agreement.
- 11. The various officers and personnel of the fire departments of the parties to this Agreement are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours consistent with local security requirements and as feasible to jointly conduct pre-fire planning inspections, drills, and training.

12. This agreement shall become effective upon the date hereof and shall remain in full force and effect until canceled by mutual agreement of the parties hereto or by written notice by one party to the other party with sixty (60) days notice of said cancellation.

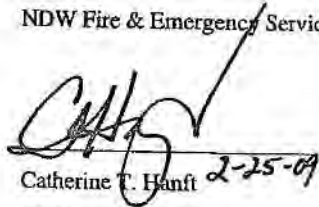
IN WITNESS WHEREOF, the parties hereto have executed this agreement on the day and year first above written.



Edward G. Stillwell 2-23-09  
Regional Fire Chief  
NDW Fire & Emergency Services



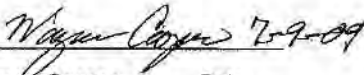
Edward J. Cannon 4-23-09  
Executive Director  
Naval District Washington

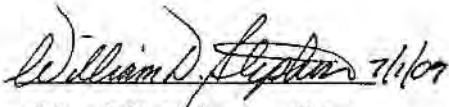



Catherine T. Hanft 2-25-09  
Captain, U.S. Navy  
Commanding Officer, NSASP





Joella M. Lane 17 APR 09  
Comptroller (Acting)  
Naval District Washington

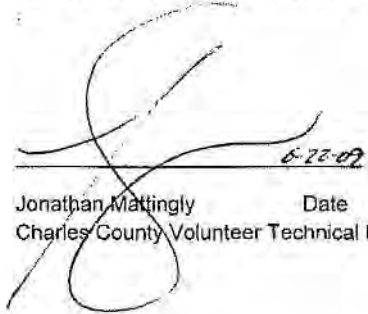
  
Wayne Cooper      Date  
Commissioner President  
Charles County Commissioners

  
William D. Stephens      Date  
Director  
Department of Emergency Services

  
John L. Filer      Date  
Chief of Emergency Medical Services  
Department of Emergency Services

  
Duane Svites      Date  
Charles County Volunteer Fire Chief

  
Ronnie Burns      Date  
Charles County Volunteer EMS Chief

  
Jonathan Mattingly      Date  
Charles County Volunteer Technical Rescue Chief



NDW CORRESPONDENCE ROUTING SHEET

(A)pprove (C)oordinate (I)nformation (R)evuew (S)ign		SUBJECT: Mutual aid agreement between NDW and Charles County at NSF Dahlgren and Indian Head			DATE: 15APR2009
TO	ACTION	SIGNATURE	COMMENTS/REMARKS	DATE	
1 N01	R, S	<i>[Signature]</i>		20 Apr 09	
2 N8	R, S	<i>[Signature]</i>		17 Apr 07	
3 NOOSP	R, S	<i>[Signature]</i>	signed a local AMS		
4					
5					
ACTION OFFICER'S NAME Andrew Snyder		OFFICE CODE N83	TELEPHONE # 202-433-2807	ROUTE SLIP # (if applicable)	
<p>1. <u>PURPOSE:</u></p> <p>2. <u>DISCUSSION:</u></p> <p>3. <u>RECOMMENDATION:</u> Forward for signature, and return to N8 for distribution.</p> <p style="text-align: center;"><i>Received back from Charles Co. on 20 July 2009</i></p> <p style="text-align: center;"><u><i>CPM.</i></u></p>					

Colonial Beach VFD

004-2240100

P. 1

MUTUAL AID EMERGENCY SERVICES ASSISTANCE AGREEMENT

THIS AGREEMENT, made and entered into this 7 day of Feb, 1995 by and between Town of Colonial Beach and the Commanding Officer, JC Cuervo,

WITNESSETH:

WHEREAS, each of the parties hereto maintains equipment and personnel for the suppression of fires/rescue and response to hazardous materials incidents within its own areas, and

WHEREAS, the parties hereto desire to augment the emergency services available in their respective areas, and

WHEREAS, the lands or structures of the parties hereto are adjacent or contiguous so that mutual assistance in a fire emergency is deemed feasible, and

WHEREAS, it is the policy of the Navy Department and Town of Colonial Beach to conclude such agreements wherever practicable, and

WHEREAS, it is mutually deemed sound, desirable, practicable, and beneficial for the parties to this agreement to render assistance to one another in accordance with these terms;

THEREFORE BE IT AGREED THAT:

1. The rendering of assistance under the terms of this agreement shall be accomplished in accordance with detailed plans and procedures of operation drawn and agreed to by the technical heads of the fire departments involved.
2. Whenever it is deemed advisable by the senior officer of a fire department belonging to a party to this agreement, or by the senior officer of such fire department actually present at a fire or emergency, to request emergency assistance under the terms of this agreement, he/she is authorized to do so, and the senior officer on duty of the fire department receiving the request shall forthwith take the following actions:
  - a. Immediately determine if the requested apparatus and personnel are available to respond to the call.
  - b. In accordance with the terms of this agreement, forthwith dispatch such apparatus and personnel as in the judgment of the senior officer receiving the call should be sent, with instructions as to their mission.
3. The rendering of assistance under the terms of this agreement shall not be mandatory, but the party receiving the request for assistance shall immediately inform the requesting service if assistance cannot be rendered.

Colonial Beach, V.F.D.

004-22470100

p. 4

4. The parties hereto waive all claims against every other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

5. All services performed under this agreement shall be rendered without reimbursement of either party or parties, except that the Colonial Beach Fire Department shall be entitled to seek reimbursement pursuant to the Section 11 of the Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2210) and Federal regulations issued thereunder (Title 44 of the Code of Federal Regulations Part 151) for all or any part of direct expenses and losses (additional fire fighting costs over above normal operating costs) incurred in fighting fires on property under the jurisdiction of the United States.

6. The senior officer of the fire department of the requesting service shall assume full charge of the operations. However, under procedures agreed to by the technical heads of the fire departments involved, a senior officer of the department furnishing the assistance may assume responsibility for the coordination of the overall operation.

7. The various officers and personnel of the fire departments of the parties to this agreement are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours consistent with local security requirements and, as feasible, to jointly conduct prefire planning inspections, drills and training.

8. This agreement shall become effective upon the date hereof and shall remain in full force and effect until canceled by mutual agreement of the parties hereto or by written notice by one party to the other party with sixty (60) days notice of said cancellation.

9. The NSWCDD Fire Department, when requested, shall provide confined space, vertical and trench rescue to the Colonial Beach Volunteer Fire Department whenever possible.

Naval Surface Warfare  
Center Dahlgren Division

Colonial Beach

By \_\_\_\_\_  
J.C. OVERTON  
Captain U. S. Navy  
Commander

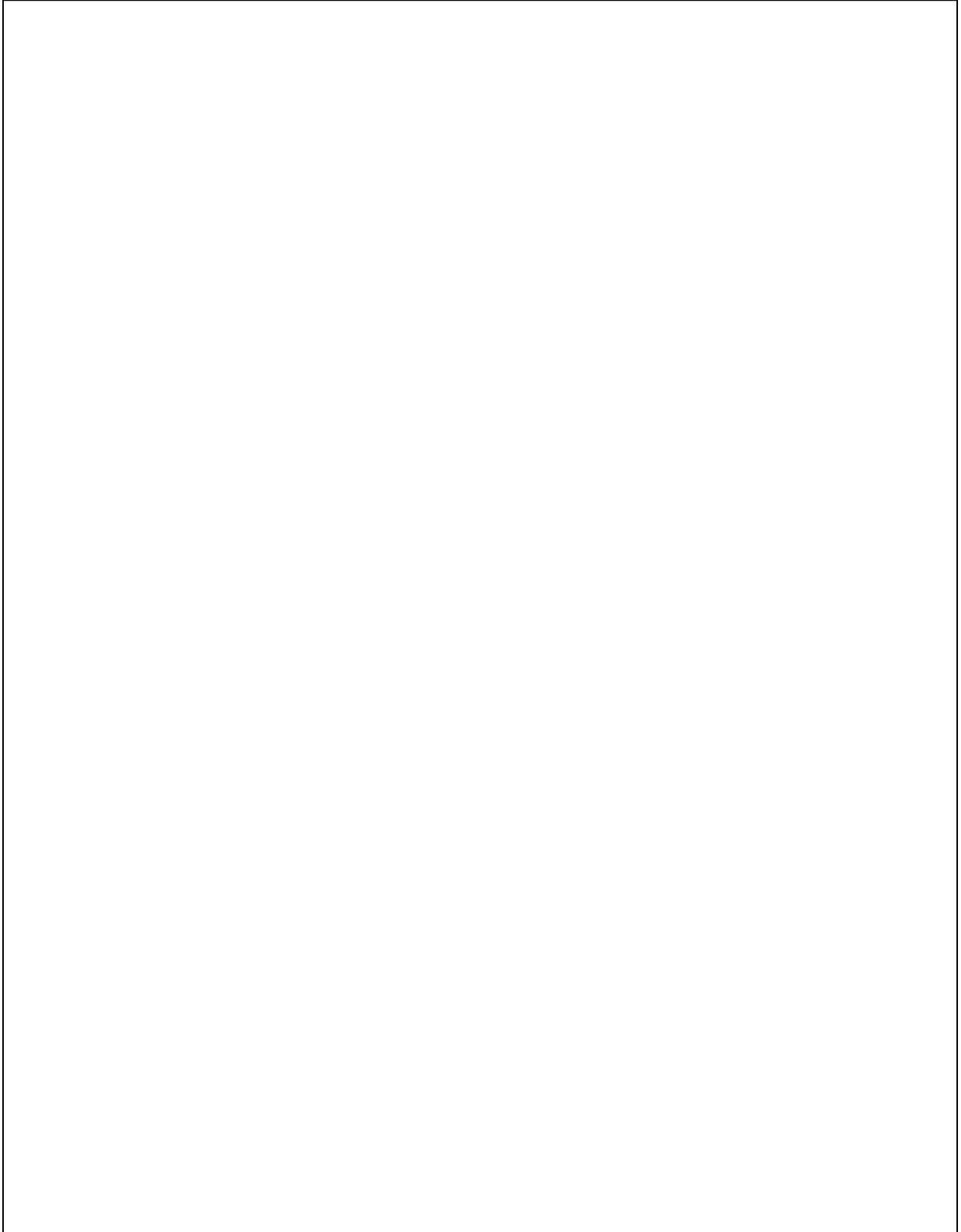
By R. Martin Long  
R. Martin Long  
Town Manager  
Town of Colonial Beach

Naval Surface Warfare  
Center Dahlgren Division

Colonial Beach

By \_\_\_\_\_  
Ralph Trowbridge  
Fire Chief

By \_\_\_\_\_  
C.E. Catlett, Jr.  
Fire Chief  
Colonial Beach Volunteer  
Fire Department





Appendix F  
ICS 209 Incident Status Summary



### Incident Status Summary (ICS-209)

1: Date		2: Time		3: Initial Update Final       			4: Incident Number		5: Incident Name	
6: Incident Kind		7: Start Date / Time		8: Cause		9: Incident Commander		10: IMT Type		11: State-Unit
12: County		13: Latitude and Longitude Lat: Long:		14: Short Location Description (in reference to nearest town):						
<b>Current Situation</b>										
15: Size/Area Involved		16: % Contained or MMA		17: Expected Containment Date: Time:		18: Line to Build (# chains)		19: Costs to Date	20: Declared Controlled Date: Time:	
21: Injuries this Reporting Period:		22: Injuries to Date:		23: Fatalities		24: Structure Information				
						Type of Structure	# Threatened	# Damaged	# Destroyed	
25: Threat to Human Life/Safety: Evacuation(s) in progress _____ No evacuation(s) imminent _____ Potential future threat _____ No likely threat _____						Residence				
						Commercial Property				
						Outbuilding/Other				
26: Communities/Critical Infrastructure Threatened (in 12, 24, 48 and 72 hour time frames):										
12 hours:										
24 hours:										
48 hours:										
72 hours:										
27: Critical Resource Needs (kind & amount, in priority order):										
1.										
2.										
3.										
28: Major problems and concerns (control problems, social/political/economic concerns or impacts, etc.) Relate critical resources needs identified above to the Incident Action Plan.										
29: Resources threatened (kind(s) and value/significance):										

ICS-209 (06/03) NFES 1333 Previous editions obsolete

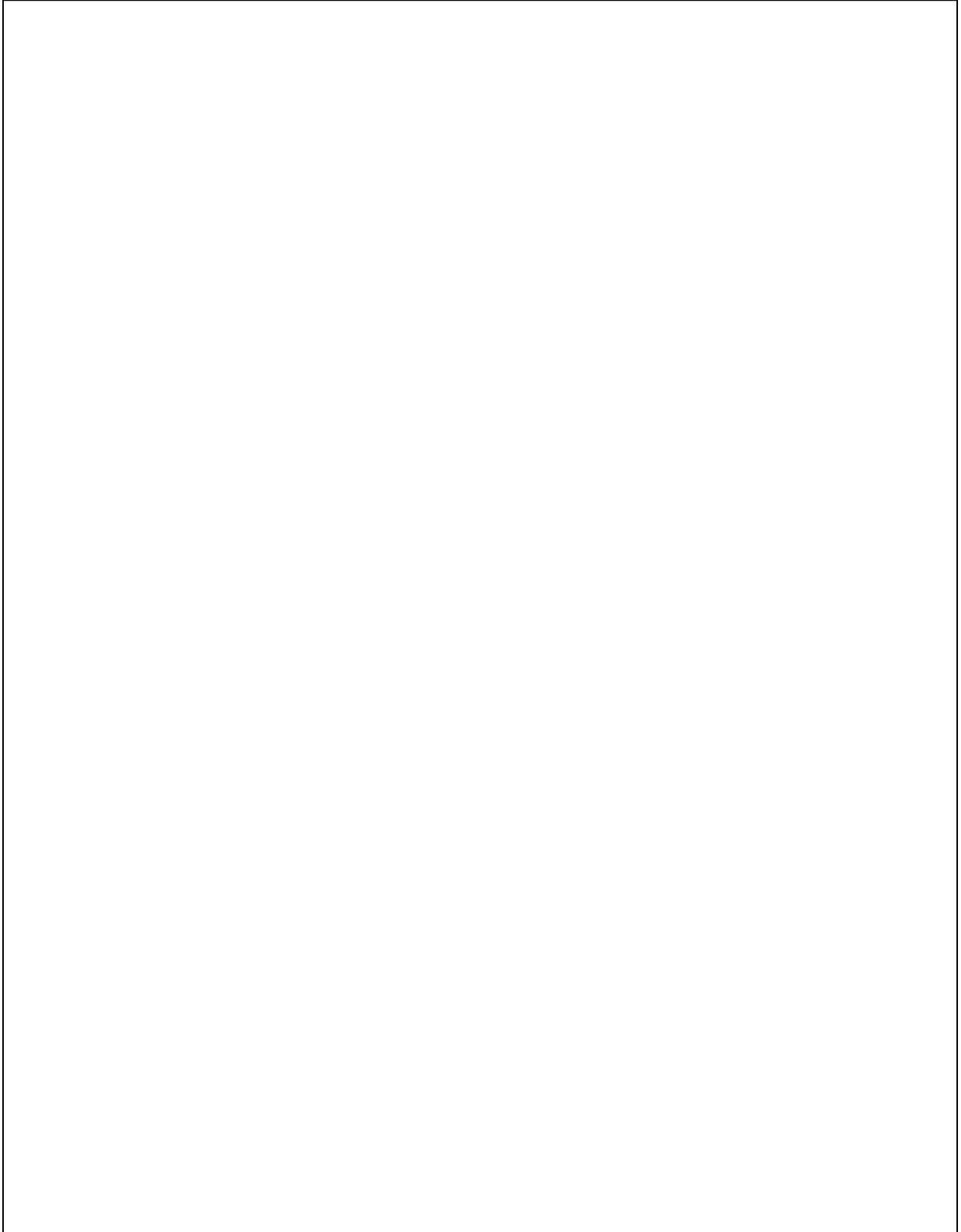
30: Current Weather Conditions Wind Speed:   mph   Temperature: Wind Direction:           Relative Humidity:		31: Resource benefits/objectives (for prescribed/wildland fire use only):	
32: Fuels/Materials Involved: Enter the predominant fuel from the Thirteen Fuel Models for Fire Behavior in the adjacent box to the right.           List additional fuels and/or materials involved in the block below.			
33: Today's observed fire behavior (leave blank for non-fire events):			
34: Significant events today (closures, evacuations, significant progress made, etc.):			
<b>Outlook</b>			
35: Estimated Control Date and Time:	36: Projected Final Size:	37: Estimated Final Cost:	38: Tomorrow's Forecasted Weather Wind Speed:   mph   Temperature: Wind Direction:           Relative Humidity:
39: Actions planned for next operational period:			
40: Projected incident movement/spread during next operational period:			
41: For fire incidents, describe resistance to control in terms of: 1. Growth Potential - 2. Difficulty of Terrain -			
42: How likely is it that containment/control targets will be met, given the current resources and suppression/control strategy?			
43: Projected demobilization start date:			
44: Remarks:			

ICS-209 (06/03) NFES 1333 Previous editions obsolete





Appendix G  
NWCG Prescribed Burn Plan Template





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## **Appendix B: Prescribed Fire Burn Plan Template**

A standardized, reproducible template form for the Prescribed Fire Plan development process is included in this appendix. A standardized format is provided for the Prescribed Fire Plan in PDF. An electronic version editable in Word is also available. Users should prepare the plan using the electronic version.

### **PRESCRIBED FIRE PLAN**

**ADMINISTRATIVE UNIT(S):** \_\_\_\_\_

**PRESCRIBED FIRE NAME:** \_\_\_\_\_

**PREPARED BY:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

*Name & Qualification/Currency*

**TECHNICAL REVIEW BY:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

*Name & Qualification/Currency*

**COMPLEXITY RATING:** \_\_\_\_\_

**MINIMUM RXB REQUIREMENT:** \_\_\_\_\_

**APPROVED BY:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

*Agency Administrator*

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**ELEMENT 2 A: AGENCY ADMINISTRATOR IGNITION AUTHORIZATION**

Instructions: The Agency Administrator’s Ignition Authorization must be completed before a prescribed fire can be implemented. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new authorization will be required.

Prior to signature it is recommended that the Agency Administrator discuss the following key items with the FMO/Burn Boss

<b>KEY DISCUSSION ITEMS</b>
Has anything changed since the Prescribed Fire Plan was approved or revalidated? <i>i.e. drought or other climate indicators of increased risk, insect activity, new subdivisions/structures, smoke requirements, Complexity Analysis Rating.</i>
Have compliance requirements and pre-burn considerations been completed? <i>i.e. preparation work, NEPA mitigation requirements, cultural, threatened and endangered species, smoke permits, state burn permits/authorizations</i>
Can all of the elements and conditions specified in Prescribed Fire Plan be met? <i>i.e. weather, scheduling, smoke management conditions, suitable prescription window, correct season, staffing and organization, safety considerations, etc.</i>
Are processes in place to ensure all internal and external notifications and media releases will be completed?
Have key agency staffs been fully briefed about the implementation of this prescribed fire?
Are there circumstances that could affect the successful implementation of the plan? <i>i.e., preparedness level restrictions, resource availability, other prescribed fire or wildfire activity</i>
Have you communicated your expectations to the Burn Boss and FMO regarding if and when you are to be notified that contingency actions are being taken?
Have you communicated your expectations to the Burn Boss and FMO regarding decisions to declare the prescribed fire a wildfire?

Implementation Recommended by: \_\_\_\_\_ Date: \_\_\_\_\_  
 FMO/Prescribed Fire Burn Boss

I am authorizing ignition of this Prescribed Fire between the dates of \_\_\_\_\_ and \_\_\_\_\_. It is my expectation that the project will be implemented within this time frame and as discussed and documented in this burn plan. If the conditions we discussed change during this time frame, it is my expectation you will brief me on the circumstances and an updated authorization will be negotiated if necessary.

**Additional Instructions or Discussion Documentation (Optional):**

Ignition Authorized by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Agency Administrator

Project Name: \_\_\_\_\_

Unit Name: \_\_\_\_\_

**ELEMENT 2 B: DAILY PRESCRIBED FIRE GO/NO-GO CHECKLIST**

A. Have conditions in or adjacent to the ignition unit changed, i.e., drought conditions, and fuel loadings, which were not considered in the prescription development? If <b>NO</b> proceed with checklist below, if <b>YES</b> go to item B.	YES	NO
B. Has the prescribed fire plan been reviewed and an amendment been approved; or has it been determined that no amendment is necessary? If <b>YES</b> , proceed with checklist below, if <b>NO</b> , STOP. Implementation is not allowed. An amendment is needed.		

YES	NO	QUESTIONS
		Have ALL permits and clearances been obtained?
		Have ALL the required notifications been made?
		Have all the pre-burn considerations and preparation work identified in the Prescribed Fire Plan been completed or addressed and checked?
		Have ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL prescription parameters met?
		Are ALL smoke management specifications met?
		Are ALL planned operations personnel and equipment on-site, available and operational?
		Has the availability of contingency resources applicable to today's implementation been checked and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
<b>If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location and results. If any questions are answered "NO" then DO NOT proceed with the test fire. Implementation is not allowed.</b>		
		After evaluating the test fire, in your judgment, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

\_\_\_\_\_  
 Burn Boss

\_\_\_\_\_  
 Date

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY**

PRESCRIBED FIRE NAME			
ELEMENT	RISK	POTENTIAL CONSEQUENCE	TECHNICAL DIFFICULTY
1. Potential for escape			
2. The number and dependence of activities			
3. Off-site values			
4. On-site values			
5. Fire behavior			
6. Management organization			
7. Public and political interest			
8. Fire treatment objectives			
9. Constraints			
10. Safety			
11. Ignition procedures/ methods			
12. Interagency coordination			
13. Project logistics			
14. Smoke management			

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	
CONSEQUENCES	
TECHNICAL DIFFICULTY	
SUMMARY COMPLEXITY DETERMINATION	
RATIONALE:	

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA**

**A. Physical Description**

1. Location:
2. Size:
3. Topography:
4. Project Area:
5. Ignition Units:

**B. Vegetation/Fuels Description:**

1. On-site fuels data
2. Adjacent fuels data

**C. Description of Unique Features:**

**ELEMENT 5: OBJECTIVES**

**A. Objectives:**

1. Resource objectives:
2. Prescribed fire objectives:

**ELEMENT 6: FUNDING:**

**A. Cost:**

**B. Funding source:**

**ELEMENT 7: PRESCRIPTION**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**A. Prescription Narrative (Describe how fire behavior will meet objectives)**

**B. Prescription Parameters:**

1. Environmental and/or Fire Behavior

#### **ELEMENT 8: SCHEDULING**

**A. Implementation Schedule (Ignition Time Frames/Season(s)):**

**B. Projected Duration:**

**C. Constraints:**

#### **ELEMENT 9: PRE-BURN CONSIDERATIONS AND WEATHER**

**B. Considerations:**

1. On Site:
2. Off Site

**C. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):**

**D. Notifications:**

#### **ELEMENT 10: BRIEFING**

**Briefing Checklist:**

- Burn Organization
- Burn Objectives

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

- Description of Prescribed Fire Area
- Expected Weather & Fire Behavior
- Communications
- Ignition Plan
- Holding Plan
- Contingency Plan
- Wildfire Declaration
- Safety and Medical
- Aerial Ignition Briefing (if required)

**ELEMENT 11: ORGANIZATION AND EQUIPMENT**

**A. Positions:**

**B. Equipment:**

**C. Supplies:**

**ELEMENT 12: COMMUNICATION**

**A. Radio Frequencies**

1. Command Frequency(ies):
2. Tactical Frequency(ies):
3. Air Operations Frequency(ies):

**B. Telephone Numbers:**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL**

**A. Safety Hazards:**

**B. Measures Taken to Reduce the Hazards:**

**C. Emergency Medical Procedures:**

**D. Emergency Evacuation Methods:**

**E. Emergency Facilities:**

**ELEMENT 14: TEST FIRE**

**A. Planned Location:**

**B. Test Fire Documentation:**

1. Weather conditions on-site:
2. Test fire results:

**ELEMENT 15: IGNITION PLAN**

**A. Firing Methods (including Techniques, Sequences and Patterns):**

**B. Devices:**

**C. Minimum Ignition Staffing:**

**ELEMENT 16: HOLDING PLAN**

**A. General Procedures for Holding:**

**B. Critical Holding Points and Actions:**

Appendix B: Prescribed Fire Burn Plan Template

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**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**C. Minimum Organization or Capabilities Needed:**

**ELEMENT 17: CONTINGENCY PLAN**

**A. Management Action Points, Triggers/Limits:**

**B. Actions Needed:**

**C. Minimum Contingency Resources and Maximum Response Time(s):**

**ELEMENT 18: WILDFIRE DECLARATION**

**A. Wildfire Declared By:**

**B. IC Assignment:**

**C. Notifications:**

**D. Extended Attack Actions and Opportunities to Aid in Fire Suppression:**

**ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY**

**A. Compliance:**

**B. Permits to be Obtained:**

**C. Smoke Sensitive Receptors:**

**D. Potential Impacted Areas:**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:**

**ELEMENT 20: MONITORING**

**A. Fuels Information Required and Procedures:**

**B. Weather Monitoring (Forecasted and Observed) Required and Procedures:**

**C. Fire Behavior Monitoring Required and Procedures:**

**D. Monitoring Required to Ensure that Prescribed Fire Plan Objectives are Met:**

**E. Smoke Dispersal Monitoring Required and Procedures:**

**ELEMENT 21: POST-BURN ACTIVITIES**

**Post-Burn Activities that must be Completed:**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**PRESCRIBED FIRE PLAN APPENDICES**

- A. Maps: Vicinity and Project/Ignition Units (Optional Fuels and Smoke Impact Areas)**
- B. Technical Review Checklist**
- C. Complexity Analysis**
- D. Agency-Specific Job Hazard Analysis or Risk Assessment**
- E. Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)**
- F. Smoke Management Plan and Smoke Modeling Documentation (optional)**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**A: MAPS**

**1. Vicinity Map:**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**2. Project Map:**

Project Name: \_\_\_\_\_

Unit Name: \_\_\_\_\_

**B: TECHNICAL REVIEWER CHECKLIST**

PRESCRIBED FIRE PLAN ELEMENTS:	S/U	COMMENTS
1. Signature page		
2. A. Agency Administrator Ignition Authorization B. Daily Prescribed Fire GO/NO-GO Checklist		
3. Complexity Analysis Summary		
4. Description of Prescribed Fire Area		
5. Objectives		
6. Funding		
7. Prescription: Prescription Narrative and Parameters		
8. Scheduling		
9. Pre-burn Considerations and Weather		
10. Briefing		
11. Organization and Equipment		
12. Communication		
13. Public and Personnel Safety, Medical		
14. Test Fire		
15. Ignition Plan		
16. Holding Plan		
17. Contingency Plan: includes identified critical smoke receptor impacts		
18. Wildfire Declaration		
19. Smoke Management and Air Quality		
20. Monitoring		
21. Post-burn Activities		
Appendix A: Maps		
Appendix C: Complexity Analysis		
Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment		
Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation		
Appendix F: Smoke Management Plan and Smoke Modeling Documentation (optional)		
Other		

S = Satisfactory                      U = Unsatisfactory

Recommended for Approval: \_\_\_\_\_ Not Recommended for Approval: \_\_\_\_\_

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

Technical Reviewer                      Qualification and currency (Y/N)                      Date

Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

Recommendation for approval is not granted. Prescribed fire plan should be re-submitted for technical review subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**C: COMPLEXITY ANALYSIS**



**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**D: AGENCY-SPECIFIC JOB HAZARD ANALYSIS or RISK  
ASSESSMENT**

**Project Name:** \_\_\_\_\_

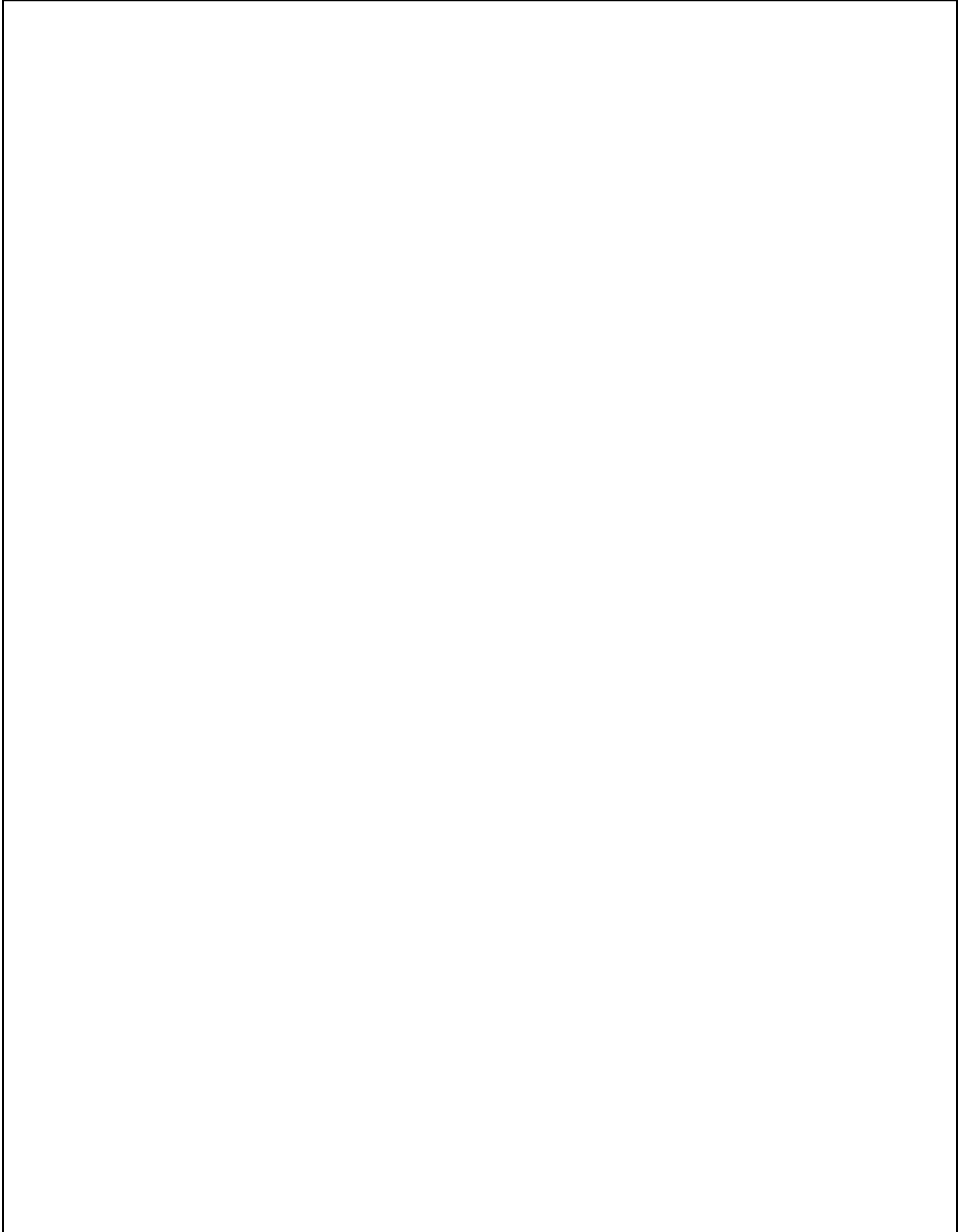
**Unit Name:** \_\_\_\_\_

**E: FIRE BEHAVIOR MODELING DOCUMENTATION OR EMPIRICAL  
DOCUMENTATION**

**Project Name:** \_\_\_\_\_

**Unit Name:** \_\_\_\_\_

**F: SMOKE MANAGEMENT PLAN AND SMOKE MODELING  
DOCUMENTATION**



Appendix H  
Virginia Department of Forestry Burn Laws and Exemptions



## Chapter 9 Prescribed Burn Laws

### Synopsis of Forest Fire and Burning Laws

**10.1-1141 -- Civil Action - Liability for Escaped Fires** - If a person carelessly, negligently or intentionally without using reasonable care and precaution to prevent its escape, starts a fire on forest land, brushland or wasteland, he is liable for the costs of suppressing the fire.

**10.1-1142-A—Regulating the Burning of Woods, Brush, Etc.** - Owner to cut and pile material for safe burning, and take reasonable care to prevent its escape. Class 3 Misdemeanor.

**10.1-1142-B -- 4 PM Burning Law** - During the period February 15 through April 30, it shall be unlawful to burn before 4:00 p.m. within 300 feet of woodland, brushland or field containing dry grass, although the precautions have been taken. Class 3 Misdemeanor.

**10.1-1142-C—Unattended fire** - Unlawful to leave open-air fires burning within 150 feet of woodland, brushland or field containing dry grass or other inflammable material. Class 3 Misdemeanor.

**18.2-86 -- Arson** - If any person maliciously sets fire to any wood, fence, grass, straw or other thing capable of spreading fire on land, that person shall be guilty of a Class 6 felony.

**18.2-87 -- Intentionally set fires** - Class 1 Misdemeanor and liability for suppression of fire if a person intentionally sets fire to brush, woods, etc., and if he intentionally allows the fire to escape to lands of another whereby the adjoining property is damaged or jeopardized.

**18.2-88 -- Carelessly set fires** - Class 4 Misdemeanor and liability for costs of suppression if a person carelessly or intentionally set fire whereby the property of another is jeopardized or damaged.

**10.1-1158 -- Prohibition of all open burning where serious fire hazards exist.** - Governor may prohibit open burning due to extreme fire conditions. Class 3 Misdemeanor.

### Virginia Certified Prescribed Burn Managers Course.

#### § 10.1-1150.1. Definitions.

As used in this article unless the context requires a different meaning:

**"Certified prescribed burn manager"** means any person who has successfully completed a certification process established by the State Forester under § 10.1-1150.2.

**"Prescribed burning"** means the controlled application of fire or wildland fuels in either the natural or modified state, under specified environmental conditions, which allows a fire to be confined to a predetermined area and produces the fire behavior and fire characteristics necessary to attain planned fire treatment and ecological, silvicultural, and wildlife management objectives.

**"Prescription"** means a written statement defining the objectives to be attained by a prescribed burning and the conditions of temperature, humidity, wind direction and speed, fuel moisture, and soil moisture under which a fire will be allowed to burn. A prescription is generally expressed as an acceptable range of the prescription elements.  
(1998, c. 156.)

**§ 10.1-1150.2. State Forester to establish certification process.**

The State Forester shall develop and administer a certification process and training course for any individual who desires to become a certified prescribed burn manager. The training program shall include the following subjects: the legal aspects of prescribed burning; fire behavior; prescribed burning tactics; smoke management; environmental effects; plan preparation, and safety. A final examination on these subjects shall be given to all attendees. The State Forester may charge a reasonable fee to cover the costs of the course and the examination.  
(1998, c. 156.)

**§ 10.1-1150.3. Voluntary certification.**

To be certified as a prescribed burn manager, a person shall:

1. Successfully complete all components of the prescribed burn course developed by the State Forester and pass the examination developed for the course;
  2. Successfully complete a training course comparable to that developed by the State Forester and pass the examination developed for Virginia's course;
  3. Demonstrate relevant past experience, complete a review course and pass the examination developed for Virginia's course.
- (1998, c. 156.)

**§ 10.1-1150.4. Prescribed burn elements.**

Prescribed burning shall be performed in the following manner:

1. A prescription for the prescribed burn shall be prepared by a certified prescribed burn manager prior to the burn. The prescription shall include: (i) the landowner's name, address and telephone number, and the telephone number of the certified prescribed burn manager who prepared the plan; (ii) a description of the area to be burned; a map of the area to be burned; the objectives of the prescribed burn, and the desired weather conditions or parameters; (iii) a summary of the methods to be used to start, control and extinguish the prescribed burn and (iv) a smoke management plan. The smoke management plan shall be based on guidelines presented in the Virginia Department of Forestry publication, "Voluntary Smoke Management Guidelines for Virginia," and the U.S. Forest Service's technical publication, "A Guide to Prescribed Fire in Southern Forests." A copy of the prescription shall be retained at the site throughout the period of the burning;
  2. Prescribed burning shall be conducted under the direct supervision of a certified prescribed burn manager, who shall ensure that the prescribed burning is in accordance with the prescription and
  3. The nearest regional office of the Virginia Department of Forestry shall be notified prior to the burn.
- (1998, c. 156.)



**§ 10.1-1150.5. Liability.**

A. Any prescribed burning conducted in compliance with the requirements of this article, state air pollution control laws, and any rules adopted by the Virginia Department of Forestry shall be in the public interest and shall not constitute a nuisance.

B. Any landowner or his agent who conducts a prescribed burn in compliance with the requirements of this article, state air pollution control laws, and any rules adopted by the Virginia Department of Forestry shall not be liable for any damage or injury caused by or resulting from smoke.

C. Subsections A and B of this section shall not apply whenever a nuisance or damage results from the negligent or improper conduct of the prescribed burn or when the prescribed burn elements described in § 10.1-1150.4 have not been complied with. (1998, c. 156.)

**§ 10.1-1150.6. Revocation of certification.**

If the actions of any certified prescribed burn manager or the prescriptions prepared by him violate any provision of this article, state air pollution control laws, or Virginia Department of Forestry rules or threaten public health and safety, his certification may be revoked by the State Forester.

(1998, c. 156.)

Exemption to the 4:00 p.m. Burning Law

For Certified Prescribed Burn Managers ONLY:

**Deadline**

Prior to February 1st of the year an exemption is desired.

**Requirements**

Form 180 Exemption Application Form (see appendix) must be completely filled out and required documents submitted to the State Forester.

Each project you plan on burning during the exemption period will need a separate exemption application completed and submitted.

The application can be submitted at anytime from May 1st through the following February 1st. The applicant will be notified once a decision is made regarding the exemption.

**Conditions**

The exemption is for the entire period the 4 PM burning law is in effect, from February 15th to April 30, and can be revoked at anytime should conditions warrant.

It is critical that all requirements of the certified prescribed burn manager be strictly followed.

**Remember**

Call the nearest VDOF Regional Office on the morning of the planned burn.

The 4:00 p.m. Law § 10.1-1142 B shall not apply if:

The fire is set for "prescribed burning" that is conducted in accordance with a "prescription" and managed by a "certified prescribed burn manager" as those terms are defined in § 10.1-1150.1;

The burn is conducted in accordance with § 10.1-1150.4;

The State Forester has approved the application for the prescribed burn and

The burn is being conducted for one of the following purposes:

control of exotic and invasive plant species that cannot be accomplished at other times of the year; wildlife habitat establishment and maintenance that cannot be accomplished at other times of the year or management necessary for natural heritage resources. The State Forester may on the day of any burn planned to be conducted pursuant to this subsection revoke his approval of the prescription for the burn if hazardous fire conditions exist. The State Forester may revoke the certification of any certified prescribed burn manager who violates any provision of this subsection.

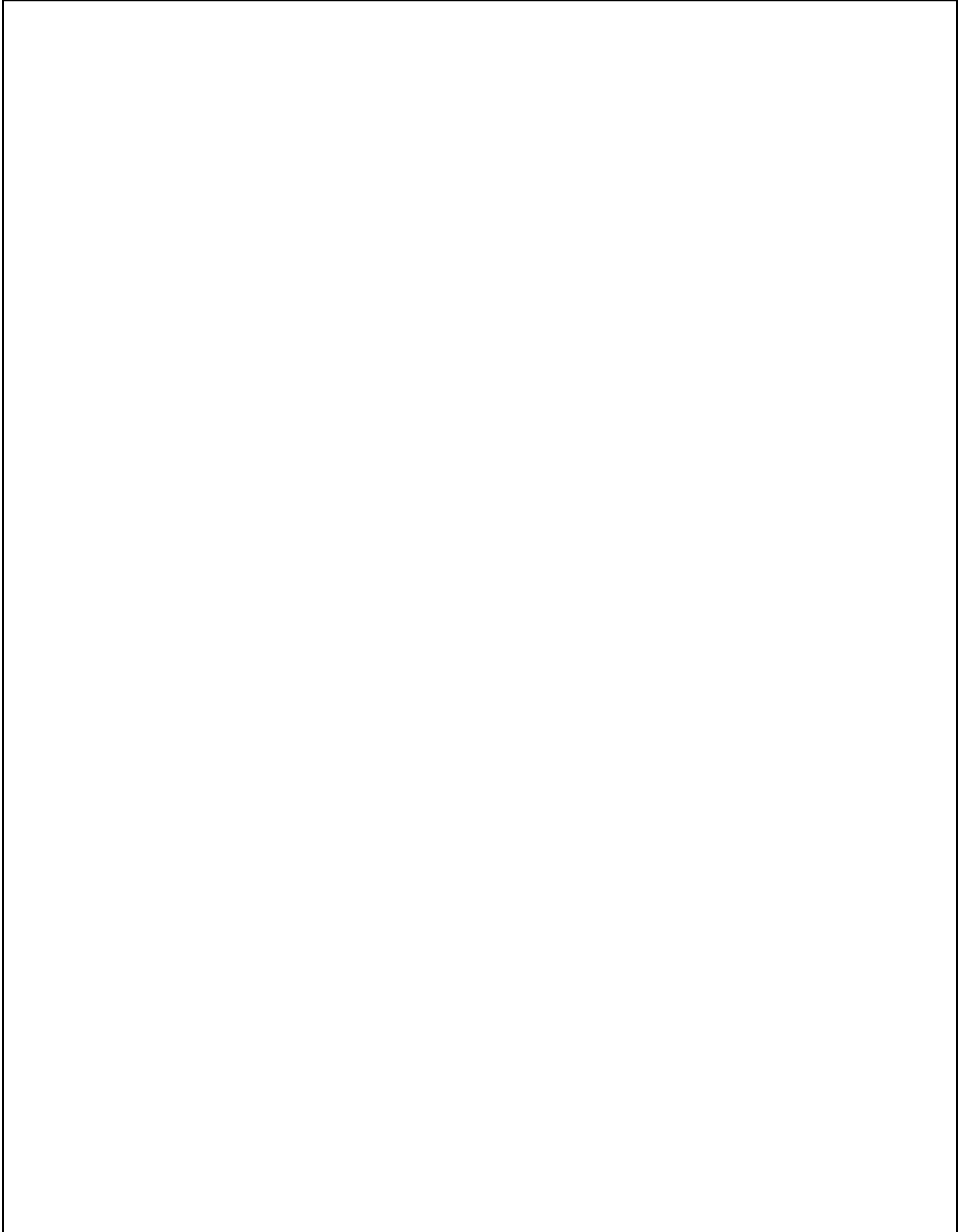
**Department of Environmental Quality (DEQ) laws relating specifically to prescribe burning.** (Refer to page 130 for more info)

9 VAC 5-40-5630 (9a) -- Burning shall be at least 1,000 feet from any occupied building, unless occupants have given prior permission.

9 VAC 5-40-5630 (9b) -- The burning shall be attended at all times.

\*Note: For complete information on the Fire Laws of Virginia refer to the Code of Virginia or "Virginia's Forest Fire Laws," Department of Forestry, Publication No. 2, Revised 1996. For complete information on the Regulations for the Control and Abatement of Air Pollution, contact the State Air Pollution Control Board.





**Appendix 5  
Naval Support Facility Dahlgren Forestry Management  
Plan**

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# Integrated Forest Management Plan

Naval Support Facility Dahlgren Virginia

John D. Wilburn and John F. Munsell

Virginia Tech

Department of Forest Resources and Environmental Conservation

6/11/2010

This forest management plan was prepared using data collected at Naval Support Facility Dahlgren from January through May of 2009. The plan details the purpose, methods, analysis, and proposed activities for management of the installation's forest resources.

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## Introduction

### Purpose of Plan

This document summarizes the 2009 forest inventory at Naval Support Facility Dahlgren (NSFDL) providing in-depth analysis of the inventory data and recommendations for forest ecosystem management activities. Recommendations are based on established *silvicultural* (see *silviculture*) practices and are projected forward using computer simulation of forest growth and yield combined with economic discounting calculation. Integration of forest management with the installation mission and constraints to forest management were addressed in the formation of the recommendations for current and future forest management at NSFDL.

### Scope

This plan builds on existing forest planning documents beginning in 1965. The last inventory was undertaken by Virginia Tech in 1992/93 with the associated planning document authorized in 1997. Continued inventory and management planning of the forest resource at NSFDL aims to maintain a sustained yield of forest products and ecological services. The 2009 inventory was performed on the accessible stands delineated by the 1992/93 inventory. Inventory of forest compartments D, F, and G was not possible due to restricted access related to the potential for *unexploded ordnance* (UXO). Based on analysis of the 2009 data and aerial photo interpretation, stand boundaries were updated and recommendations for management are based upon these new delineations. Current conditions of the forest are described in detail and projections of the forest conditions and volume yields for 10 and 100 years are provided under various management scenarios.

### Objectives

The objectives for forest management at NSFDL include: integration with the military mission, sustainable multiple use of the resource, maintenance of the health and productivity of natural ecosystems, support and maintenance of biodiversity of native flora and fauna, protection of unique and sensitive areas and habitats, protection of installation real property, and soil and water conservation. The objectives of this plan are to describe the current conditions of the forest, report on and analyze inventory data collected from the inventory, provide silvicultural prescriptions to guide management toward the installation objectives, and project the future condition of the forest resources on NSFDL under the prescriptions for management. The document will describe the previous forest classification scheme and state the baseline conditions of the forest. Then the methods of the 2009 forest inventory will be described along with the new forest classification scheme. A review of applicable silvicultural management regimes will be provided, followed by detailed descriptions of the individual stands and recommendations for management. Projections of forest conditions under the proposed management alternatives will be provided following each stand description. Technical terminology in bold and italics are included in the glossary. Tables and figures not included in the body of the text are referenced to the Appendix.

## Background

NSFDL is located in the coastal plain physiographic province, on the Virginia shore of the Potomac River directly southeast of Washington D.C. Its proximity to the Chesapeake Bay requires that management activities comply with the policies of the Chesapeake Bay Preservation Act, Virginia Best Management Practices (BMPs), and other related water quality policy. The installation consists of two areas, Mainside and Pumpkin Neck, which are divided by Upper Machodoc Creek. Mainside is significantly more developed than Pumpkin Neck and contains almost all of the facilities for housing, administration, and mission related activities. Mainside is approximately 2,678 acres, of which 1,102 are forested. Pumpkin Neck comprises approximately 1,641 acres, of which 1,178 are forested. On Pumpkin Neck only 503 acres of forest are accessible, with the remainder being restricted due to the potential for UXO.

## Forest Classification

### Forest Compartments

The forest on NSFDL is delineated into seven forest compartments: A, B, C, D, E, F, and G. Compartments A and B are located on Mainside, and C, D, E, F, and G are on Pumpkin Neck. Gambo Creek forms the boundary between compartments A and B, with A to the south and B to the north. Compartment A is the most accessible compartment being constrained less by mission related operations. Compartment B contains testing areas and munitions ranges (electromagnetic rail gun, blasting cap, and terminal range) which cause road closures and restricted access due to explosive safety quantity distance (ESQD) arcs on testing days. Out of the compartments on Pumpkin Neck, C and E are the only accessible areas for inventory and management due to potential for UXO in compartments D, F, and G. Areas within ESQD arcs in compartments C and E are also constrained on certain days due to testing operations.

### Cover Types

For the '92/93 forest inventory, the cover types of Pine (P), Hardwood (H), and Pine-Hardwood (PH) were used in combination with a size classification of 1, 2, or 3. Table 1, replicated from the last plan, shows the general characteristics of each cover and size class.

Table 1 - Characteristics of the forest cover types from the 1997 forest management plan.

Type Symbol	Cover Type	Size Class	Approx. Age	Approx. Ht. (ft.)	Crown Diam. (ft.)*	Approx. DBH (inches)
P1	Pine (0-20% HW)	Seedling-Sapling	0-20	0-30	0-15	0-3.5
P2	Pine (0-20% HW)	Poletimber	21-35	30-60	15-30	3.6-9.5
P3	Pine (0-20% HW)	Sawtimber	36-75	60+	30+	9.6+
PH1	Pine/HW (21-79% HW)	Seedling-Sapling	0-20	0-30	0-10	0-3.0
PH2	Pine/HW (21-79% HW)	Poletimber	21-40	30-60	10-30	3.1-11.5
PH3	Pine/HW (21-79% HW)	Sawtimber	41-90	60+	30+	11.6+
H1	Hardwood (80-100% HW)	Seedling-Sapling	0-20	0-30	0-10	0-3.0
H2	Hardwood (80-100% HW)	Poletimber	21-40	30-60	10-30	3.1-11.5
H3	Hardwood (80-100% HW)	Sawtimber	41-90	60+	30+	11.6+

\* Average crown diameters, in 20ths of an inch, as measured on 1:4800 aerial photography

## Stands

Stands were delineated by aerial photo interpretation by Virginia Tech Department of Forestry for the '92/93 inventory (Figure 1). At the time of inventory work for this plan, a total of 118 of the previous forest stands were accessible, 87 on Mainside and 31 on Pumpkin Neck. The stands on Mainside are highly fragmented by both man-made and natural features. Stands on the installation are relatively small, averaging 12 acres per stand on Mainside and 16 acres on Pumpkin Neck. Previous wildlife management philosophy encouraged a patchwork forest of many small stands for its increased edge effect. This philosophy has shifted towards encouraging larger continuous habitat areas rather than conglomerations of many small patches of habitat types. Either way, the highly developed nature of NSFDL makes achieving either ideal difficult in some areas. Managing a fragmented forest also poses challenges to the economics of forest management. Smaller timber harvests can be less economical for logging operators, making contracting for management activities more challenging. While timber production is not the primary objective for the NSFDL forest, larger stand sizes facilitate management activities prescribed for ecosystem benefit. Where possible, stand boundaries have been re-delineated as a result of data analysis from the 2009 inventory and aerial photo interpretation in an effort to facilitate greater stand manageability.

## 2009 Forest Inventory Methods

The 2009 inventory established a permanent inventory system on the NSFDL forest. By allowing re-measurement of the same plots, this permanent inventory system enables the direct calculation of growth and yield between inventories, including *ingrowth*, *mortality*, and diameter and height *increment*.

Sample plots were located in each stand by overlaying a rectangular grid system of  $n \times n$  chains designed to achieve both a random sample and adequate coverage of the area. Due to time constraints on data collection, a minimum sample size thought to achieve adequate coverage and an acceptable margin of error was obtained for each stand. Once a plot location was established it was marked with aluminum tree tags seated at stump level on two or more trees close to plot center. The distance and azimuth from plot center to the tags was recorded. The latitude and longitude of the plot was also recorded using a **Garmin GPSMap CSx™** GPS unit set to WGS 1984. The inventory plot database file associated with the inventory\_points GIS layer provides the tag numbers, distances and bearings, and coordinates for each point, to aid relocation and future re-inventory. A total of 359 plots were established, averaging about one plot for every four acres of accessible forestland.

### 1997 Forest Cover Types and Stands

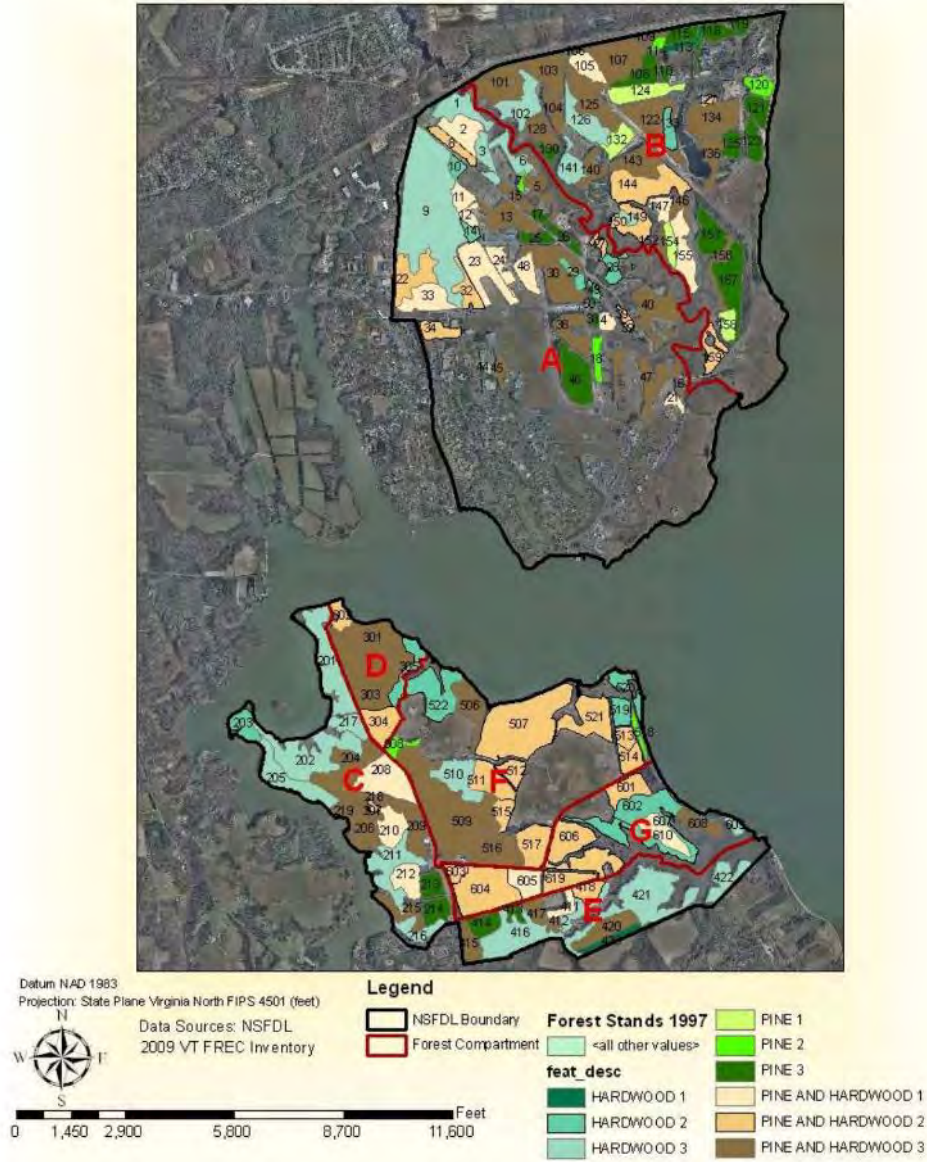


Figure 1 - 1997 forest stands and cover types.

#### Overstory Measurement

Circular, 1/10<sup>th</sup> acre (37.24 foot radius) plots were established for the overstory sample. The species and **diameter at breast height** (dbh) to .1 inches were recorded for every tree or woody shrub within the plot and greater than or equal to 4.5 inches dbh. Ocular estimates of merchantable volume (**logs** or **bolts**) were made for all measured stems. Pulpwood bolts, or 8 foot lengths, were tallied on the **bole** up to a minimum 4 inch top diameter for softwoods less than 10 inches dbh and for hardwoods less than 12 inches dbh. Additional pulpwood from the tops and limbs on trees, or **topwood**, was also tallied. For example, the amount of topwood above tallied logs on pines was estimated up to a minimum 4 inch top diameter. Likewise in hardwoods with wider crowns, limbs deemed merchantable for pulp were also tallied as bolts. Since no estimate of the bottom diameter (equivalent to dbh) of topwood bolts was made during the inventory, all topwood bolts were assumed to have a 6 inch diameter at 4.5 feet from the bottom end and a four inch top. Previous inventory efforts have not accounted for topwood, therefore a large increase in pulpwood volume should be expected when looking at volume change from the previous inventory. Logs were measured as 16 foot sections to a minimum 8 inch top for softwoods greater than or equal to 10 inches dbh and for hardwoods greater than or equal to 12 inches dbh. Once a 16 foot log was tallied for an individual tree, additional half logs of 8 feet were then tallied if present.

Visible damage or decay, **crown position**, **live crown ratio (LCR)**, and a rating of either **acceptable growing stock (AGS)** or **unacceptable growing stock (UGS)** were also recorded for each tree. Whether a tree was considered AGS was based on if the tree held merchantable value and was reasonably free of disease or defect. Crown position is a descriptor of the relative position of the tree within the canopy. Suppressed trees are overtopped by surrounding trees and receive the least amount sunlight. Intermediates are located just below the canopy line and receive some sunlight on the upper branches. Co-dominant stems receive sunlight on upper branches and some lower branches, but are located alongside the dominants in the main canopy. Dominant stems have tops which exceed the average canopy height and receive the most sunlight.

To obtain average stand height, average live crown, and approximate stand age, two trees per plot of dominant or co-dominant crown position, located closest to a random azimuth from plot center were measured for total height and height to live crown using a **clinometer**. At every third plot per stand one of the two randomly selected total height trees was cored for age and **site index** calculation. Where stands had a sample size of less than three plots, at least one tree was cored per stand. The cores were stored and the annual rings were counted under a dissecting microscope at Virginia Tech's **dendrochronology** lab.

All accessible stands size class 2 and above were sampled. Qualitative data was collected for Class 1, or non-merchantable, stands. These qualitative descriptions are included in the Non-Merchantable condition class section of the plan.

#### Understory Measurement

From April through May 2009 understory data were collected for **advance regeneration** smaller than 4.5 inches dbh, non-woody vegetative cover, and **coarse woody debris (CWD)**. These data were collected from a subsample of the overstory plots. Overstory stands were grouped into 30 clusters using **k-means**



*cluster analysis* based on the overstory data analysis up to that point. Then a subsample of 200 overstory plots was randomly and proportionally selected across the clusters based on cluster acreage. For example, cluster 1 consisted of 6 stands totaling 49.7 acres, or 3.62% of the total forested acreage, so 3.62% of the 200 plot subsample, or roughly 7 plots were selected from the plots within cluster 1 to be sampled for understory data. Furthermore, within cluster 1, those 7 plots were distributed proportionally to the stands based on relative stand size. Stand 1 had 15.5 acres, making up 31% of the total acreage of cluster 1, so 31% of the 7 plots, roughly 2 plots were selected randomly from Stand 1. At each subsample plot, two 37.2 foot transects oriented on a random azimuth from plot center were established 180 degrees from each other. A 1/1000<sup>th</sup> acre, or mil-acre, subplot (radius 3.72 feet) was located with its center point at the end of each transect. Figure 2 shows the inventory plot design.

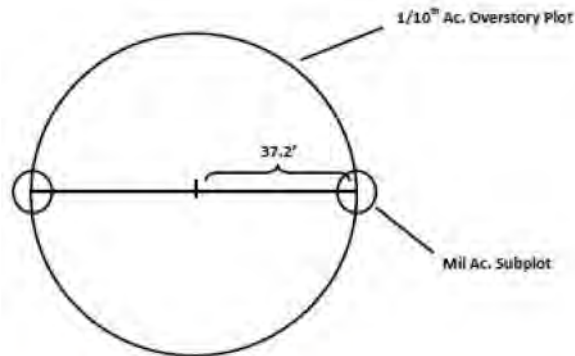


Figure 2 - Plot design for the 2009 permanent inventory, showing a 0.1 acre overstory plot with a radius of 37.2 feet. Two radii 180 degrees from one another formed CWD transects. Where transects ended marked the center of the 0.001 acre understory plot.

All stems within the subplot less than 4.5 inches were tallied by species and classified according to height. Stems less than 1 foot in total height were coded 1, 1-3 feet coded 2, 3-5 feet coded 3, and >5 feet coded 4. CWD was then sampled using a variation of the **line intersect method** along both transects. Along the entire transect length all CWD larger than three inches in diameter was tallied. From 27.9 feet to the end of the transect (the last quarter), CWD 1-3 inches in diameter was also tallied, and from 32.5 feet onward (the last eighth) CWD less than one inch in diameter was also tallied. CWD less than one inch in diameter was further subdivided into categories of zero to one-quarter inch in diameter and one-quarter to one inch. For all CWD tallied, approximate diameter, distance from plot center, and decay class was recorded. Where possible, species was also recorded. Decay classes were recorded as follows: 1 = Recently fallen, >75% bark intact, most branches intact; 2 = <75% bark intact, beginning decay process; 3 = Little or no bark, bole is solid, soft but cannot poke a hole in it with finger; and 4 = Bole is fragmenting, can poke a hole in it, supports herbaceous plants. The formula to calculate cubic feet of CWD/acre is listed in the Appendix.

### Volume Estimation

The exact equations used to predict pulpwood for the 1997 plan were not explicitly stated. Volumes for the 2000 inventory were determined by a volume table for pine pulpwood in the coastal plain of South Carolina and Georgia. For the 2009 inventory, the equation used to predict pulpwood was:

$$\text{Volume (ft}^3\text{)} = 0.01878 \times (\text{dbh}^2 \times S)$$

S = number of 5.25 ft sticks. Bolts were converted to the equivalent number of sticks for the use of this equation.

The equation used to estimate board foot volumes for sawtimber in the 2009 inventory was kept consistent with the 1992 inventory by Virginia Tech. This was done to make clear comparisons in growth and minimize changes in volume due to conversion to a different equation. The 2000 inventory used a volume table for southern conifers and eastern hardwoods for board footage in the International 1/4" log rule. The 1992 and 2009 equation for volume in International 1/4" rule, form class 78 was:

$$\begin{aligned} \text{Volume (bd. ft.)} \\ = (1.52963L^2 + 9.58615L - 13.35212) + (1.7962 - 0.27465L^2 - 2.5999L)D \\ + (0.04482 - 0.00961L^2 + .45997L)D^2 \end{aligned}$$

where L = number of 16 foot logs; and D= diameter at breast height.

Volumes and all other recorded data are available in the database files for tree\_data, inventory\_points, and forest\_stand\_polygons.

### Cluster Analysis

Since small stands generally require more plots per acre than larger stands to achieve comparably adequate margin of error, and a low number of plots were taken per stand, a large range in margin of error resulted. In order to improve the margin of error for population estimates, a larger sample of plots was needed. *K-means* cluster analysis was again used to cluster stands in order to generate larger stratified samples. The percentage of the total **basal area** (BA) made up by important species or species groups classified as pulpwood or sawtimber was calculated for each stand. This combined variable represents the relative dominance of each important species/product class. The distribution of species/product classes provides a good descriptor of the species composition and size structure for the stand. Quality may also be implied in the product class of a tree since pulpwood may include defective sawtimber sized trees. SPSS, statistical software package (originally known as Statistical Package for the Social Sciences), was used to compute the cluster analysis using this combined relative dominance variable. The gum category includes blackgum and sweetgum, and the other oaks category includes southern red, northern red, scarlet, black, post, and chestnut oaks. Miscellaneous species which occurred more rarely and which were not directly indicative of a forest cover type were not included in the analysis so that the clusters were not based on the occurrence of non-significant species; however the impact of these excluded species is indirectly reflected in the reduced relative dominance of the included species categories.

The analysis was run for  $n= 3$  to 10 clusters which were then evaluated by comparison with the individual stand attributes.  $N=7$  was found to most adequately cluster the stands, based on key differences in species composition and size structure. Table 2 shows the results of the seven clusters.

Table 2 - Using k-means cluster analysis on a common variable representing the composition by species/products groups.  $n= 7$  clusters were chosen that most adequately represented the forest. From these clusters, forest condition classes were developed.

Cluster Variables (% of total BA)	Cluster						
	C1	C2	C3	C4	C5	C6	C7
<b>Pulpwood Categories</b>							
Gum	5.4%	<b>16.0%</b>	7.3%	5.1%	9.0%	5.6%	<b>17.0%</b>
Yellow poplar	0.0%	0.4%	0.0%	0.4%	4.5%	3.9%	0.6%
White oak	4.7%	6.2%	9.2%	0.0%	0.4%	0.7%	4.3%
Red maple	1.4%	<b>15.6%</b>	6.4%	0.9%	3.3%	0.7%	3.3%
Willow oak	0.7%	1.8%	0.0%	1.0%	0.3%	0.0%	1.8%
Other oaks	6.2%	3.6%	4.2%	1.3%	0.6%	1.6%	9.6%
Loblolly pine	0.1%	1.7%	0.0%	<b>61.8%</b>	4.1%	0.1%	2.6%
Virginia pine	2.4%	1.3%	<b>56.2%</b>	0.1%	0.2%	0.4%	1.9%
<b>Sawtimber Categories</b>							
Gum	5.4%	<b>20.3%</b>	0.0%	0.6%	5.0%	9.9%	4.3%
Yellow poplar	3.0%	2.7%	0.0%	0.0%	2.3%	<b>40.5%</b>	5.0%
White oak	7.1%	<b>10.3%</b>	3.3%	0.0%	0.7%	5.6%	8.3%
Red maple	0.5%	5.0%	0.0%	0.0%	0.9%	1.2%	1.5%
Willow oak	4.1%	1.3%	5.7%	0.5%	0.7%	0.5%	5.2%
Other oaks	<b>50.3%</b>	4.4%	0.0%	0.0%	1.6%	8.4%	<b>12.6%</b>
Loblolly pine	3.5%	3.2%	0.0%	<b>27.4%</b>	<b>64.5%</b>	12.9%	<b>11.9%</b>
Virginia pine	4.1%	2.2%	4.4%	0.0%	0.0%	1.6%	3.4%

The bold numbers in Table 2 indicate the significant relative dominances of that cluster. This value indicates the distinguishing characteristics of that cluster which are reflected in the titles assigned to the clusters. These seven clusters were adopted as *forest condition classes*. Compared to the six previous forest cover types shown in Table 1, these seven condition classes are more specific in terms of species and product composition which facilitates prescription making and management for larger blocks of fragmented forest. The forest condition classes are as follows C-1 – *Oak Sawtimber*, C-2 – *Mixed Gum*, C-3 – *Virginia Pine*, C-4 – *Loblolly Pulpwood*, C-5 – *Loblolly Sawtimber*, C-6 – *Yellow Poplar Sawtimber*, and C-7 – *Mixed Hardwood and Pine*. An eighth *Non-Merchantable* condition class was added to include the young stands previously referred to as Class 1 stands, and which were not measured or included in the cluster analysis.

#### Stand Consolidation

To increase the manageability of small, fragmented stands, those stands adjacent to one another or within an acceptable range of operability and of the same forest condition class were consolidated together into one stand. No cross-compartment consolidations were made. In ArcGIS 9.3.1 (see GIS), the forest stands layer was edited, performing "unions" to consolidate old stand polygons into the new stand polygon. Stand polygon boundaries were also edited to more accurately depict the stand boundaries and to reflect recent losses to development and gains in new forest establishment. Where young forest stands have established themselves, new stand polygons were digitized to include this new

acreage. Plot data were then re-summarized for the new stand consolidations and prescriptions were written to guide stand management. Figures 3 and 4 show the plot locations overlaid on the new stand maps for Mainside and Pumpkin Neck respectively.

Stand consolidation aided by cluster analysis of the inventory data resulted in a reduction from 118 stands to 60, including the addition of seven previously un-delineated non-merchantable stands. Using the most newly edited stand polygons, the total accessible forested acreage is 1604.8 acres. The mean stand size for the entire forest is 26.8 acres, ranging from 1.7 to 189.0 acres with a standard deviation of 36.3 acres. 48 of the 60 stands are located on Mainside, averaging 23.0 acres, from 1.7 to 170.9 acres and a standard deviation of 31.2 acres. The remaining 12 stands located on Pumpkin Neck average 41.9 acres, ranging from 9.5 to 189.0 acres with a standard deviation of 48.9 acres.

### Mainside Forest Stands and Plot Locations

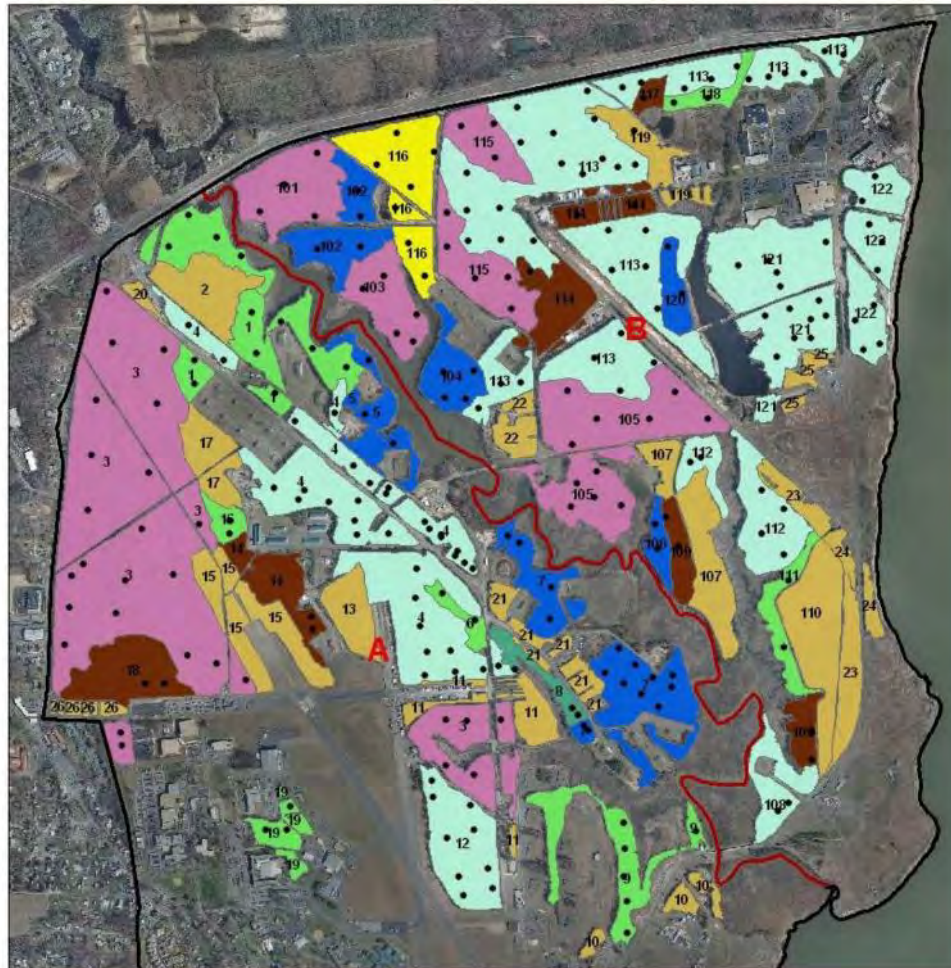
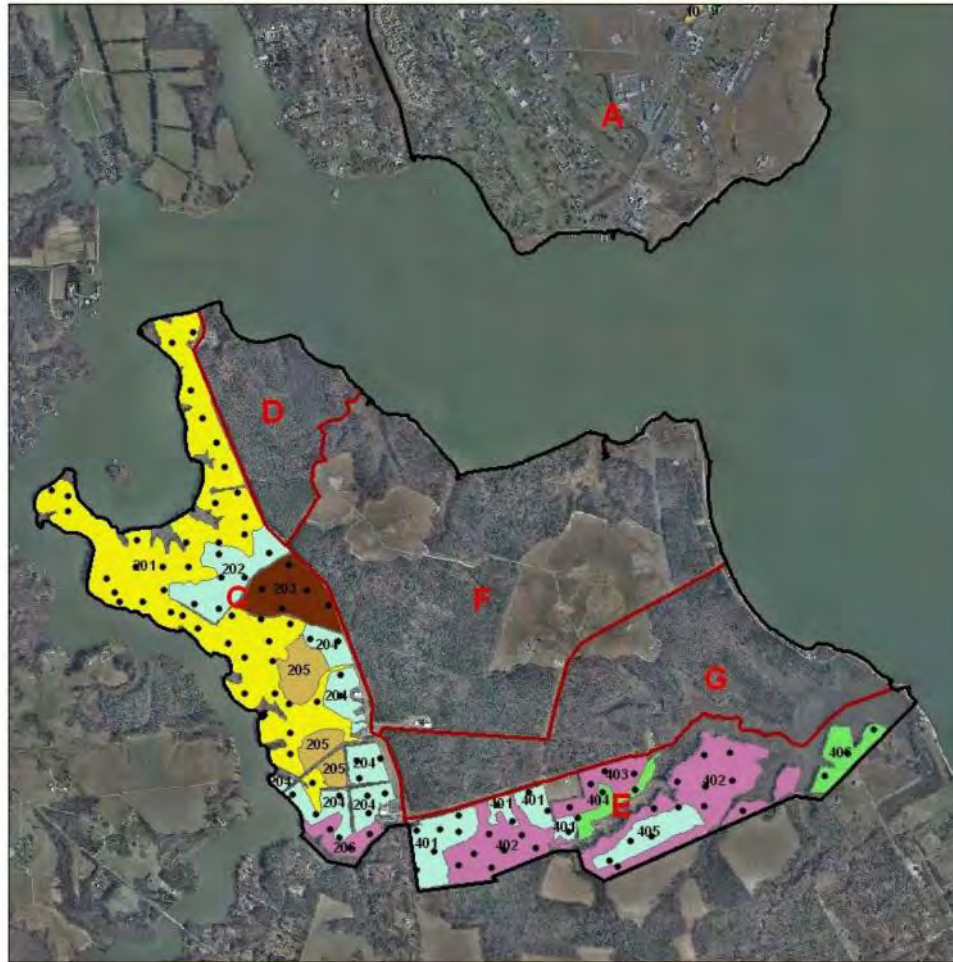
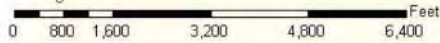


Figure 3 - Mainside forest stands and permanent inventory plot locations.

### Pumpkin Neck Forest Stands and Plot Locations



Datum: NAD 1983  
 Projection: State Plane Virginia North FIPS 4501 (feet)  
 Data Sources: NSFDL  
 2009 VT FREC Inventory



#### Legend

- NSFDL Boundary
- Forest Compartment
- Forest Inventory Plots

#### Forest Stands (2009)

- Mixed Hardwood and Pine
- Non-merchantable
- Oak Sawtimber
- Virginia Pine
- Yellow Poplar Sawtimber
- Loblolly Pulpwood
- Loblolly Sawtimber
- Mixed Gum

#### CondName

- Mixed Hardwood and Pine
- Non-merchantable
- Oak Sawtimber
- Virginia Pine
- Yellow Poplar Sawtimber
- Loblolly Pulpwood
- Loblolly Sawtimber
- Mixed Gum

Figure 4 - Pumpkin Neck forest stands and permanent inventory plot locations.

## Review of Silvicultural Systems

The general silvicultural concepts reviewed below will serve as a general guide to management of the NSFDL forest.

### Even-age Management

Even-age management systems are characterized by area-wide treatments designed to regenerate a stand all at once or by successive treatments within a short time interval (e.g. 5 years), with the resulting stand composed of trees relatively close in age to one another. Intermediate silvicultural treatments are implemented in the middle of a *rotation* to improve the growth of the residual trees and generate intermediate revenue. Even-age regeneration systems include *clearcut*, *shelterwood*, and *seed tree*.

#### Clearcut

In a clearcut system all trees are removed from the site at once, creating conditions favoring trees intolerant of shade. Regeneration after a clearcut is achieved differently depending on the desired species. Most hardwoods will regenerate vegetatively from the stump, known as stump sprouting. Oak regeneration is often accomplished most successfully by stump sprouts. Undesirable species will also sprout prolifically however, causing problems in species composition and stocking and increasing costs for competition control. A benefit to the clearcut system is the limited entry into the stand (typically only once) reducing detrimental effects on site quality by soil compaction from harvesting equipment. A clearcut creates the widest area of disturbed ground for natural seeding to take place creating the potential for prolific natural regeneration and rapid stand development given the right conditions. Regeneration after a clearcut can also be achieved artificially. The most common and successful artificial method in the southeast is direct planting of pine seedlings. Planting seedlings from regional tree improvement programs helps ensure productive genetics and adequate initial stocking densities. The improvement in growth, quality, and stocking provides increased returns and usually justifies the initial costs to artificially regenerate the stand.

#### Shelterwood

A shelterwood is a regeneration harvest that occurs in two stages. In the first stage most of the merchantable wood is harvested except for a residual overstory of a desirable species composition and density. The overstory density, most commonly measured as *residual basal area* (RBA), is set at a level to create optimal light conditions to favor the establishment and growth of shade intermediate species over less desirable and often more competitive shade intolerant species. Once advance regeneration is adequately established, the second stage of a conventional shelterwood system removes the overstory to allow release of the regeneration to grow into the overstory. During this final harvest some damage can occur to the understory so it is important to have sufficient numbers of advance regeneration. A variation to the conventional shelterwood is a *shelterwood with reserves*. In this system no secondary harvest of the overstory is performed, creating a two-aged stand. If properly managed a two-aged stand can have a more varied aesthetic look however the coexistence of two age classes comes at the expense of the growth of each individual *cohort*. At a certain point the growth of the younger cohort will level off in shade of the overstory, while the overstory will have less available resources due to competition from the younger cohort. Most species regenerated under a shelterwood, such as oaks, will not grow into a

dominant crown class without the removal of the overstory. The shelterwood method for oaks works best in stands where there is pre-existing oak regeneration. If this is not the case delay the initial cutting until after a good acorn crop. For the initial cut, leave an RBA of 45-55 ft<sup>2</sup>/acre, roughly 25-50 trees per acre (TPA) of dominant oaks with good form, vigor, and large crowns. When managing for oak, yellow poplar must not be left in the overstory because it is a prolific seed producer and competitor with oaks. Sweetgum and yellow poplar are also both prolific stump sprouters. Timing harvests during the summer can reduce the number and vigor of root sprouts because of low carbohydrate reserves.

A prescribed burn 3-5 years after the initial harvest of a shelterwood has been beneficial for favoring oak dominance in the new cohort. Burning favors the large deep root systems of oaks causing more damage to the species that emphasize rapid shoot growth over roots, like yellow poplar. Burning after harvest can reduce yellow poplar, red maple, and sweetgum to a greater extent than the reduction in oaks. However, if oak numbers are low, burning can be detrimental because some trees will be killed in the fire and others will not sprout vigorously. After the initial cut, the stand is left for 3-5 years to allow root development of advance oak regeneration. The logging residue from the harvest should be left on site and distributed throughout to provide needed fuel for the burn. However, logging residue should be moved away from the base of crop trees prior to a burn to prevent damaging the trees during a high intensity fire. *Cut-to-length* harvesting is better suited to the shelterwood-burn technique since it leaves residues more evenly distributed in the woods, as opposed to *whole-tree* harvesting where *bucking* and delimiting occur at the *landing*. Harvesting residuals in areas where there is a market for biomass is also incompatible with a shelterwood-burn.

Given similar fuel moisture, lower relative humidity (RH) will result in higher intensity fires than high RH. Burns performed in the spring can take advantage of lower RH and reduced carbohydrate reserves in the roots due to leaf expansion, which reduces sprouting potential after a burn. Fall and winter burns do not reduce competition to the same degree because of marginal burning conditions and full root carbohydrate reserves in the roots. Two to three years after the burn the oak regeneration should be evaluated. If there are 150 free to grow oaks per acre then stocking is adequate to produce an oak dominated stand on the site. If adequate regeneration is not present additional burns can be implemented to continue to stockpile oak regeneration. The overstory should not be removed until adequate regeneration is produced, otherwise fuel for additional burns will be too light and more competitive seedlings may outgrow the oaks.

If a burn is not implemented there will still be benefits from the slow release of nutrients and organic matter from the decay of the residue which will contribute to soil productivity. *Timber Stand Improvement* (TSI), which refers to *pre-commercial* treatments aimed at removing low quality or competing stems to enhance the growth of the residual trees, is an alternative to burning. TSI can include pre-commercial thinning or herbicide treatment to control competing vegetation in the stand. Directed application, either by foliar spray or stem injection, of a non-specific herbicide which controls hardwoods and pines may be used to control competition and favor oak dominance. In this case care must be taken to minimize spray drift to non-target species. Herbicide may also be used in combination with the shelterwood technique before or after the initial harvest to kill undesirable regeneration competing with oaks and/or create fuel for a burn. On stumps of acceptable species with many sprouts



it is beneficial to thin down to all but one or two of the most vigorous stems per stump to direct the most resources to their growth.

#### **Seed Tree**

The seed tree method differs from the shelterwood by leaving fewer TPA for the main purpose of leaving a seed source with good genetics for the new age class rather than to control sunlight levels. Also unlike a conventional shelterwood the seed trees are not always removed from the stand, depending on the cost versus benefit of their harvest. Whereas in a shelterwood, leaving a large quantity of overstory trees can be detrimental, the lower RBA used in a seed tree system will not significantly shade or suppress the regeneration. In this way a seed tree is more like a clearcut, but with a more deliberate attempt at promoting natural seeding. In areas where natural regeneration from surrounding stands and residual seed is sufficient, seed trees may be unnecessary.

Immediate establishment of a new cohort after a regeneration harvest is the most economically desirable situation as it avoids a compounding delay of the revenue generated from future rotations. In all even-age systems the regeneration should be evaluated within the first few growing seasons to determine if adequate stocking is present. If the stocking of seedlings is too low, supplemental planting may be necessary to bring the stocking up to adequate levels. Stocking levels depend on the goals for the stand. A documented objective of the NSFDL forest is to maintain the current ratio of pine to hardwood dominated stands. Pine stands are valued aesthetically as evergreens, ecologically for their contribution to diversity of the forest, and economically for their diversification of the wood products portfolio. Preventing conversion to hardwoods requires careful planning in the regeneration of loblolly pine stands and competition control during stand development.

#### **Site Preparation**

Regeneration of a stand can be enhanced by site preparation treatments which can improve the condition of the ground for natural or artificial regeneration. Site preparation includes a wide variety of treatments such as soil tillage, soil scarification, removal (through burning or harvest) or mechanical treatment of logging residue, and pre-plant herbicide application or mechanical treatment for competition control, among others. As with any forest management activity the benefits of the treatment should be considered before bearing the cost of application. Common methods of site preparation worth considering are prescribed burning and the application of herbicides. Implementation of these methods is subject to constraints unique to the installation. Such constraints include limited staff and budget, conflicts with the military mission, policy constraints, close proximity to developed areas such as buildings and roads, potential for UXO, and other safety concerns. Historically loblolly pine has been regenerated successfully at NSFD without site preparation. The vast abundance of advance regeneration encountered under many stands during the forest inventory suggests that conditions are favorable for natural regeneration of loblolly pine as well as other proficient natural seeders.

Prescribed burning can be performed at different stages of the rotation and provide benefits for the establishment of desirable species composition in the new stand. A burn implemented just before harvest improves conditions for seed germination on the forest floor. It can also kill unwanted advance regeneration before the overstory is removed. Burning before harvest can also be risky. A fire that is too

intense can scorch the timber crop, reducing or negating its value. The most common time for site preparation prescribed burn is after harvest and just before planting. Burning removes logging debris, making the planting job easier and kills unwanted natural regeneration. A burn releases nutrients stored in the debris and organic matter on the site, but also makes them highly mobile and available for a much shorter time compared to the slow release from natural decay.

Herbicides can be used in place of prescribed burning for site preparation in artificial regeneration. A site prep spray will kill unwanted hardwoods and volunteer pines in order to control stocking to only that which is planted. Herbicides do not reduce logging slash, but they do not affect the nutrient cycling of logging residue and can be cost-effective compared to burning costs especially considering the safety and smoke management issues associated with prescribed burns.

### **Intermediate Treatments**

Opportunities for silviculture do not occur only at the end and beginning of a rotation. Often the most crucial time for management to positively affect a stand occurs between establishment and harvest. Opportunities exist in mid-rotation for treatments to enhance the multiple uses and yields of the forest ecosystem.

### **Density Management**

Intervention in natural stand development through density management, commonly implemented by thinning, promotes forest health and productivity by removing stressed trees that are more susceptible to insects and disease, reducing hazardous fuel buildup, maintaining high live crown ratios, and allocating more resources to residual trees. Thinning also improves habitat for wildlife by opening the canopy and promoting the growth of browse and other forage. *Commercial thinning* provides intermediate revenue generation which helps to offset the costs of management, while pre-commercial thinning corrects overstocking and leads to a healthier and more productive and profitable rotation. Competing vegetation can be controlled through density management by controlling both site occupancy and the amount of light reaching the understory. Maintaining adequate density and site occupancy is important in restricting regeneration of undesirable vegetation and the premature regeneration of a new age class during a rotation. Appropriate thinning methods will also ensure that good genetic quality remains in the stand to serve as a source of seed at the time of the regeneration cut.

#### *Methods of Measuring and Managing Density*

There are many different methods for measuring and evaluating the density of a stand. At the most basic level TPA will give you some understanding of the density of a stand. However, TPA does not factor in the diameter of the trees which is the other important consideration. BA per acre does take diameter into account and combines the factors of TPA and dbh. However BA per acre alone will not give you an idea of the TPA. For example, a stand with 400 TPA can have the same BA/acre as a stand with 200 TPA because the 400 TPA stand has smaller diameter trees. A more refined density metric is called the **stand density index** (SDI), which is based on the concept of a maximum size and density relationship. For a given *average diameter* or *quadratic mean diameter* (QMD) there is a corresponding maximum number of TPA that a site can carry before a significant amount of density related mortality will occur. When

plotted on a logarithmically scaled X/Y axis, all possible combinations of average diameter and maximum TPA forms a negatively sloped line representing the maximum stand density line. Beyond this line the stand is overstocked, tree mortality increases, and the stand begins self thinning. SDI is calculated by the formula:

$$SDI = 10^{(\log_{10} TPA + 1.605 \log_{10} Dq - 1.605)}$$

According to Reineke (1933), the maximum SDI for loblolly pine is 450. The southern variant of the Forest Vegetation Simulator uses 505. The SDI divided by the species' maximum SDI, expressed as a percentage, is the relative SDI. Using Reineke's maximum, 450 SDI is 100% of maximum SDI, however density related mortality in loblolly pine stands can actually begin at about 50-55% of maximum SDI, or 225-248 SDI.

A similar concept to maximum stand density is **full stocking**, also called **normal stocking**. A fully stocked stand is at full site occupancy and beyond this level the stand is overstocked, meaning that growth declines and density related mortality is highly probable. Stocking diagrams have been developed for even-age stands that combine stand variables such as average diameter or QMD, TPA, BA per acre, SDI, and site index to allow the user to graphically display where a stand is in terms of stocking. Figure 24 in the appendix shows a stocking diagram developed for even-age upland oaks. Figure 25 shows a density management diagram (DMD) for loblolly pine. DMDs are stocking diagrams which are useful for developing thinning regimes. To use the DMD, first maximum and minimum relative SDI limits are set. When the stand reaches the upper limit it is time to thin. The stand is thinned down to the lower limit of relative SDI. Following the recommendations of Dean and Baldwin (1993), loblolly stands should be managed below 45% and above 30% of maximum SDI. Canopy closure in loblolly pine occurs at about 25% of maximum SDI, so 30% of maximum SDI will maintain adequate site occupancy. By using an appropriate site index curve one can figure out the time in years that the stand will take to reach the upper limit and need thinning again. A site index curve for loblolly pine is provided in Figure 22 in the appendix.

#### *Pre-commercial Thinning:*

Thinning operations where the trees are too small to be merchantable and no income is received are considered pre-commercial. Pre-commercial thinning is important where the stocking of young stands is high and competition is drastically affecting productivity. As this is the first thinning of the stand the timing of implementation is dependent on the stand goals. The timing and intensity of the first thinning is critical because when trees are young they are better able to respond to thinning by crown expansion. If the goal is to produce high quality knot-free wood, thinning can be postponed, or the intensity can be low, to encourage dieback of the lower branches until a predetermined length of clear bole has been reached. Due to the expense involved, pre-commercial thinning should be implemented when the increase in productivity will justify the costs. Stands should be considered for pre-commercial thinning at levels above normal planting rates, e.g. above 600 TPA, when crown competition begins to restrict growth, and when live crown ratios start to decrease below 40%. This commonly occurs between 5-10 years of age depending on the level of stocking.

#### *Commercial Thinning:*

Thinning which generates revenue is termed commercial. To sustain commercial thinning, contractors in the eastern US typically require at least 5-7 *cords* (375-560 ft<sup>3</sup>) of pulpwood per acre. A **thinning from below**, or low thinning, removes trees in the suppressed and intermediate crown classes, and in higher intensity low thinning some co-dominants can be harvested. Conversely, **thinning from above**, or high thinning, removes the older and often over-mature trees in the overstory in order to release the suppressed trees beneath. This method is often a means of rehabilitating a site. A **crown thinning** releases trees in dominant and co-dominant crown classes by removing competitors immediately adjacent to their crowns and leaves all the other trees in the suppressed or intermediate classes. This method improves the growth of the best trees while leaving the lower valued trees not directly in competition to be harvested later as pulpwood. A **quality thinning** removes all defective trees to improve the quality of the stand. Combinations of all of these methods can be employed in any thinning regime to achieve the desired residual stand structure and silvicultural goals. In an optimal thinning regime, thinning is scheduled at critical times during the rotation to provide an optimal yield of products and revenue. Typically a thinning is done as early as commercially feasible to increase or maintain the live crown and maintaining or increasing the photosynthetic capability of the tree. Trees in dominant and co-dominant crown positions are in the best physiological condition to respond to thinning and therefore should be favored as crop trees.

#### **Uneven-age Management (Selection Systems)**

Un-even aged management regimes, also called **selection systems**, maintain a wide distribution of age classes which is regulated by harvesting at more frequent cutting cycles. By definition, uneven-aged stands must support at least three age-classes in order to be managed effectively. Mature trees are harvested to regenerate a new age class while concurrent **tending** of immature age classes is performed to improve growth, maintain healthy densities, and encourage recruitment upwards into the larger diameter classes. An important assumption of uneven age management is that diameter is representative of age. In stands that have been managed as even-aged or have undergone **diameter limit harvests or high-grading**, diameter will not truly correlate with age. Diameter-limit harvests and high-grading can have the same effect by harvesting the biggest trees and leaving the small intermediate and suppressed crown classes under the incorrect premise that these trees will continue to grow. The result is a stand of unresponsive, small diameter trees that can be as old as trees in the dominant and co-dominant crown positions. The first cutting cycle of a selection system should serve to correct this phenomenon, taking out low quality species as well as trees across other diameter classes, regulating the **diameter distribution** toward a condition where diameter class will indicate age class more accurately.

Recruitment of trees from one diameter class to the next larger class in an uneven-age system is assumed to follow a relatively constant rate. This rate is derived from the ratio of the number of trees of a dbh class to the next largest class. Since uneven-age stands ideally have greater numbers of smaller diameter trees (from younger age classes) than larger diameter classes, this ratio, referred to as the "q-factor", or "quotient", is usually greater than 1. The shape of the diameter distribution of an idealized

uneven-age stand with a constant  $q$ -factor is downward sloping, often referred to as an inverse-J distribution because of its shape.

Figure 5 shows a diameter distribution in 2 inch classes with  $q = 1.5$  and RBA of 55 ft<sup>2</sup>. Removals in uneven-age stands are often based off of a guide curve which shows the ideal diameter distribution for meeting the silvicultural objectives of the stand. Guide curves can be customized by setting the desired RBA, the maximum diameter of the oldest age class, and the  $q$ -factor.

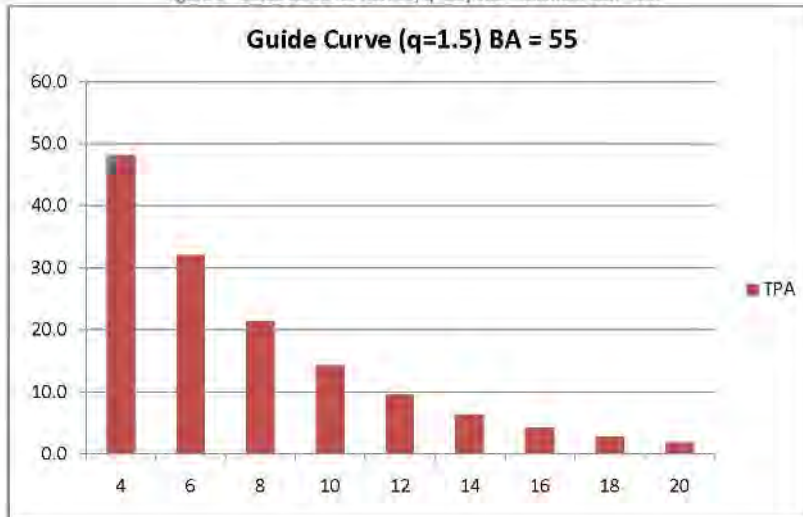
Guide curves can be calculated from the following equation:

$$N_{max} = \frac{RBA}{\sum \left( BA_i + q \frac{D_{max} - D_i}{w} \right)}$$

where the  $N_{max}$  is the number of TPA in the largest diameter class; residual basal area (RBA) is the selected residual basal area in ft<sup>2</sup>/acre,  $BA_i$  is the basal area of the tree of dbh  $D_i$ ,  $q$  is the  $q$ -factor representing the guiding curve structure,  $D_{max}$  is the maximum tree dbh represented by the guiding curve, and  $w$  is diameter class width in inches.

Once the  $N_{max}$  is set the number of trees per dbh class can be calculated by multiplying  $q$  times the number of trees in the next largest class. For example, the number of 19 inch trees equals  $q$  times the number of 20 inch trees.

Figure 5 - Guide curve for RBA 55,  $q=1.5$ , and maximum dbh = 20.



The 1997 forest management plan for NSFDL recommended uneven-age management as the preferred method for all hardwood stands on the base. Uneven-age management provides benefits such as aesthetics, constant forest cover, and regular generation of revenue. Uneven-age management is not

ideal for all hardwoods however, especially intolerant and intermediate species such as oaks. Under the more new forest condition class system the previous "hardwood" cover type has been subdivided, enabling more specific stand level silvicultural prescriptions.

#### **Single tree selection**

Selection systems can be divided into single tree selection, group selection, or a hybrid selection which combines single tree and group selection. Single tree selection creates few openings larger than the diameter of a mature tree crown. For intermediate or intolerant species a lower RBA is required, involving more widespread single tree removals to allow adequate light penetration through the canopy. In southern pines foresters can use an RBA of 45-60 sq/ ft. per acre with a cutting cycle of no more than ten years.

#### **Group selection**

Group selection is often applied when trying to regenerate intermediate to intolerant species because of the larger openings and increased light levels. This method is best applied by harvesting small clusters of at least two to three mature trees. These clusters are often called family groups because they were established in the stand at generally the same time. Group selection creates a mosaic of small even-age groups throughout the stand. Where shade tolerant species predominate, it may be necessary to control their competitive edge through controlled burning or directed herbicide application in order to achieve successful regeneration of less tolerant species.

Oaks are generally not suited for regeneration under the uneven-age management method. The recruitment of oaks versus more shade tolerant species underneath the partial shade of uneven-aged stands is problematic due to their lower relative tolerance to shade. Oak regeneration is especially difficult on sites with high site index. On these better sites, succession tends towards more shade tolerant and/or mesophytic species. Succession of oak-hickory forest types is most stable on poor to medium quality, drier upland sites where their ability to survive dry conditions is superior to other species.

#### **Constraints to Forest Management**

Due to the nature of mission related operations on NSFDL, forest management is subject to various constraints. Figures 6 and 7 display the constraints which have been spatially located on Mainside and Pumpkin Neck, respectively. Estimated wetland acreage has been identified throughout the NSFDL forests. Section 404 of the Clean Water Act gives the Army Corps of Engineers (ACOE) the authority to regulate activities affecting wetlands. Forest operations on wetlands are ordinarily exempt from regulation by the ACOE however, permanent road building, construction of stream or wetland crossings, draining, and other activities impacting wetlands and streams should be submitted for approval by the ACOE. Wetlands should be managed for the unique habitat and environmental services that they provide and the high potential for impact when operating on them should be weighed when considering forest management operations on wetland areas. Wetland soils are subject to damage from compaction, especially in wet times of the year, which can degrade the soil structure and permeability. When operations are planned around wetlands, location of roads and crossings, time of year, and equipment type should be considered to minimize impact to hydric soils.

A significant area on the base within ESQD arcs is restricted during testing times. There are live fire range areas which can limit accessibility to certain areas of the forest. Some stands have forestland enclosed within munitions magazines. These areas have restricted access and a key is needed to gain access inside the magazine. This poses problems for timber and wildlife management inside magazines.

Areas of cultural significance have been identified on the base and within the forest. Where historic features are present, consultation with the cultural resources manager should take place if forest management activities are to occur around these resources.

Bald Eagles are protected on the base by Federal and State policy. Eagle nest sites have been located on the base. These nest sites require protection and buffering, especially during the nesting season. Forestry operations in proximity to eagle nests shall occur outside of the December 15 to June 15 nesting season. Bald eagle protection buffers of 750 and 1320 have been established around active and inactive nests. Forest clearing activities should be restricted within these buffer areas.

**Mainside Constraints to Forest Management**

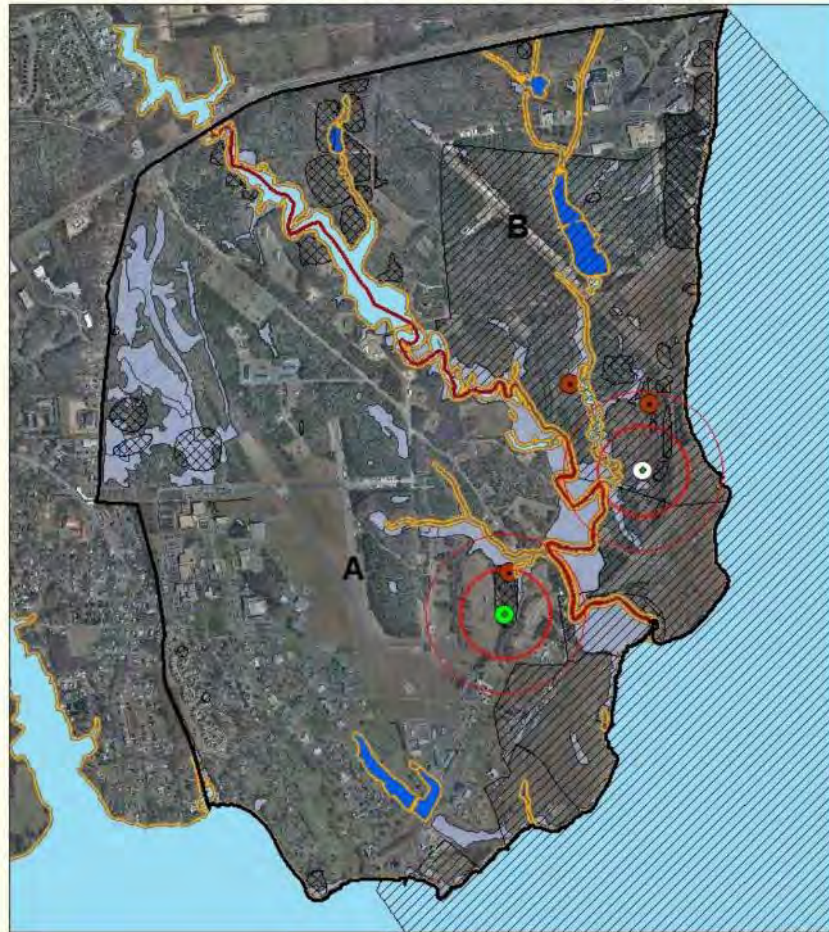


Figure 6 - Constraints map for Mainside.



### Pumpkin Neck Constraints to Forest Management



Figure 7 Constraints map for Pumpkin Neck

### **Growth and Yield Modeling**

Growth and yield modeling is essential for making informed forest management decisions. Modeling of forest stand growth was accomplished using the southern variant of the USDA Forest Service's Forest Vegetation Simulator (FVS). This model has the ability to simulate various silvicultural treatments.

Forest conditions are quantified over the 100 year interval by density, size, stocking, composition, *mean annual increment*, and other indices listed in the yield tables following the stand prescriptions. The field headings of the growth and yield summary output are explained in the key provided in Table 22 in the appendix.

### **Economic Analysis**

Future volume yields are projected and values are calculated and discounted to year 0 (2009) to give an estimate *Present Value* (PV) of economic yields of the various treatments. The formula for PV is listed in the Appendix. The second quarter 2009 report of Timber Mart South for Region 2 of Virginia was used as a reference for stumpage values in this region. Timber Mart South is a quarterly report which compiles timber stumpage values. Using this report as a guide, a conservative rate of \$22/ton was used for mixed sawtimber, and \$12/ton for pine and hardwood pulpwood.

### **Forest Condition Class Descriptions and Stand Prescriptions**

The following section provides detailed descriptions of the forest condition classes, including diameter distributions, management goals, and recommendations for management to achieve those goals.

### Oak Sawtimber Condition Class

Classification under previous system: H3

Old Stands: 5, 27, 28, 39, 40, 102, 133, 141, 152

New Stands: 5, 7, 102, 104, 106, 120

Acres = 92.57

Hardwood and Pine TPA= 108

Shrub TPA = 46

Hardwood and Pine BA/Acre = 117 ft<sup>2</sup>

Shrub BA/Acre = 9 ft<sup>2</sup>

QMD = 12.2 inches

% BA Pine/HW = 8/92

% AGS/UGS = 48/52

Sawtimber (MBF/Acre) = 11.07 (0.95 pine, 10.12 hardwood)

Pulpwood (ft<sup>3</sup>/acre) = 710 (538 pine, 91 hardwood, 81 shrub)

Average Age = 65 years

Average Height = 87 ft.

White Oak Site Index<sub>50</sub> = 78

Loblolly Pine Site Index<sub>50</sub> = 91

Yellow Poplar Site Index<sub>50</sub> = 92

Gingrich Stocking (Upland Oaks) = 105% (above A line)

Average Live Crown Ratio = 42%

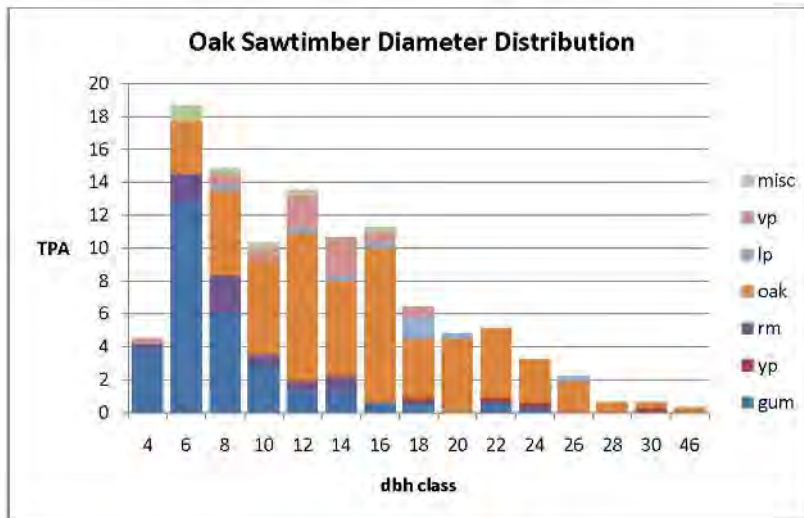


Figure 8 - Composite diameter distribution for the Oak Sawtimber condition class.

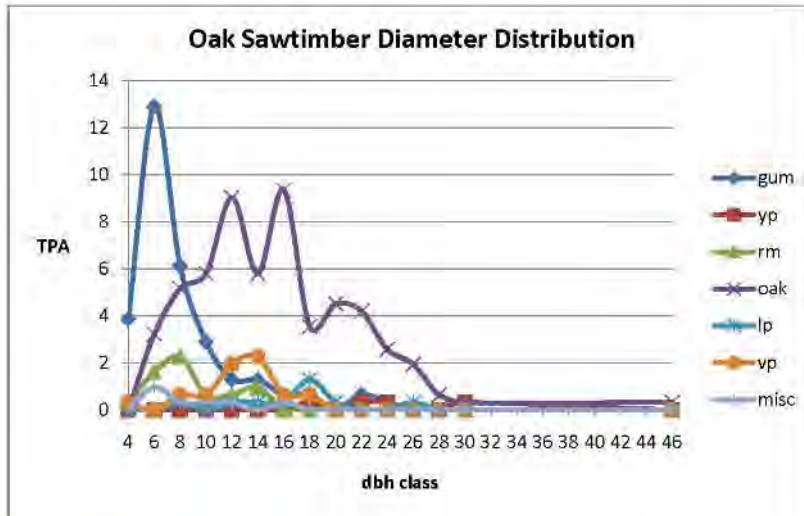


Figure 9 - Species diameter distribution for the Oak Sawtimber condition class

This condition class is composed of hardwood stands with a significant relative dominance of oak sawtimber. The average species/product relative dominance is shown for this condition class in Table 2. 78% of the BA is in significant sawtimber species categories. Significant pulp species make up 21% of the total BA and the remaining 1% consists of miscellaneous species. The dominant sawtimber class is 78% oak, 6% gum, 5% loblolly pine, 5% Virginia pine, and 4% yellow poplar. The pulpwood class is 57% oak, 24% gum, 10% Virginia pine, and 5% red maple. Pulpwood should not be assumed to be younger growing stock. Pulpwood is a combination of younger trees, older suppressed tree, and larger trees not classified as sawtimber due to defect. On average 53% of the TPA are oak, consisting of southern red oak (29%), white oak (10%), chestnut oak (9%), willow oak (3%), black oak (2%), and a small percentage of scarlet oak. Gum is also significant, representing 29% of the trees in this condition class.

This condition class is of medium quality with 48% acceptable (AGS) and 52% unacceptable (UGS) growing stock. The composite diameter distribution shown in Figure 8 shows an uneven-age distribution. Figure 9 shows the diameter distributions subdivided by species groups. This shows the oak group having a more even-aged distribution, with the high amount of smaller diameter gum giving the stand the inverse-J displayed in Figure 8. This situation can occur where a shade tolerant population which forms an inverse-J occurs on the same site as an even-aged population of shade intolerant species or when many suppressed trees exist under the main canopy. It is possible for an even-aged, mixed species stand to form an inverse-J diameter distribution because of different growth rates and shade tolerances among species. Gum is not a desirable tree in this cover type and should be discouraged in order to prevent conversion from oak to gum dominance.

Table 3 - Regeneration by species for the Oak Sawtimber condition class.

Regeneration by Species for Forest Condition Class 1					
Ht. Class	ah	gum	oak	rm	Total
1	83	83	333	500	1000
2	333	0	0	0	333
3	83	0	0	0	83
4	583	0	0	0	583
Total	1083	83	333	500	2000

The average regeneration in TPA is shown in Table 3. Out of a total of 2000 TPA, about half of this is made up in holly. The remaining half is about 55% red maple, 36% oak, and 9% gum. This is a moderate amount of oak regeneration which is encouraging for succession of an oak dominated stand. Red maple and gum are competitors with oak and should be targeted in removal or control measures.

**Management:**

The value of oak for forest biodiversity and the benefits it provides for wildlife, recreation, and timber is of major importance. Oak forests provide not only potentially valuable wood products but also desirable habitat for wildlife. Hard mast in the form of acorns is one of the more important wildlife foods. Having a diversity of oak species is also a valuable trait for a stand, particularly having a balance between white and red oaks. White oaks produce acorns every year while red oaks produce every other year. In years where some species may have a poor crop other species may produce better balancing out the food supply. Regeneration and management of this condition class should focus on regenerating a new age class with a dominant oak component. Regeneration of oaks can be a serious problem regardless of the silvicultural system used. The main problem concerning oak regeneration is either the lack of advance oak seedlings and sprouts in mature stands or the slow growth and inability of oaks to compete with other vegetation following removal of the canopy.

*Prescriptions for Individual Stands*

Stand 5 is a 10.4 acre stand that borders Gambo Creek to the north. A *streamside management zone* (SMZ) along the shoreline will be necessary and will reduce some of the volume available for harvest in this stand. Stand 5 is approximately 66 years old and has a site index for white oak of 81. Stocking is currently at 55.4% of maximum SDI and 110% stocking on the guide for upland hardwoods, meaning this stand is overstocked. Density related mortality is highly probable for this level of stocking. The quality of the stand was observed as 40% AGS and 60% UGS. This stand should be a priority for treatment aimed at reducing stocking by thinning or regeneration either by shelterwood or clearcut.

Stand 7 is the largest stand in this condition class at approximately 35.7 acres. Stand 7 is the result of combining old stands 27, 28, 39, and 40. Stand 7 also borders Gambo Creek and will need an SMZ. Stand 7 is an upland site, approximately 78 years old with a white oak site index of 76. At an average of 103 TPA and 106 ft<sup>2</sup> of BA, this stand is at 80% stocking on the upland hardwood guide and is at 43% of maximum SDI. The quality of the stand was observed as 69% AGS and 31% UGS. This stand is a lower

priority but will need treatment when the stocking begins to reach 100% on the upland hardwood guide. This stand should be looked at for a regeneration harvest by shelterwood or clearcut in 10 years.

Stand 102 did not change when reassigning stand numbers and is the middle stand between stand 101 and 103 on the peninsula in Compartment B. This stand also borders Gambo Creek to the south and a drainage to the east, each requiring an SMZ. This stand is 19.91 acres, averaging 72 years old, with a site index of 81 for white oak. The quality of the stand was observed as 76% AGS and 24% UGS. At 103 TPA and 128 ft<sup>2</sup> of BA this stand is at 100 % stocking on the upland hardwood stocking guide and approximately 46% of maximum SDI putting it at the upper limit of full stocking. Beyond this level of stocking the productivity of this stand will decline. Regeneration of this stand should be considered within the next 5 years through either shelterwood or clearcut.

Stand 104 is an 11.8 acre stand in compartment B bordering Gambo Creek to the north. This stand will also have acreage in an SMZ. This stand has the lowest stocking of all stands in this condition class with only 53 TPA and 96 ft<sup>2</sup> of BA putting it at 75% stocking on the upland stocking guide and 32.8% of maximum SDI. The quality of the stand was observed as 62% AGS and 38% UGS. This stand showed good oak regeneration in some areas and evidence of prior harvesting which would explain the low stocking. Further evaluation of the regeneration on the stand level is recommended. In areas where advance oak regeneration is adequate an overstory removal could be implemented. This treatment would be similar to a group selection or the second phase of a shelterwood harvest.

Stand 106 is a small 4 acre stand bordering Gambo Creek to the north in compartment B. This stand has mature oak timber, sampled at 91 years of age with a sampled site index for white oak of 72. With 150 TPA and 145 ft<sup>2</sup> of basal area, this stand is somewhere around 120% stocking on the upland hardwood guide and 54% of maximum SDI. The quality of the stand was observed as 63% AGS and 37% UGS. Due to the small size of this stand it should be harvested along with nearby stands. This stand is a high priority for a shelterwood harvest to encourage oak regeneration.

Stand 120 is another small stand, approximately 6.7 acres, consisting of a pocket of hardwoods surrounded by a pine dominated stand 113. This stand borders Hideaway Pond, a recreational area which will require an SMZ if harvesting activities occur. This stand should be treated at the same time as stand 113. The quality of the stand was observed as 59% AGS and 41% UGS. Stand 120 had a sampled age of 65 years and sampled site index for white oak of 79. With 170 TPA yielding 141 ft<sup>2</sup> of basal area this stand is at 115% stocking on the upland hardwood guide and 55.4% of maximum SDI. This stand should be treated as soon as possible to reduce the stocking in this stand either by thinning or regeneration harvest via shelterwood or clearcut followed by TSI.

Table 4 - Growth and yield tables for the Oak Sawtimber condition class stands.

Stand Rx Acreage	Year	Pulp										RPulp										Revenue					
		Topa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	RTpa	RTpa	RTCuFt	ATBFA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	IMA	Fortyp	SizeCls	StkCls	(\$/ac)	PV	
5 Shelterwood harvest in 2011, RBA 45, remove residuals in 2016 12.74	2009	217	152	266	236	83	11.4	11665	858	2596	0	0	152	266	236	83	11.4	2	104	24	54.55	520	1	1	0.00	0.00	
	2011	213	135	269	239	84	11.6	12115	899	2703	200	6770	1854	45	57	87	25.1	5	29	4	55.22	520	1	1	999.52	906.59	
	2016	360	48	116	58	31	4.9	5883	49	844	13	5883	49	844	0	0	3	0.1	3	0	0	53.40	520	1	4	761.59	541.25
	2019	371	1	5	3	12	0.7	0	0	0	0	0	0	0	0	12	0.7	10	6	0	0	51.52	520	3	4	0.00	0.00
	2029	364	23	65	61	42	3.4	0	66	66	0	0	23	65	61	42	3.4	10	55	0	46.72	520	3	4	0.00	0.00	
	2039	356	56	131	140	62	5.4	0	681	681	0	0	56	131	140	62	5.4	10	85	1	47.49	520	2	3	0.00	0.00	
	2049	348	80	173	167	76	6.5	35	1612	1617	0	0	80	173	167	76	6.5	10	119	3	50.65	520	2	2	0.00	0.00	
	2059	340	111	225	198	86	7.7	804	2658	2782	0	0	111	225	198	86	7.7	10	127	17	55.86	520	2	2	0.00	0.00	
	2069	315	137	262	218	95	8.9	2524	3302	3701	0	0	137	262	218	95	8.9	10	127	28	59.88	520	2	2	0.00	0.00	
	2079	289	158	289	232	100	10.0	6131	3174	4151	0	0	158	289	232	100	10.0	10	134	33	62.59	520	2	1	0.00	0.00	
	2089	266	179	316	248	104	11.1	10047	3046	4611	0	0	179	316	248	104	11.1	10	124	33	65.08	520	1	1	0.00	0.00	
2099	250	199	338	262	106	12.1	13796	2910	5016	0	0	199	338	262	106	12.1	10	126	36	66.68	520	1	1	0.00	0.00		
2109	236	218	360	277	107	13.0	17314	2891	5480	0	0	218	360	277	107	13.0	0	0	0	68.05	520	1	1	0.00	0.00		
5 Let grow 12.74																								1,761.11	1,447.84		
5 Let grow 12.74	2009	217	152	266	236	83	11.4	11665	858	2596	0	0	152	266	236	83	11.4	10	112	17	54.55	520	1	1	0.00	0.00	
	2019	204	171	288	258	89	12.4	14469	1074	3211	0	0	171	288	258	89	12.4	10	108	26	59.36	520	1	1	0.00	0.00	
	2029	189	186	303	272	94	13.4	17025	1239	3727	0	0	186	303	272	94	13.4	10	105	29	61.73	520	1	1	0.00	0.00	
	2039	177	200	317	285	97	14.4	19667	1399	4176	0	0	200	317	285	97	14.4	10	95	26	63.07	520	1	1	0.00	0.00	
	2049	169	213	331	297	99	15.2	22112	1430	4584	0	0	213	331	297	99	15.2	10	79	61	63.57	520	1	1	0.00	0.00	
	2059	152	213	324	290	101	16.0	23192	1385	4653	0	0	213	324	290	101	16.0	10	72	60	59.90	520	1	1	0.00	0.00	
	2069	138	212	317	283	102	16.8	23960	1371	4705	0	0	212	317	283	102	16.8	10	65	57	56.30	520	1	1	0.00	0.00	
	2079	127	211	311	276	103	17.5	24662	1331	4727	0	0	211	311	276	103	17.5	10	61	54	52.99	520	1	1	0.00	0.00	
	2089	117	211	306	269	103	18.2	25344	1280	4735	0	0	211	306	269	103	18.2	10	52	50	50.02	520	1	1	0.00	0.00	
	2099	110	210	300	261	104	18.7	25707	1270	4743	0	0	210	300	261	104	18.7	10	49	45	47.13	520	1	1	0.00	0.00	
	2109	103	210	297	254	105	19.3	26140	1259	4761	0	0	210	297	254	105	19.3	10	41	40	44.70	520	1	1	0.00	0.00	
2119	98	209	293	247	106	19.7	26403	1233	4753	0	0	209	293	247	106	19.7	0	0	0	42.35	520	1	1	0.00	0.00		

Stand	7																					Revenue							
Rx	Let grow																					PV							
Acres	38.5																												
Year	Typ	BA	SDI	CCF	TophHt	QMD	BdFt	Pulp	CuFt	TCuFt	RTpa	RBdFt	RPulp	CuFt	RTCuFt	ATBA	ATSDI	ATCFE	ATTopHt	ATQMD	PrtLen	Acc	Mort	MAI	ForTyp	SizeCts	StkCts	Revenue (\$/ac)	PV
2009	233	126	232	234	81	10.0	8878	738	2018	0	0	0	0	0	126	232	234	81	10.0	10	87	8	40.23	520	1	2	0.00	0.00	
2019	224	146	258	260	86	10.9	11217	925	2528	0	0	0	0	0	146	258	260	86	10.9	10	92	19	44.67	520	1	2	0.00	0.00	
2029	209	161	275	270	90	11.9	13280	1145	3022	0	0	0	0	0	161	275	270	90	11.9	10	82	25	47.55	520	1	1	0.00	0.00	
2039	194	172	287	273	93	12.8	15081	1280	3391	0	0	0	0	0	172	287	273	93	12.8	10	83	22	48.46	520	1	1	0.00	0.00	
2049	183	185	300	279	95	13.6	17071	1389	3767	0	0	0	0	0	185	300	279	95	13.6	10	75	21	49.47	520	1	1	0.00	0.00	
2059	175	197	313	285	96	14.4	18956	1489	4096	0	0	0	0	0	197	313	285	96	14.4	10	73	21	49.84	520	1	1	0.00	0.00	
2069	167	208	324	290	97	15.1	20702	1604	4424	0	0	0	0	0	208	324	290	97	15.1	10	66	40	49.98	520	1	1	0.00	0.00	
2079	155	212	324	284	98	15.8	21706	1656	4587	0	0	0	0	0	212	324	284	98	15.8	10	62	53	48.36	520	1	1	0.00	0.00	
2089	141	212	318	273	99	16.6	22185	1676	4644	0	0	0	0	0	212	318	273	99	16.6	10	50	47	45.86	520	1	1	0.00	0.00	
2099	131	210	311	262	99	17.2	22647	1625	4632	0	0	0	0	0	210	311	262	99	17.2	10	53	43	43.30	520	1	1	0.00	0.00	
2109	122	211	307	255	100	17.8	23713	1445	4586	0	0	0	0	0	211	307	255	100	17.8	10	45	42	41.39	520	1	1	0.00	0.00	
2119	114	210	302	246	100	18.4	24252	1357	4556	0	0	0	0	0	210	302	246	100	18.4	0	0	0	39.36	520	1	1	0.00	0.00	
Stand	102																												
Rx	Uneven age management																												
Acres	18.25																												
Year	Typ	BA	SDI	CCF	TophHt	QMD	BdFt	Pulp	CuFt	TCuFt	RTpa	RBdFt	RPulp	CuFt	RTCuFt	ATBA	ATSDI	ATCFE	ATTopHt	ATQMD	PrtLen	Acc	Mort	MAI	ForTyp	SizeCts <td>StkCts<td>Revenue (\$/ac)<td>PV</td></td></td>	StkCts <td>Revenue (\$/ac)<td>PV</td></td>	Revenue (\$/ac) <td>PV</td>	PV
2009	113	130	205	181	87	14.6	14940	679	2824	0	0	0	0	0	130	205	181	87	14.6	7	100	6	49.99	520	1	2	0.00	0.00	
2016	111	146	224	198	90	15.5	18184	671	3269	53	13802	248	2221	50	84	76	77	12.6	3	55	2	53.77	520	1	2	1,807.40	1,284.49		
2019	153	54	108	81	79	8.0	5158	412	1189	0	0	0	0	0	54	108	81	79	8.0	10	64	1	53.73	520	1	3	0.00	0.00	
2029	151	75	139	113	86	9.5	8048	428	1621	0	0	0	0	0	75	139	113	86	9.5	7	69	2	54.65	520	1	3	0.00	0.00	
2036	149	89	161	134	90	10.5	10120	481	1961	29	5824	80	932	50	97	84	80	8.8	3	57	1	55.50	520	1	2	758.86	209.26		
2039	177	55	113	92	82	7.6	4943	437	1186	0	0	0	0	0	55	113	92	82	7.6	10	72	1	55.50	520	1	3	0.00	0.00	
2049	174	78	148	126	90	9.0	7681	614	1743	0	0	0	0	0	78	148	126	90	9.0	7	74	2	56.88	520	1	3	0.00	0.00	
2056	172	94	172	148	94	10.0	9692	742	2139	38	6446	117	1047	50	99	89	83	8.3	3	63	1	57.77	520	1	2	844.25	85.23		
2059	209	56	118	97	85	7.0	4166	607	1236	0	0	0	0	0	56	118	97	85	7.0	10	82	1	57.85	520	1	3	0.00	0.00	
2069	205	81	159	134	92	8.5	6975	882	1896	0	0	0	0	0	81	159	134	92	8.5	7	89	2	59.53	520	1	3	0.00	0.00	
2076	203	100	188	159	95	9.5	9229	1085	2394	68	5811	418	1242	50	99	88	87	8.3	3	61	1	60.91	520	1	2	809.82	30.81		
2079	270	56	124	96	89	6.1	4078	718	1320	0	0	0	0	0	56	124	96	89	6.1	10	88	1	62.58	520	1	3	0.00	0.00	
2089	266	86	175	145	94	7.7	7687	881	1978	0	0	0	0	0	86	175	145	94	7.7	7	94	2	62.58	520	1	3	0.00	0.00	
2096	262	108	209	176	97	8.7	10596	935	2438	142	7209	324	1346	50	97	86	85	8.7	3	65	1	63.85	520	1	2	974.24	13.97		
2099	404	56	135	95	87	5.0	4040	668	1287	0	0	0	0	0	56	135	95	87	5.0	10	90	1	63.86	520	1	3	0.00	0.00	
2109	388	93	201	160	91	6.5	7412	874	1989	263	4208	264	897	50	99	88	82	8.2	10	75	1	65.33	520	1	2	580.36	4.41		
																												5,774.92	1,622.17





Stand Rx Acreage	104 Let/grow 11.82	Pulp														RPulp				Revenue									
		Year	Tpa	BA	SDI	CCF	TophHt	QMD	BdFt	CuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrLen	Acc	Mort	MAI	ForTyp	SizeCfs	StkCfs	Revenue (\$/ac)	PV
		2009	78	101	156	109	84	15.4	11246	248	1669	0	0	0	0	101	156	109	84	15.4	10	48	6	0.00	502	1	3	0.00	0.00
		2019	75	112	168	119	87	16.5	12751	280	1883	0	0	0	112	168	119	87	16.5	10	48	7	0.00	502	1	2	0.00	0.00	
		2029	73	122	180	128	90	17.5	14149	322	2093	0	0	0	122	180	128	90	17.5	10	53	9	0.00	502	1	2	0.00	0.00	
		2039	71	133	192	137	92	18.5	15825	338	2307	0	0	0	133	192	137	92	18.5	10	46	10	0.00	502	1	2	0.00	0.00	
		2049	69	142	200	142	94	19.4	17070	385	2497	0	0	0	142	200	142	94	19.4	10	41	4	0.00	502	1	2	0.00	0.00	
		2059	68	151	210	149	96	20.1	18473	377	2665	0	0	0	151	210	149	96	20.1	10	43	16	0.00	502	1	2	0.00	0.00	
		2069	66	158	216	152	97	20.9	19536	393	2798	0	0	0	158	216	152	97	20.9	10	38	16	0.00	502	1	2	0.00	0.00	
		2079	64	163	220	154	97	21.7	20411	407	2910	0	0	0	163	220	154	97	21.7	10	36	15	0.00	502	1	2	0.00	0.00	
		2089	62	168	224	155	98	22.3	21278	414	3014	0	0	0	168	224	155	98	22.3	10	33	14	0.00	502	1	2	0.00	0.00	
		2099	60	172	227	156	99	22.9	22081	414	3103	0	0	0	172	227	156	99	22.9	10	31	13	0.00	502	1	2	0.00	0.00	
		2109	58	176	230	156	100	23.5	22844	413	3186	0	0	0	176	230	156	100	23.5	10	30	12	0.00	502	1	2	0.00	0.00	
Stand Rx Acreage	106 Let/grow 4.59																												
		Year	Tpa	BA	SDI	CCF	TophHt	QMD	BdFt	CuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrLen <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>ForTyp</td> <td>SizeCfs</td> <td>StkCfs</td> <td>Revenue (\$/ac)</td> <td>PV</td>	Acc	Mort	MAI	ForTyp	SizeCfs	StkCfs	Revenue (\$/ac)	PV
		2009	150	145	237	211	79	13.3	9932	1304	2793	0	0	0	145	237	211	79	13.3	10	100	14	40.38	520	1	1	0.00	0.00	
		2019	140	165	260	231	82	14.7	12713	1370	3254	0	0	0	165	260	231	82	14.7	10	96	23	44.73	520	1	1	0.00	0.00	
		2029	129	182	277	245	85	16.1	15448	1281	3536	0	0	0	182	277	245	85	16.1	10	95	30	47.15	520	1	1	0.00	0.00	
		2039	117	197	289	257	86	17.6	18231	1079	3699	0	0	0	197	289	257	86	17.6	10	80	22	48.56	520	1	1	0.00	0.00	
		2049	110	211	302	268	88	18.7	20557	1006	3922	0	0	0	211	302	268	88	18.7	10	74	54	49.24	520	1	1	0.00	0.00	
		2059	96	214	297	265	89	20.2	21957	831	3894	0	0	0	214	297	265	89	20.2	10	67	61	47.28	520	1	1	0.00	0.00	
		2069	83	213	288	258	90	21.7	22797	707	3832	0	0	0	213	288	258	90	21.7	10	59	56	44.61	520	1	1	0.00	0.00	
		2079	73	212	280	251	90	23.1	23492	591	3763	0	0	0	212	280	251	90	23.1	10	54	51	42.10	520	1	1	0.00	0.00	
		2089	65	212	273	243	90	24.4	24131	484	3697	0	0	0	212	273	243	90	24.4	10	48	47	39.85	520	1	1	0.00	0.00	
		2099	59	211	266	236	91	25.6	24626	400	3640	0	0	0	211	266	236	91	25.6	10	43	42	37.75	520	1	1	0.00	0.00	
		2109	54	210	261	229	91	26.7	25083	322	3587	0	0	0	210	261	229	91	26.7	10	42	39	35.86	520	1	1	0.00	0.00	

Stand Rx Acreage	106 Shelterwood harvest in 2011, RBA 45, remove res'duals in 2016 4.59	Pulp															RPulp				Revenue (\$/ac)						
		Year	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrLen	Acc	Mort	MAI	ForTyp	SizeCfs	SkkCfs	PV
2009	150	145	237	211	79	13.3	9932	1304	2793	0	0	0	0	145	237	211	79	13.3	2	95	3	40.38	520	1	1	0.00	0.00
2011	150	149	243	217	79	13.5	10437	1363	2924	132	6006	1233	2131	45	61	57	83	21.5	5	32	3	41.44	520	1	1	961.80	872.38
2016	231	49	108	61	39	6.2	5016	127	813	18	5016	127	813	0	0	3	0.1	3	0	0	0	40.86	520	1	4	662.54	470.86
2019	248	1	3	2	11	0.6	0	0	0	0	0	0	0	1	3	2	11	0.6	10	0	0	39.70	520	3	4	0.00	0.00
2029	245	13	38	39	35	3.2	0	0	0	0	0	0	0	13	38	39	35	3.2	10	32	0	36.24	520	3	4	0.00	0.00
2039	241	33	79	90	49	5.0	0	573	573	0	0	0	0	33	79	90	49	5.0	10	79	0	35.91	520	3	4	0.00	0.00
2049	238	61	129	134	62	6.8	0	1980	1980	0	0	0	0	61	129	134	62	6.8	10	107	1	39.08	520	2	3	0.00	0.00
2059	234	96	186	177	71	8.7	980	3319	3467	0	0	0	0	96	186	177	71	8.7	10	122	1	43.68	520	2	2	0.00	0.00
2069	233	132	240	219	77	10.2	3232	4179	4675	0	0	0	0	132	240	219	77	10.2	10	123	28	48.66	520	2	1	0.00	0.00
2079	206	157	269	240	82	11.8	6788	3802	4855	0	0	0	0	157	269	240	82	11.8	10	118	30	51.48	520	1	1	0.00	0.00
2089	186	180	294	260	85	13.3	10572	3261	4885	0	0	0	0	180	294	260	85	13.3	10	118	32	53.61	520	1	1	0.00	0.00
2099	171	202	318	279	87	14.7	14407	2751	4928	0	0	0	0	202	318	279	87	14.7	10	114	43	55.39	520	1	1	0.00	0.00
Stand Rx Acreage	120 Shelterwood harvest in 2012, RBA 45, remove res'duals in 2014 6.67																				1,624.34 1,343.24						
Year	2009	2000	145	237	211	79	11.5	11213	975	2766	0	0	0	145	237	211	79	11.5	3	114	2	60.17	520	1	1	0.00	0.00
2012	200	154	264	210	86	11.9	12377	1024	2927	182	6665	922	1946	45	61	48	92	21.8	2	42	4	62.51	520	1	1	997.78	861.92
2014	382	47	116	51	40	4.8	6080	101	981	17	6080	101	981	0	0	0	2	0.1	5	0	0	61.81	520	1	4	794.94	622.86
2019	396	2	9	5	16	1.0	0	0	0	0	0	0	0	2	9	5	16	1.0	5	0	0	57.64	520	3	4	0.00	0.00
2024	393	11	36	28	30	2.3	0	0	0	0	0	0	0	11	36	28	30	2.3	5	10	0	53.99	520	3	3	0.00	0.00
2029	390	28	77	72	42	3.6	0	57	57	0	0	0	0	28	77	72	42	3.6	5	49	0	51.39	520	3	3	0.00	0.00
2034	386	42	107	108	50	4.5	0	326	326	0	0	0	0	42	107	108	50	4.5	5	86	0	51.25	520	3	3	0.00	0.00
2039	383	58	136	135	57	5.3	0	852	852	0	0	0	0	58	136	135	57	5.3	5	107	1	53.61	520	2	3	0.00	0.00
2044	379	76	170	162	64	6.1	0	1434	1434	0	0	0	0	76	170	162	64	6.1	5	119	2	56.24	520	2	2	0.00	0.00
2049	376	95	203	186	70	6.8	0	2076	2076	0	0	0	0	95	203	186	70	6.8	5	132	3	59.15	520	2	2	0.00	0.00
2054	372	117	240	213	76	7.6	227	2819	2859	0	0	0	0	117	240	213	76	7.6	5	152	27	63.26	520	2	1	0.00	0.00
2059	350	133	261	226	79	8.3	336	3468	3527	0	0	0	0	133	261	226	79	8.3	5	132	33	65.94	520	2	1	0.00	0.00
2064	330	147	280	238	83	9.0	1259	3818	4038	0	0	0	0	147	280	238	83	9.0	5	156	36	68.16	520	2	1	0.00	0.00
2069	312	161	298	250	86	9.7	3484	3760	4360	0	0	0	0	161	298	250	86	9.7	5	167	40	70.23	520	2	1	0.00	0.00
2074	285	176	317	263	88	10.5	6498	3507	4610	0	0	0	0	176	317	263	88	10.5	5	161	40	72.41	520	1	1	0.00	0.00
2079	282	190	335	275	90	11.1	9276	3322	4875	0	0	0	0	190	335	275	90	11.1	5	158	40	74.20	520	1	1	0.00	0.00
2084	270	204	351	286	92	11.8	12180	3101	5114	0	0	0	0	204	351	286	92	11.8	5	150	60	75.76	520	1	1	0.00	0.00
2089	255	214	360	293	93	12.4	15031	2755	5213	0	0	0	0	214	360	293	93	12.4	5	136	115	76.24	520	1	1	0.00	0.00
2094	229	213	351	285	94	13.0	17540	2147	4987	0	0	0	0	213	351	285	94	13.0	5	125	107	74.36	520	1	1	0.00	0.00
2099	209	212	344	279	95	13.7	19152	1825	4889	0	0	0	0	212	344	279	95	13.7	5	117	100	72.53	520	1	1	0.00	0.00
2104	191	212	337	274	96	14.2	20549	1573	4819	0	0	0	0	212	337	274	96	14.2	5	114	97	70.77	520	1	1	0.00	0.00
2109	176	211	332	269	96	14.8	21679	1419	4795	0	0	0	0	211	332	269	96	14.8	5	115	98	69.12	520	1	1	0.00	0.00
Stand Rx Acreage	120 Shelterwood harvest in 2012, RBA 45, remove res'duals in 2014 6.67																				1,792.72 1,484.78						



### Mixed Gum Condition Class

Classification under previous system: H3

% AGS/UGS = 42/58

Old Stands:

1,3,6,10,14,29,44,45,47,113,156,411,422

Sawtimber (MBF/Acre) = 7.64 (0.99 pine, 6.58 hardwood)

New Stands: 1, 6, 9, 16, 19, 111, 118, 404, 406

Pulpwood (ft<sup>3</sup>/acre) = 1357 (97 pine, 1181 hardwood, 79 shrub)

Acres = 108.5

Average Age of Dominants = 71 years

Hardwood and Pine TPA= 148

Average Height = 77 ft.

Shrub TPA= 37

White Oak Site Index<sub>50</sub> = 72

Hardwood and Pine BA/Acre = 133 ft<sup>2</sup>

Loblolly Pine Site Index<sub>50</sub> = 86

Shrub BA/Acre = 9 ft<sup>2</sup>

Yellow Poplar Site Index<sub>50</sub> = 79

Hardwood and Pine QMD = 12.8 inches

Gingrich Stocking (Upland Oaks) = 105% (above A line)

% BA Pine/HW = 8/92

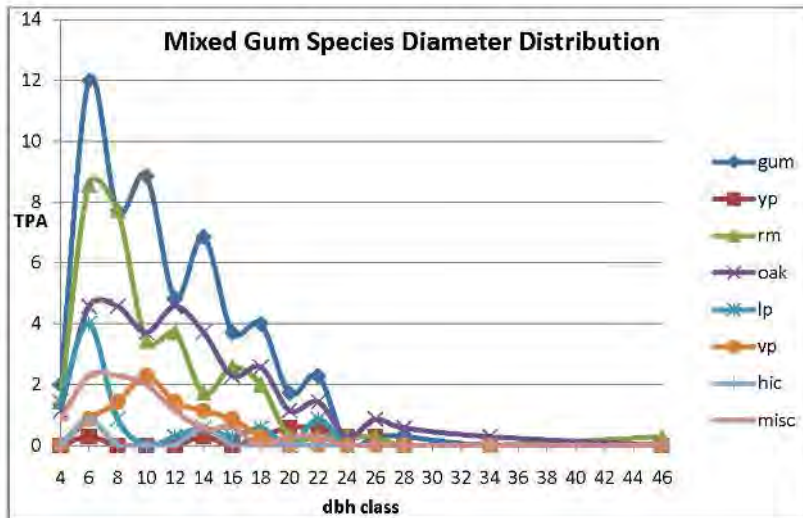


Figure 10 - Species diameter distribution for the Mixed Gum condition class showing the typically inverse-J of an uneven-age stand.

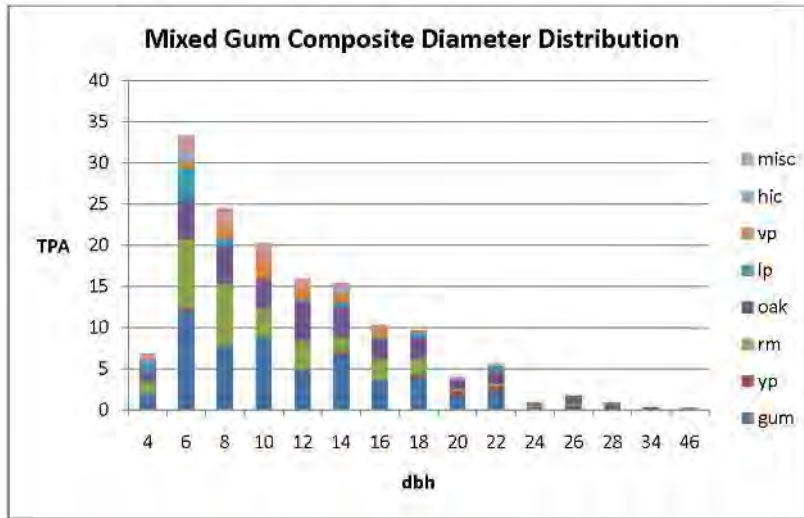


Figure 11 - Composite diameter distribution for the Mixed Gum condition class.

**Description of Current Conditions:**

Table 2 shows the cluster centers for the composition of this condition class. Notable are the high relative dominances of gum and white oak sawtimber and gum and red maple pulpwood. The product distribution among these species categories is roughly even between pulpwood and sawtimber. Species such as oak, loblolly pine, and yellow poplar are the faster growing and better quality trees in this condition class. Sweetgum is a tier below these species in value, but is still a fast growing tree of good form. Red maple generally exhibited poor form when encountered during the inventory and makes up a large percentage of the pulpwood class.

Basal area and stems per acre are given for only hardwoods and pines and for shrubs separately which include non-merchantable shrub and understory tree species such as American holly (*Ilex opaca*), dogwood (*Cornus florida*), hornbeam (*Carpinus caroliniana*) and eastern red cedar (*Juniperus virginiana*). Shrub basal area is important when considering the regeneration potential of a stand. Shrub species shade out and compete for growing space with desirable regeneration. This is especially important for shade intolerant and important commercial species such as yellow poplar, loblolly pine, and many of the oaks.

Both diameter distributions from Figures 10 and 11 show a higher proportion of smaller diameter trees (assumed to be in younger age classes) to larger diameter trees (assumed to be older age classes) indicative of an uneven-aged stand. When plotted on the Gingrich stocking diagram this cover type is at about 105% stocking, just above A-line stocking. The A line marks full-stocking, beyond this level diameter growth suffers and density dependent mortality will occur.

These areas are relatively poor in quality with 42% acceptable (AGS) and 58% unacceptable (UGS) growing stock. Nine stands comprising a total of approximately 108.5 acres are classified as under this condition class. Uneven management was the previous preferred method for the hardwood stands on the base.

Table 5 - Regeneration by species for the Mixed Gum condition class

Regeneration by Species for Forest Condition Class 2 (stems/ac)										
Ht. Class	ah	bc	gum	oak	hick	lp	pers	rm	vp	Total
1	261	87	826	1870	43	435	43	1261	130	4957
2	0	0	0	130	0	130	0	0	0	261
3	87	0	43	0	0	130	0	0	0	261
4	261	0	174	0	0	217	0	87	0	739
Total	609	87	1043	2000	43	913	43	1348	130	6217

The regeneration numbers are in agreement with the overstory data suggesting an abundance of younger trees. This stand has an average of 6217 TPA of stems less than 4.5 inches dbh. Oak has the highest number with red maple, gum, and loblolly pine also contributing significantly. Good regeneration like this is vital to maintaining a productive uneven-age system. These smaller diameter classes can be tended to during the cutting cycle to maintain healthy spacing and initiate ingrowth into the merchantable diameter classes.

**Even-age management:**

Even-age management of this stand would involve cutting the stand to move it towards an even-aged structure. This could be done several ways, the simplest being a clearcut. Starting over with a clearcut also opens up opportunities for reshaping the stand composition in the next rotation through intermediate treatments such as timber stand improvement (TSI), crop tree release, and thinning.

Another way to regulate the stand structure is by thinning from both above and below. This would remove the mature trees and the youngest merchantable trees, attempting to re-shape the diameter distribution towards a normal distribution and thereby leaving a more narrowly defined age structure.

The shelterwood burn/herbicide treatment seeking to favor more controlled regeneration favoring oaks and leaving desirable oak species in the overstory as seed sources and partial shade is another option for even-age management. A seed tree cut is not necessary for achieving regeneration in this mixed hardwood stand and is therefore not recommended. Adequate regeneration will come from sprouting, and seed blown in from adjacent sources.

**Uneven-age management:**

The uneven-age structure of this stand lends itself to uneven-age management. Uneven-age management also aligns well with the goals of the base, sustaining yield of forest products while maintaining continuous forest cover for mission requirements, aesthetics, wildlife habitat, and recreational use.

Uneven-age management is more appropriate in this condition class since it already has an uneven-age structure. Uneven-age management, however, can produce conditions that are suited to prolific stump-sprouters and shade tolerant species such as red maple. Maintaining a low residual basal area over the course of the cutting cycle is recommended to create light conditions more favorable to the intolerant and intermediate species.

The diameter distribution guide presented in Table 6 uses *q* values from 1.4 – 1.7 for 2 inch diameter classes and a *merchantable* residual BA (not including non-merchantable understory species) of 50ft<sup>2</sup> to balance open canopy with efficient site utilization. The maximum diameter for the distribution was set at 20 inches, so trees above 20 inches dbh will be marked for harvest. This range of *q* and residual density echoes the recommendations for upland oaks and similar species with similar light requirements for regeneration and overstory recruitment. Figure 3 shows a guide curve for *q*=1.5.

It is usually advised that when initially regulating a stand to an uneven-age structure a heavy reduction in basal area should be achieved over multiple cutting cycles to reduce the damage to logs from in epicormic sprouting and risk of windthrow. Once the stand is regulated, a cutting cycle of 20 years is recommended.

Table 6 - Series of guide distributions for a residual basal area of 50 square feet, a maximum diameter of 20 inches, and a range of *q* from 1.4-1.7.

dbh class	1.4		1.5		1.6		1.7	
	TPA	BA	TPA	BA	TPA	BA	TPA	BA
4	33.1	2.9	43.8	3.8	55.5	4.8	67.9	5.9
6	23.7	4.6	29.2	5.7	34.7	6.8	40.0	7.8
8	16.9	5.9	19.5	6.8	21.7	7.6	23.5	8.2
10	12.1	6.6	13.0	7.1	13.5	7.4	13.8	7.5
12	8.6	6.8	8.6	6.8	8.5	6.6	8.1	6.4
14	6.2	6.6	5.8	6.2	5.3	5.7	4.8	5.1
16	4.4	6.1	3.8	5.4	3.3	4.6	2.8	3.9
18	3.1	5.6	2.6	4.5	2.1	3.7	1.7	2.9
20	2.2	4.9	1.7	3.7	1.3	2.8	1.0	2.1
<b>Totals</b>	<b>110.4</b>	<b>50.0</b>	<b>127.9</b>	<b>50.0</b>	<b>145.8</b>	<b>50.0</b>	<b>163.6</b>	<b>50.0</b>

**Marking Guide:**

Under these distribution guides the residual number of TPA ranges from 110 to roughly 165. The current average for this condition class is 150 TPA. Much of the reduction in basal area will be accomplished by harvesting mature and over-mature trees in the larger diameter classes. Concurrent tending of the lower diameter classes must also occur to thin trees, maintaining productive growth rates to encourage recruitment into the larger diameter classes. The guide curve and marking guide in Table 6 do not include the contributing basal area from American holly and other understory species. The effect these species have in hindering regeneration must be noted. Gains in light penetration by the reduction in the overstory will be negated by persistent midstory shrubs casting shade on areas where regeneration is



desired. Ideally enough holly should be treated during harvest at the end of each cutting cycle by mechanical traffic, cutting and leaving, and possible follow-up treatments with herbicide to kill the holly and open up space for seedlings to become established. Intermediate mechanical, chemical, or combination release treatments can also be performed to address persistent midstory competition.

Preference in selection cuts should be given to trees of good form, species, large crown size, and probability of surviving until the next cutting cycle. The ranking for trees to leave in this stand is as follows: 1) oak 2) hickory 3) yellow poplar 4) loblolly pine. Trees targeted for removal include: Virginia pines, red maple, and black cherry. Black cherry and red maple both exhibited generally poor form when sampled during the inventory. When possible, family groups should be harvested together create larger openings in the canopy. A good rule of thumb is to create openings with a diameter of roughly 1.5 to 2 times the adjacent overstory tree height. Locate groups where trees are dying naturally, remove trees from size classes with excessive numbers present, in areas that can be seeded naturally by desired species, where wildlife habitats are benefited and where desirable advance regeneration is already present.

The initial cut should be marked over two harvests to avoid excessive epicormic sprouting and wind-throw. It is suggested that all the trees be marked at one time but with different markings or colors to symbolize and separate removals for two harvests. Single trees and groups cut in each harvest should be evenly distributed over the stand area.

Table 7 - Example of a marking guide that can be used to determine how many trees of what size to remove during the cutting cycle. The UGS column gives additional insight into the amount of UGS that can be removed to improve the quality of the stand.

Marking Guide for q= 1.4 BA=50					
DBH Class	Current	UGS	Excess	Deficient	Guide
4	6.9	50%		-26.3	33.1
6	33.4	54%	9.8		23.7
8	24.6	60%	7.7		16.9
10	20.3	59%	8.2		12.1
12	16.0	66%	7.4		8.6
14	15.4	56%	9.3		6.2
16	10.3	53%	5.9		4.4
18	9.7	53%	6.6		3.1
20+	13.7	38%	11.5		2.2
<b>Totals</b>	<b>150.3</b>		<b>66.2</b>	<b>-26.3</b>	<b>110.4</b>

**Stand Recommendations**

Stand 1 is located in Compartment A next to B gate. It consists of old stands 1, 3, 6, and 10 and is the largest stand in this condition class at 39.9 acres. These stands were consolidated into new Stand 1 because of membership in the Mixed Gum condition class and because of their close proximity. Stand 1 borders Gambo Creek and will have SMZ acreage if harvesting is to occur. Stand 1 has an average sampled age of dominants of 81 years however this stand exhibits an uneven-age structure. The

sampled average site index is 71 for white oak. The quality of the stand was observed as 40% AGS and 60% UGS. With 138 TPA yielding 140 ft<sup>2</sup> this stand is overstocked at 110% stocking on the upland hardwood guide and 53% of maximum SDI.

Stand 6 is a small stand consisting of a hardwood buffer inside of stand 4. This stand should be treated at the same time as adjacent stand 4. Harvesting should be limited to 50% of the basal area in order to maintain the stands integrity as an SMZ. The average sampled age for stand 6 was 46 years. At 270 TPA and 149 ft<sup>2</sup> of basal area some thinning should occur to maintain the health of the trees within this stand. Current stocking levels are at 120% on the upland hardwood guide and 59% of maximum SDI. The quality of the stand was observed as 33% AGS and 67% UGS.

Stand 9 is old stand 47, an irregularly shaped 23 acre stand that in fact had significant grassland included in its acreage. Also included is a section of fenced magazine which was not sampled. This stand is highly variable due to previous selection harvest. This stand is also the site of an active eagle nest. The average sampled age was 47 however this is an uneven aged stand with mature and immature age classes. The site index for loblolly pine base age 50 was sampled at 90. There is an average of 108 TPA and 91 ft<sup>2</sup> of basal area per acre. Stocking levels of 73% on the hardwood guide and 38% maximum SDI indicate full site utilization. Management of this stand is constrained largely by the eagle nest present. If possible management should continue the uneven-age structure of this stand and seek to improve quality of growing stock. The quality of the stand was observed as 75% AGS and 25% UGS.

Stand 16 is a small 3.8 acre stand in Compartment A which is adjacent to the largest area of stand 3 known as the wetland swale. This area should be managed coinciding with adjacent stand management.

Stand 19 is a small isolated stand near base housing and research facilities which was previously split into two stands, 44 and 45. This 6.48 acre stand has a mean sampled age of dominants of 83 years and a sampled white oak site index of 75. With 113 TPA and 97 ft<sup>2</sup> of basal area this stand is at 80% stocking on the upland hardwood guide and 36% of maximum SDI. The quality of the stand was observed as 50% AGS and 50% UGS. This stand is currently a low priority due to its small, isolated nature, and its low stocking level. This stand should be managed along with adjacent stands. This stand has a high aesthetic impact so selection systems are favored to maintain visual and aesthetic integrity.

Stand 111 is a narrow stand of 8 acres which serves as a riparian buffer for a drainage that leads from Hideaway Pond and empties into Gambo Creek. This stand is of low priority for timber production due to its higher value as a riparian buffer. The average age of sampled dominant trees is 56 years and the white oak site index is 73. With 195 TPA and 192 ft<sup>2</sup> of BA this stand is overstocked, plotted somewhere around 120% stocking on the upland hardwood guide and 69.2% of maximum SDI. The quality of this stand was observed as 26% AGS and 74% UGS.

Stand 118 is another small narrow stand of 5 acres in the northeastern portion of Compartment B consisting of low quality hardwoods along the outside of Stand 113 and bordering Installation Restoration Site 17. This stand is at 100% stocking on the upland hardwood guide and 46.2% of maximum SDI. There are 240 TPA yielding 113 ft<sup>2</sup> of basal area and a QMD of 9.6 inches. The quality of

this stand was observed as 38% AGS and 62% UGS. This stand should be managed at the same time as Stand 113.

Stand 404 is located in compartment E in Pumpkin Neck. This stand is a narrow 9.6 acres of hardwood sawtimber with 147 TPA yielding a basal area of 158 ft<sup>2</sup> and a QMD of 14.1 inches. This stand is overstocked at 120% stocking on the upland hardwood guide and 55.2% of maximum SDI. Quality was observed as 36% AGS and 64% UGS. Species preference should favor oaks, yellow poplar, and hickory as leave trees. Preference for removal is high for sweetgum, holly, red maple, and species with defect. An uneven-age method of single tree and group selection is recommended. Where trees of similar age classes are clustered these may be removed together to create larger openings to create a more open canopy and favor less tolerant species such as oak and poplar. A 20 year cutting cycle is recommended, each time bringing the basal area down to around 50 ft<sup>2</sup>. A guide curve may be used to regulate the stand towards a sustainable uneven-age structure.

Stand 406 is an isolated stand of hardwood sawtimber constrained due to a poor quality water crossing which is too narrow and not sufficient for log trucks. This stand is also located in compartment E and is approximately 13 acres. The average sampled age was 83 years and sampled site index is 71 for white oak. There are approximately 137 TPA yielding 146 ft<sup>2</sup> of basal area and a QMD of 14.1 inches. Stocking on the upland hardwood guide is 117% and 51.6% of maximum SDI.

Table 8 - Growth and yield tables for the Mixed Gum condition class stands.

Stand Rx Acreage	1 Uneven age management beginning 2011, 20 year cutting cycle, RBA 50, q = 1.4, 20 inch maximum diameter 37.98														Revenue (\$/ac)	PV													
	Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TCuFt	RTpa	RbDfT	CuFt	RPulp CuFt			RTCuFt	ATBTA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SkCls
2009	197	152	260	145	85	11.9	9.267	1336	3081	0	0	0	0	0	152	260	145	85	85	11.9	2	41	60	48.33	997	1	2	0.00	0.00
2011	189	151	256	143	83	12.1	9.208	1284	3021	101	6650	662	1917	50	91	51	74	74	74	10.2	8	21	18	47.02	997	1	2	2,044.16	1,854.11
2019	232	50	111	51	74	6.3	2757	476	1031	0	0	0	0	0	50	111	51	74	74	6.3	10	23	9	43.89	997	1	4	0.00	0.00
2029	282	54	122	55	75	5.9	3088	457	1074	0	0	0	0	0	54	122	55	75	75	5.9	2	25	8	41.11	997	1	4	0.00	0.00
2031	295	55	125	56	75	5.9	3174	449	1081	2	405	25	105	50	116	51	73	73	5.6	8	25	7	40.68	997	1	4	123.66	42.27	
2030	247	55	121	57	74	6.4	3065	474	1086	0	0	0	0	0	55	121	57	74	74	6.4	10	33	10	38.95	997	1	4	0.00	0.00
2049	205	64	131	67	76	7.6	3407	701	1374	0	0	0	0	0	64	131	67	76	76	7.6	2	38	14	36.98	997	1	4	0.00	0.00
2051	200	66	134	69	76	7.8	3468	767	1449	54	974	142	334	50	101	53	71	71	7.9	8	37	11	36.58	997	1	4	302.08	38.92	
2059	214	58	122	61	72	7.0	2796	857	1407	0	0	0	0	0	58	122	61	72	7.0	10	48	10	35.33	201	1	4	0.00	0.00	
2069	193	69	138	72	75	8.1	3673	880	1594	0	0	0	0	0	69	138	72	75	8.1	2	53	14	35.40	201	1	4	0.00	0.00	
2071	189	72	141	74	76	8.3	3862	849	1593	35	1225	203	439	50	102	52	72	7.7	8	47	9	35.55	201	1	4	381.12	18.51		
2079	167	58	117	60	77	8.0	3360	613	1255	0	0	0	0	0	58	117	60	77	8.0	10	52	10	35.72	201	1	4	0.00	0.00	
2088	179	69	135	69	82	8.4	4229	701	1507	0	0	0	0	0	69	135	69	82	8.4	2	55	13	35.90	201	1	4	0.00	0.00	
2091	182	71	139	71	83	8.5	4428	712	1552	21	1437	156	429	50	103	51	79	7.5	8	46	8	35.95	201	1	4	442.41	8.10		
2099	171	58	117	58	83	7.9	3631	665	1345	0	0	0	0	0	58	117	58	83	7.9	10	54	9	35.79	201	1	4	0.00	0.00	
2108	179	69	136	67	88	8.4	4573	802	1650	0	0	0	0	0	69	136	67	88	8.4	0	0	0	0	35.99	201	1	4	0.00	0.00
2119	97	209	292	248	100	19.9	18982	1487	3899	0	0	0	0	0	209	292	248	100	19.9	0	0	0	0	38.35	520	1	1	3,293.43	1,961.91

Stand 6		Uneven age management beginning 2015, 20 year cutting cycle, RBA 50, q = 1.4, 20 inch maximum diameter																										
Rx		Acreage 3.73																										
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc Mort	MAI	ForTyp	SizeCls	StkCls	Revenue (\$/ac)	PV		
2008	270	149	272	246	76	10.0	5611	2146	2986	0	0	0	0	149	272	246	76	10.0	6	105	17	0.00	508	1	2	0.00	0.00	
2015	257	161	287	259	79	10.7	7424	2141	3246	157	4995	1533	2277	50	93	78	77	9.6	4	51	1	0.00	508	1	2	1,483.77	1,107.21	
2019	413	56	135	85	79	5.0	2930	680	1113	0	0	0	0	56	135	85	79	5.0	10	61	1	0.00	508	1	3	0.00	0.00	
2029	405	83	184	136	83	6.1	4977	719	1436	256	2491	144	503	50	101	83	72	7.9	10	52	1	0.00	508	1	3	659.32	248.49	
2039	653	67	171	108	76	4.3	4157	653	1236	0	0	0	0	67	171	108	76	4.3	10	65	2	0.00	508	1	3	0.00	0.00	
2049	637	95	233	164	79	5.3	6143	783	1627	488	3931	173	713	71	101	77	71	7.8	10	50	1	0.00	508	1	3	1,033.42	146.79	
2059	1117	67	190	95	74	3.3	3592	741	1256	0	0	0	0	67	190	95	74	3.3	10	64	8	0.00	508	1	3	0.00	0.00	
2069	980	106	267	178	78	4.5	5325	867	1610	853	2946	302	713	50	98	66	71	8.5	10	59	1	0.00	508	1	2	796.90	42.66	
2079	1831	69	215	86	74	2.6	3834	794	1336	0	0	0	0	69	215	86	74	2.6	10	56	19	0.00	508	1	3	0.00	0.00	
2089	1416	111	299	205	76	3.8	5368	752	1496	1210	3111	257	688	50	108	74	72	6.7	10	42	1	0.00	508	1	2	833.39	16.82	
2099	2622	67	225	99	75	2.2	3275	665	1124	0	0	0	0	67	225	99	75	2.2	10	51	19	0.00	508	1	3	0.00	0.00	
2109	1831	109	310	237	77	3.3	4561	641	1266	0	0	0	0	109	310	237	77	3.3	0	0	0	0.00	508	1	3	0.00	0.00	
Stand 6																											4,806.80	1,561.98
Rx	Let grow																											
Acreage	3.73																											

Stand	9																																																								
Rx	Let.grow																																																								
Acreage	19.3																																																								
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TcuFt	RtPa	RbdFt	CuFt	RTcuFt	ATBDA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV																														
2006	152	108	188	151	71	11.4	2947	1073	1444	0	0	0	0	0	108	188	151	71	11.4	10	73	3	205.79	520	1	2	0.00	0.00																													
2019	148	127	213	172	77	12.5	3561	1396	1851	0	0	0	0	127	213	172	77	12.5	10	80	4	149.21	520	1	2	0.00	0.00																														
2029	145	146	237	192	81	13.6	4350	1532	2100	0	0	0	0	146	237	192	81	13.6	10	83	15	127.79	520	1	2	0.00	0.00																														
2039	137	160	252	205	85	14.7	5110	1586	2261	0	0	0	0	160	252	205	85	14.7	10	82	20	114.23	520	1	2	0.00	0.00																														
2049	128	172	264	216	89	15.7	5893	1510	2294	0	0	0	0	172	264	216	89	15.7	10	79	21	104.56	520	1	2	0.00	0.00																														
2059	121	184	276	226	92	16.7	6667	1424	2312	0	0	0	0	184	276	226	92	16.7	10	74	18	97.34	520	1	2	0.00	0.00																														
2069	116	195	286	235	95	17.6	7442	1296	2288	0	0	0	0	195	286	235	95	17.6	10	66	20	91.73	520	1	2	0.00	0.00																														
2079	111	205	295	242	97	18.4	8089	1241	2315	0	0	0	0	205	295	242	97	18.4	10	63	26	86.40	520	1	1	0.00	0.00																														
2089	105	211	299	245	100	19.2	8654	1135	2280	0	0	0	0	211	299	245	100	19.2	10	53	46	81.10	520	1	1	0.00	0.00																														
2099	97	210	293	240	101	19.9	8878	1037	2202	0	0	0	0	210	293	240	101	19.9	10	47	40	75.97	520	1	1	0.00	0.00																														
2109	90	209	288	235	103	20.6	9072	982	2164	0	0	0	0	209	288	235	103	20.6	10	43	37	68.11	520	1	1	0.00	0.00																														
2119	85	209	284	230	103	21.3	9261	920	2118	0	0	0	0	209	284	230	103	21.3	0	0	0	63.11	520	1	1	0.00	0.00																														
Stand	16																																																								
Rx	Let.grow																																																								
Acreage	3.94																																																								
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TcuFt	RtPa	RbdFt	CuFt	RTcuFt	ATBDA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV																														
2006	290	128	244	229	71	9.0	3544	1512	2073	0	0	0	0	128	244	229	71	9.0	10	97	10	42.79	503	1	1	0.00	0.00																														
2019	276	151	277	257	76	10.0	5574	1699	2578	0	0	0	0	151	277	257	76	10.0	10	104	21	49.00	503	1	1	0.00	0.00																														
2029	255	170	300	276	79	11.1	7877	1776	2999	0	0	0	0	170	300	276	79	11.1	10	105	29	53.07	503	1	1	0.00	0.00																														
2039	235	187	319	291	82	12.1	10450	1713	3307	0	0	0	0	187	319	291	82	12.1	10	104	26	55.51	503	1	1	0.00	0.00																														
2049	221	206	339	309	84	13.1	13177	1660	3632	0	0	0	0	206	339	309	84	13.1	10	90	71	57.72	503	1	1	0.00	0.00																														
2059	191	204	328	298	86	14.0	14758	1405	3572	0	0	0	0	204	328	298	86	14.0	10	78	65	54.23	503	1	1	0.00	0.00																														
2069	168	203	318	289	87	14.9	15744	1314	3581	0	0	0	0	203	318	289	87	14.9	10	71	59	50.88	503	1	1	0.00	0.00																														
2079	151	202	310	281	88	15.6	16613	1248	3597	0	0	0	0	202	310	281	88	15.6	10	64	54	47.92	503	1	1	0.00	0.00																														
2089	138	201	303	273	88	16.4	17363	1189	3608	0	0	0	0	201	303	273	88	16.4	10	55	49	45.23	503	1	1	0.00	0.00																														
2099	127	200	297	267	89	17.0	17890	1163	3623	0	0	0	0	200	297	267	89	17.0	10	52	44	42.68	503	1	1	0.00	0.00																														
2109	118	199	292	262	89	17.6	18385	1150	3648	0	0	0	0	199	292	262	89	17.6	10	50	42	40.49	503	1	1	0.00	0.00																														
2119	110	199	288	257	90	18.2	18895	1130	3670	0	0	0	0	199	288	257	90	18.2	0	0	0	38.56	503	1	1	0.00	0.00																														

Stand 16		Uneven age management beginning 2015, 20 year cutting cycle, RBA 50, q = 1.4, 20 inch maximum diameter																				Revenue					
Rx	Acreage																					(\$/ac)	PV				
3.94																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV
2008	290	128	244	229	71	9.0	3544	1512	2073	0	0	0	0	128	244	229	71	9.0	6	92	8	42.79	503	1	1	0.00	0.00
2015	283	142	264	246	74	9.6	4652	1633	2371	188	2712	1146	1160	50	92	78	68	9.8	4	43	2	46.41	503	1	1	930.01	693.99
2019	462	55	136	85	70	4.7	2287	545	906	0	0	0	0	55	136	85	70	4.7	10	49	3	46.10	504	1	3	0.00	0.00
2029	452	76	175	124	75	5.5	3430	656	1187	0	0	0	0	76	175	124	75	5.5	6	54	2	46.29	504	1	3	0.00	0.00
2035	445	91	203	156	77	6.1	4323	680	1341	306	2493	122	130	50	100	84	71	8.1	4	36	1	46.66	504	1	3	718.39	202.04
2038	748	55	150	92	73	3.7	2208	576	924	0	0	0	0	55	150	92	73	3.7	10	42	1	46.16	504	1	3	0.00	0.00
2048	731	78	197	140	77	4.4	3175	682	1174	0	0	0	0	78	197	140	77	4.4	6	54	0	45.70	504	1	3	0.00	0.00
2055	729	98	237	189	79	5.0	4014	737	1353	532	2259	205	209	50	107	80	75	6.8	4	36	0	46.15	504	1	2	664.80	70.47
2059	1260	56	168	89	76	2.8	2047	584	914	0	0	0	0	56	168	89	76	2.8	10	49	3	45.79	504	1	3	0.00	0.00
2069	1183	87	237	166	79	3.7	2956	778	1234	0	0	0	0	87	237	166	79	3.7	6	55	5	45.80	504	1	2	0.00	0.00
2079	2048	57	187	91	78	2.3	1649	736	1000	0	0	0	0	57	187	91	78	2.3	10	43	10	45.86	504	2	3	0.00	0.00
2088	1741	89	260	187	83	3.1	2451	808	1191	0	0	0	0	89	260	187	83	3.1	6	54	7	44.94	504	1	2	0.00	0.00
2095	1650	123	335	291	84	3.7	2977	926	1387	1410	1535	305	306	50	111	79	79	6.2	4	43	1	45.02	503	1	2	475.95	7.17
2099	3059	57	205	92	81	1.9	1786	675	965	0	0	0	0	57	205	92	81	1.9	10	38	19	44.96	504	2	3	0.00	0.00
2109	2323	88	274	203	83	2.6	2596	582	995	0	0	0	0	88	274	203	83	2.6	0	0	0	43.31	503	1	2	0.00	0.00
																										3,390.37	997.68
Stand 19	Rx																					Revenue					
Let grow	Acreage																					(\$/ac)	PV				
7.4																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV
2009	117	98	165	148	81	12.4	5642	1108	1913	0	0	0	0	98	165	148	81	12.4	10	91	3	33.15	508	1	3	0.00	0.00
2019	114	122	195	178	87	14.0	7600	1465	2529	0	0	0	0	122	195	178	87	14.0	10	98	5	39.05	508	1	2	0.00	0.00
2029	111	145	224	207	92	15.4	10098	1432	2835	0	0	0	0	145	224	207	92	15.4	10	91	6	44.35	406	1	2	0.00	0.00
2039	109	164	247	230	96	16.6	12458	1253	2986	0	0	0	0	164	247	230	96	16.6	10	90	9	47.92	406	1	2	0.00	0.00
2049	106	182	266	250	99	17.8	14747	1129	3172	0	0	0	0	182	266	250	99	17.8	10	87	26	50.66	406	1	2	0.00	0.00
2059	98	194	276	261	101	18.9	16605	1016	3285	0	0	0	0	194	276	261	101	18.9	10	86	26	51.46	406	1	1	0.00	0.00
2069	94	205	286	272	103	20.0	18481	917	3426	0	0	0	0	205	286	272	103	20.0	10	78	24	52.06	406	1	1	0.00	0.00
2079	90	215	294	280	104	21.0	20160	865	3574	0	0	0	0	215	294	280	104	21.0	10	64	18	52.15	406	1	1	0.00	0.00
2088	87	224	302	289	105	21.8	21642	776	3664	0	0	0	0	224	302	289	105	21.8	10	60	38	51.78	406	1	1	0.00	0.00
2099	81	227	301	288	107	22.6	22513	717	3692	0	0	0	0	227	301	288	107	22.6	10	53	46	50.03	406	1	1	0.00	0.00
2109	75	226	296	282	108	23.4	23044	604	3621	0	0	0	0	226	296	282	108	23.4	10	50	43	47.66	406	1	1	0.00	0.00

Stand 19		Rx Shelterwood harvest in 2014, RBA 45, remove residuals in 2019																				Revenue						
Acreage 7.4		Pulp										RPulp										(\$/ac)		PV				
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBSI	ATCBA	ATCCF	ATTopHt	ATQMD	Prolen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV	
2009	117	98	165	148	81	12.4	5642	1108	1913	0	0	0	0	98	165	148	81	12.4	5	83	3	33.15	508	1	3	0.00	0.00	
2010	115	109	179	162	84	13.2	6455	1347	2260	95	2823	1190	1589	45	62	68	87	20.3	5	30	4	35.86	508	1	2	1,088.29	852.71	
2014	132	48	95	73	46	8.2	4022	155	700	20	4022	155	700	0	0	0	3	0.1	5	0	0	35.34	508	1	4	1,448.51	885.26	
2024	144	1	4	2	17	1.1	0	0	0	0	0	0	0	1	4	2	17	1.1	5	0	0	33.52	999	5	5	0.00	0.00	
2025	143	4	13	9	29	2.2	0	0	0	0	0	0	0	4	13	9	29	2.2	5	7	0	31.87	999	5	5	0.00	0.00	
2034	141	5	25	21	40	3.4	0	78	78	0	0	0	0	5	25	21	40	3.4	5	9	0	30.65	508	3	4	0.00	0.00	
2038	140	14	35	31	50	4.2	0	181	181	0	0	0	0	14	35	31	50	4.2	5	31	0	29.71	508	3	4	0.00	0.00	
2044	138	19	46	40	57	5.0	0	543	543	0	0	0	0	19	46	40	57	5.0	5	33	0	29.76	508	2	4	0.00	0.00	
2049	137	25	58	49	64	5.8	0	931	931	0	0	0	0	25	58	49	64	5.8	5	42	1	29.89	508	2	4	0.00	0.00	
2054	136	32	70	57	70	6.6	0	1423	1423	0	0	0	0	32	70	57	70	6.6	5	52	1	30.36	508	2	4	0.00	0.00	
2055	134	40	83	66	75	7.4	31	1987	1992	0	0	0	0	40	83	66	75	7.4	5	64	2	31.13	508	2	4	0.00	0.00	
2064	133	49	97	76	79	8.2	292	2467	2510	0	0	0	0	49	97	76	79	8.2	5	70	2	32.26	508	2	4	0.00	0.00	
2068	131	59	112	86	83	9.1	647	2911	3008	0	0	0	0	59	112	86	83	9.1	5	72	3	33.52	508	2	3	0.00	0.00	
2074	130	69	126	96	86	9.8	1202	3165	3347	0	0	0	0	69	126	96	86	9.8	5	80	3	34.73	508	2	3	0.00	0.00	
2079	128	79	141	107	88	10.6	2023	3254	3559	0	0	0	0	79	141	107	88	10.6	5	96	4	36.09	508	1	3	0.00	0.00	
2084	127	91	159	119	91	11.5	3510	2892	3416	0	0	0	0	91	159	119	91	11.5	5	101	5	37.85	508	1	3	0.00	0.00	
2089	125	104	176	130	93	12.3	4795	2826	3532	0	0	0	0	104	176	130	93	12.3	5	91	6	39.64	508	1	2	0.00	0.00	
2094	124	115	190	140	94	13.0	6023	2692	3570	0	0	0	0	115	190	140	94	13.0	5	90	7	40.98	508	1	2	0.00	0.00	
2099	122	125	203	150	95	13.7	7143	2655	3686	0	0	0	0	125	203	150	95	13.7	5	98	8	42.20	508	1	2	0.00	0.00	
2104	121	137	217	160	97	14.4	8391	2612	3812	0	0	0	0	137	217	160	97	14.4	5	99	9	43.55	508	1	2	0.00	0.00	
2109	119	148	231	170	98	15.1	9873	2333	3735	0	0	0	0	148	231	170	98	15.1	5	101	10	44.81	508	1	2	2,536.81	1,741.97	
Stand 111																												
Rx	Uneven age management beginning 2018, 20 year cutting cycle, RBA 50, q = 1.4, 20 inch maximum diameter																											
Acreage	8.42																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RTCuFt	ATBSI	ATCBA	ATCCF	ATTopHt	ATQMD	Prolen	Acc	Mort	MAI	ForTyp	SizeCls	SktCls	Revenue	PV	
2009	210	196	323	243	88	13.1	9215	2448	3726	0	0	0	0	196	323	243	88	13.1	9	108	23	88.25	508	1	1	0.00	0.00	
2018	196	211	339	257	91	14.1	10819	2472	3958	117	9222	1391	2658	50	89	77	73	10.8	1	54	1	87.75	508	1	1	4,340.14	2,797.69	
2019	294	52	118	79	74	5.7	1681	1104	1351	0	0	0	0	52	118	79	74	5.7	10	57	1	87.28	520	1	4	0.00	0.00	
2029	289	73	156	110	80	6.8	2690	1231	1630	145	1137	223	387	50	100	79	74	8.0	10	56	1	83.61	520	1	3	538.45	202.94	
2039	428	69	161	105	80	5.4	2570	1092	1471	0	0	0	0	69	161	105	80	5.4	10	75	1	80.64	520	1	3	0.00	0.00	
2049	421	101	218	150	84	6.6	3941	1250	1816	274	2523	278	641	50	101	76	78	7.9	10	54	1	80.01	520	1	2	1,180.77	167.72	
2059	686	67	173	95	83	4.2	2194	1280	1611	0	0	0	0	67	173	95	83	4.2	10	66	3	77.65	520	1	3	0.00	0.00	
2069	649	104	242	152	86	5.4	3174	1618	2083	478	1877	369	643	50	104	74	80	7.3	10	57	1	76.43	520	1	3	889.15	47.60	
2079	1119	68	193	95	85	3.3	2049	1658	1961	0	0	0	0	68	193	95	85	3.3	10	64	9	74.92	520	1	3	0.00	0.00	
2089	940	110	274	167	89	4.6	2943	1908	2333	755	1796	468	727	50	105	73	85	7.0	10	67	1	73.51	508	1	3	858.43	17.32	
2099	1691	72	219	99	89	2.8	2178	1762	2081	0	0	0	0	72	219	98	89	2.8	10	64	17	73.06	520	1	3	0.00	0.00	
2106	1232	119	307	184	91	4.2	3094	1818	2260	0	0	0	0	119	307	184	91	4.2	0	0	0	71.46	508	1	2	0.00	0.00	
																											7,806.94	3,233.28





Stand	118																											
Rx	Let/grow																											
Acreage	5.07																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	ATPrlen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls	Revenue	PV
2009	240	113	213	240	69	9.3	1173	1920	2091	0	0	0	0	0	113	213	240	69	9.3	10	102	3	0.00	519	2	2	0.00	0.00
2019	234	141	253	281	74	10.5	1879	2503	2774	0	0	0	0	141	253	281	74	10.5	10	110	12	0.00	519	1	2	0.00	0.00	
2029	220	166	286	312	79	11.8	2975	2632	3065	0	0	0	0	166	286	312	79	11.8	10	113	30	0.00	519	1	1	0.00	0.00	
2039	195	185	304	330	83	13.2	4314	2308	2934	0	0	0	0	185	304	330	83	13.2	10	109	24	0.00	519	1	1	0.00	0.00	
2049	181	204	324	351	86	14.4	5544	2163	2963	0	0	0	0	204	324	351	86	14.4	10	108	25	0.00	519	1	1	0.00	0.00	
2059	169	223	343	370	89	15.5	6870	1875	2862	0	0	0	0	223	343	370	89	15.5	10	104	46	0.00	519	1	1	0.00	0.00	
2069	152	233	349	375	91	16.8	7998	1532	2668	0	0	0	0	233	349	375	91	16.8	10	85	72	0.00	519	1	1	0.00	0.00	
2079	130	230	335	360	93	18.0	8598	1167	2374	0	0	0	0	230	335	360	93	18.0	10	83	65	0.00	519	1	1	0.00	0.00	
2089	114	230	326	349	96	19.2	9196	903	2177	0	0	0	0	230	326	349	96	19.2	10	78	64	0.00	519	1	1	0.00	0.00	
2099	101	230	317	339	97	20.4	9718	656	1989	0	0	0	0	230	317	339	97	20.4	10	65	58	0.00	519	1	1	0.00	0.00	
2109	91	228	309	328	99	21.5	10044	516	1880	0	0	0	0	228	309	328	99	21.5	10	59	50	0.00	519	1	1	0.00	0.00	
Stand	404																											
Rx	Uneven age management beginning 2011, 20 year cutting cycle, RBA 50, q = 1.4, 20 inch maximum diameter																											
Acreage	9.52																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbDft	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	ATPrlen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls	Revenue	PV
2006	150	158	255	200	88	13.9	10439	1417	2920	0	0	0	0	158	255	200	88	13.9	2	83	43	0.00	503	1	2	0.00	0.00	
2011	145	160	255	200	86	14.2	10807	1352	2905	70	8540	646	1873	50	88	66	73	11.0	8	50	1	0.00	503	1	2	2,716.60	2,464.03	
2019	214	61	128	80	77	7.3	3227	801	1284	0	0	0	0	61	128	80	77	7.3	10	58	1	0.00	503	1	3	0.00	0.00	
2029	210	82	161	107	81	8.5	4876	827	1536	0	0	0	0	82	161	107	81	8.5	2	54	2	0.00	503	1	3	0.00	0.00	
2031	209	86	166	112	82	8.7	5178	837	1587	78	2917	103	525	90	98	70	77	8.3	8	48	1	0.00	503	1	3	916.61	313.34	
2039	285	63	138	85	81	6.4	3233	819	1296	0	0	0	0	63	138	85	81	6.4	10	66	1	0.00	503	1	3	0.00	0.00	
2049	280	87	178	117	85	7.5	5031	907	1631	0	0	0	0	87	178	117	85	7.5	2	64	2	0.00	503	1	3	0.00	0.00	
2051	279	91	185	122	85	7.7	5372	926	1696	140	3168	139	592	90	100	71	80	8.1	8	52	1	0.00	503	1	2	997.95	128.58	
2059	414	63	149	85	83	5.3	3072	987	1435	0	0	0	0	63	149	85	83	5.3	10	67	1	0.00	503	1	3	0.00	0.00	
2069	406	90	198	125	86	6.4	4655	1204	1867	0	0	0	0	90	198	125	86	6.4	2	68	2	0.00	503	1	2	0.00	0.00	
2071	405	96	207	133	87	6.6	5033	1217	1931	269	3067	342	778	90	99	74	79	8.2	8	61	1	0.00	503	1	2	986.29	47.89	
2079	664	66	170	93	82	4.3	2999	1104	1541	0	0	0	0	66	170	93	82	4.3	10	75	4	0.00	503	1	3	0.00	0.00	
2089	625	101	236	148	84	5.5	5142	1080	1816	0	0	0	0	101	236	148	84	5.5	2	76	2	0.00	503	1	2	0.00	0.00	
2091	622	108	249	159	85	5.6	5530	1116	1905	485	3413	359	846	50	99	74	78	8.2	8	53	1	0.00	503	1	2	1,095.11	20.04	
2099	1104	64	183	91	81	3.3	2935	977	1412	0	0	0	0	64	183	91	81	3.3	10	88	9	0.00	506	1	3	0.00	0.00	
2109	953	110	273	170	83	4.6	5055	1153	1867	0	0	0	0	110	273	170	83	4.6	0	0	0	0.00	506	1	2	0.00	0.00	
																											6,712.56	2,973.89

Stand Rx Acreage	404 Let-grow 9.52	Pulp										RPulp										Revenue						
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbdfT	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	SkCls	Revenue (\$/ac)
2008	150	158	255	200	88	13.9	10439	1417	2920	0	0	0	0	0	158	255	200	88	13.9	10	93	23	0.00	503	1	2	0.00	0.00
2019	137	174	270	213	88	15.3	12946	1256	3088	0	0	0	0	0	174	270	213	88	15.3	10	93	23	0.00	503	1	1	0.00	0.00
2029	127	190	285	227	90	16.6	15388	1158	3300	0	0	0	0	0	190	285	227	90	16.6	10	83	27	0.00	503	1	1	0.00	0.00
2039	118	202	295	237	91	17.7	17411	1080	3471	0	0	0	0	0	202	295	237	91	17.7	10	72	58	0.00	503	1	1	0.00	0.00
2049	102	202	286	233	92	19.1	18367	936	3424	0	0	0	0	0	202	286	233	92	19.1	10	69	57	0.00	503	1	1	0.00	0.00
2059	88	201	278	229	92	20.4	19246	794	3367	0	0	0	0	0	201	278	229	92	20.4	10	60	53	0.00	503	1	1	0.00	0.00
2069	78	200	270	224	94	21.6	19877	677	3305	0	0	0	0	0	200	270	224	94	21.6	10	61	51	0.00	503	1	1	0.00	0.00
2079	70	200	265	221	94	22.9	20600	579	3273	0	0	0	0	0	200	265	221	94	22.9	10	50	47	0.00	503	1	1	0.00	0.00
2089	63	199	258	216	95	24.0	21025	493	3218	0	0	0	0	0	199	258	216	95	24.0	10	48	42	0.00	503	1	1	0.00	0.00
2099	58	199	253	213	96	25.0	21517	429	3185	0	0	0	0	0	199	253	213	96	25.0	10	45	40	0.00	503	1	1	0.00	0.00
2109	54	198	249	209	97	26.0	21947	373	3172	0	0	0	0	0	198	249	209	97	26.0	10	42	37	0.00	503	1	1	0.00	0.00
Stand Rx Acreage	406 Let-grow 13.14																											
2019	140	166	261	181	92	14.7	12132	724	2386	0	0	0	0	0	166	261	181	92	14.7	10	89	25	58.45	508	1	2	0.00	0.00
2029	130	181	275	189	93	16.0	14343	711	2633	0	0	0	0	0	181	275	189	93	16.0	10	80	30	59.04	508	1	1	0.00	0.00
2039	120	191	284	193	95	17.1	16218	646	2793	0	0	0	0	0	191	284	193	95	17.1	10	72	22	58.13	508	1	1	0.00	0.00
2049	114	203	295	199	96	18.1	18067	589	2957	0	0	0	0	0	203	295	199	96	18.1	10	75	29	57.40	508	1	1	0.00	0.00
2059	107	214	304	203	96	19.1	19984	512	3099	0	0	0	0	0	214	304	203	96	19.1	10	61	59	56.54	508	1	1	0.00	0.00
2069	96	212	295	196	97	20.2	20611	421	3056	0	0	0	0	0	212	295	196	97	20.2	10	56	52	52.52	508	1	1	0.00	0.00
2079	87	212	288	190	97	21.2	21181	368	3045	0	0	0	0	0	212	288	190	97	21.2	10	53	49	49.23	508	1	1	0.00	0.00
2089	79	211	283	185	97	22.1	21685	323	3033	0	0	0	0	0	211	283	185	97	22.1	10	49	47	46.29	508	1	1	0.00	0.00
2099	73	211	278	181	97	23.0	22163	277	3017	0	0	0	0	0	211	278	181	97	23.0	10	40	41	43.65	508	1	1	0.00	0.00
2109	68	209	273	176	98	23.8	22438	239	2992	0	0	0	0	0	209	273	176	98	23.8	10	41	37	41.11	508	1	1	0.00	0.00
2119	64	209	269	173	98	24.5	22833	212	2991	0	0	0	0	0	209	269	173	98	24.5	0	0	0	39.09	508	1	1	0.00	0.00

### Virginia Pine Condition Class

Classification under previous system: PH2

Old Stands: 49, 39

New Stands: 8

Acres = 5.85

Hardwood and Pine TPA= 214

Shrub TPA = 3

BA/Acre = 104 ft<sup>2</sup>

QMD = 9.4 inches

% BA Pine/HW = 72/28

% AGS/UGS = 13/87

Sawtimber (MBF/Acre) = 1.00 (.47 pine, .53  
 hardwood)

Pulpwood (ft<sup>3</sup>/acre) = 2415 (537 pine, 1876  
 hardwood, 2 shrub)

Average Age = 46 years

Average Height = 65 ft.

Virginia Pine Site Index<sub>25</sub> = 67

White Oak Site Index<sub>50</sub> = 63

Loblolly Pine Site Index<sub>50</sub> = 75

Yellow Poplar Site Index<sub>50</sub> = 59

Average Live Crown Ratio = 24%

Priority: High

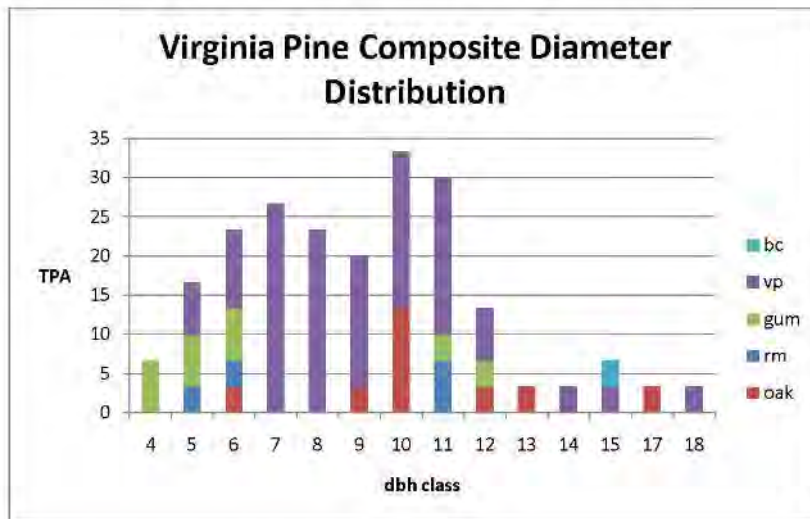


Figure 12 - Composite diameter distribution for the Virginia Pine condition class.

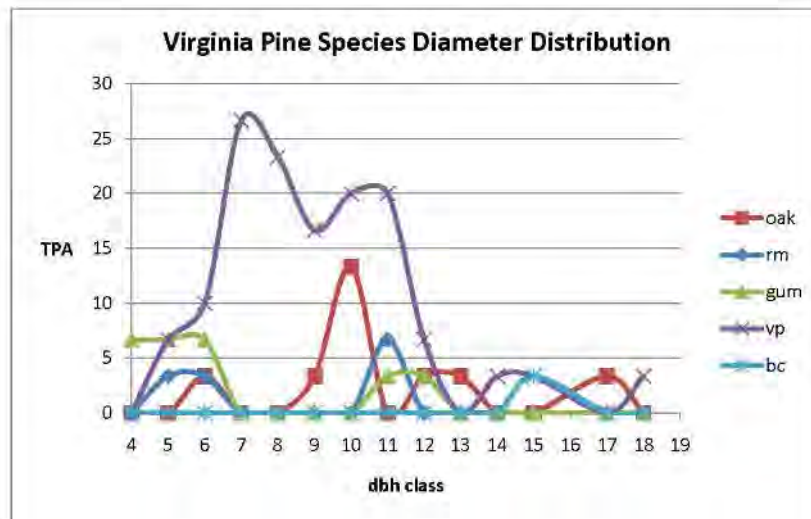


Figure 13 - Species diameter distribution for the Virginia Pine condition class.

**Description of Current Conditions:**

These areas are dominated by Virginia Pine. The cluster averages for the species and product composition are shown in Table 2. While only two stands represent this class they were deemed important and unique enough to require different treatment. Most of the trees are pulpwood size, except for a component of hardwoods that occupies the larger diameter classes. Virginia Pine has a relatively short lifespan, is considered to be a very poor timber species, and has little benefit for wildlife. In other stands on the forest a high incidence of Virginia pine blow down was observed.

**Management:**

The management recommendation is to harvest the merchantable Virginia pine and convert these stands from Virginia pine dominance to a higher quality stand of either pure loblolly or a mixed hardwood and loblolly pine stand.

**Stand Recommendations**

Stand 8 is a new stand created from a portion of the old stand 39 and all of old stand 49. This section was differentiated from the rest of stand 39 because of its almost pure Virginia pine composition. This stand is about 5.85 acres with an average sampled age of 46 years and a Virginia pine site index of 67 (base age 50). This stand averages 214 TPA yielding 104 ft<sup>2</sup> of basal area and a QMD of 9.4 inches. The quality of growing stock was observed as 13% acceptable and 87% unacceptable. Harvest of this low value stand is recommended, followed by planting loblolly pine seedlings.

Table 9 - Growth and yield tables for the Virginia Pine condition class.

Starc Rx Acreage	Year	Pulp										RPulp										Revenue													
		Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	RTpa	RTCuFt	RTpa	RTCuFt	RTpa	RTCuFt	RTpa	RTCuFt	RTpa	RTCuFt	RTpa	RTCuFt	ATCCF	ATSDI	ATCCF	ATTopHt	ATQMD	ATPrlen	Acc	Mort	MAI	ForTyp	SizeCds	ShCds	Revenue (\$/ac)
8 Clearcut 2011 and plant 500 loblolly pine seedlings per acre in 2012. 5.85	2009	325	160	299	288	73	9.5	666	2354	2468	0	0	0	0	0	0	0	0	160	299	288	73	9.5	2	88	12	88.69	163	1	1	1	0.00	0.00		
	2011	322	164	305	292	73	9.7	702	2418	2537	322	702	2418	2420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,891.79	1,715.91
	2019	603	25	76	65	20	2.8	0	0	0	0	0	0	0	25	76	65	20	25	76	65	20	2.8	10	97	0	75.31	161	3	3	0.00	0.00			
	2029	592	84	202	188	42	5.1	0	1142	1142	0	0	0	0	84	202	188	42	84	202	188	42	5.1	10	159	6	14.94	161	2	2	0.00	0.00			
	2039	525	153	317	330	56	7.3	407	2034	2101	0	0	0	0	153	317	330	56	153	317	330	56	7.3	10	214	23	38.69	161	2	1	0.00	0.00			
	2049	462	206	393	435	65	9.0	1063	2047	2223	0	0	0	0	206	393	435	65	206	393	435	65	9.0	10	157	51	56.71	161	1	1	0.00	0.00			
	2059	390	239	429	500	71	10.6	1688	1756	2030	0	0	0	0	239	429	500	71	239	429	500	71	10.6	10	155	74	66.16	161	1	1	0.00	0.00			
	2069	325	252	431	526	75	11.9	2140	1306	1649	0	0	0	0	252	431	526	75	252	431	526	75	11.9	10	125	94	67.59	161	1	1	0.00	0.00			
	2079	264	251	412	523	77	13.2	2381	1008	1382	0	0	0	0	251	412	523	77	251	412	523	77	13.2	10	109	91	64.37	161	1	1	0.00	0.00			
	2089	219	249	395	522	79	14.5	2542	896	1286	0	0	0	0	249	395	522	79	249	395	522	79	14.5	10	96	85	60.68	161	1	1	0.00	0.00			
2099	186	248	380	516	80	15.6	2666	827	1227	0	0	0	0	248	380	516	80	248	380	516	80	15.6	10	94	82	57.04	161	1	1	0.00	0.00				
2109	159	247	369	515	81	16.9	2786	810	1219	0	0	0	0	247	369	515	81	247	369	515	81	16.9	0	0	0	53.97	161	1	1	0.00	0.00				
8 Let grow 5.85																																	1,891.79	1,715.91	

### Loblolly Pulpwood Condition Class

Classification under previous system: P2

Old Stands: 24, 33, 114, 124, 132, 154, 158, 208

New Stands: 14, 18, 109, 114, 117, 203

Acres = 97.34

TPA=325

Shrub TPA = 1

BA/Acre = 131 ft<sup>2</sup>

Shrub BA/Acre < 1ft<sup>2</sup>

QMD = 8.7 inches

% BA Pine/HW = 83/17

% AGS/UGS = 76/24

Sawtimber (MBF/Acre) = 3.65 (3.31 pine, .35 hardwood)

Pulpwood (ft<sup>3</sup>/acre) = 1975 (1668 pine, 306 hardwood)

Average Age = 24 years

Average Height = 51 ft.

Loblolly Pine Site Index<sub>50</sub> = 84

White Oak Site Index<sub>50</sub> = 71

Yellow Poplar Site Index<sub>50</sub> = 77

Stand Density Index (SDI) = 257

Relative SDI= 57% of maximum

Average Live Crown Ratio = 22%

Priority: High

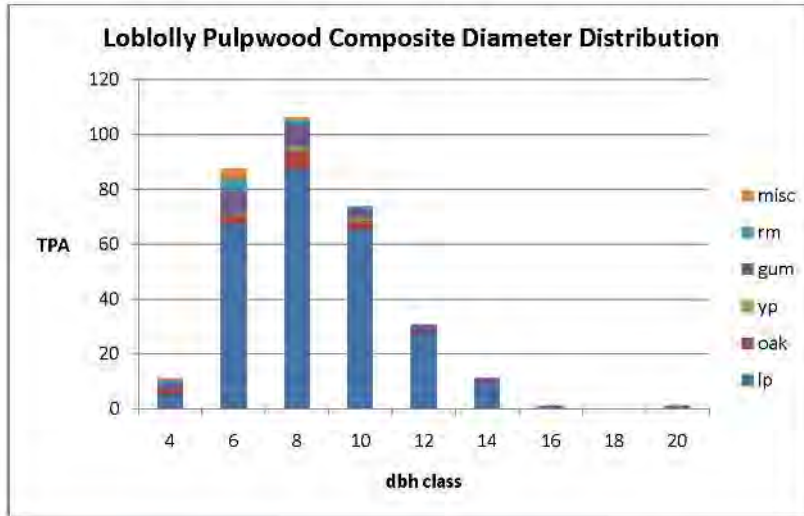


Figure 14 - Composite diameter distribution for the Loblolly Pine Pulpwood condition class.

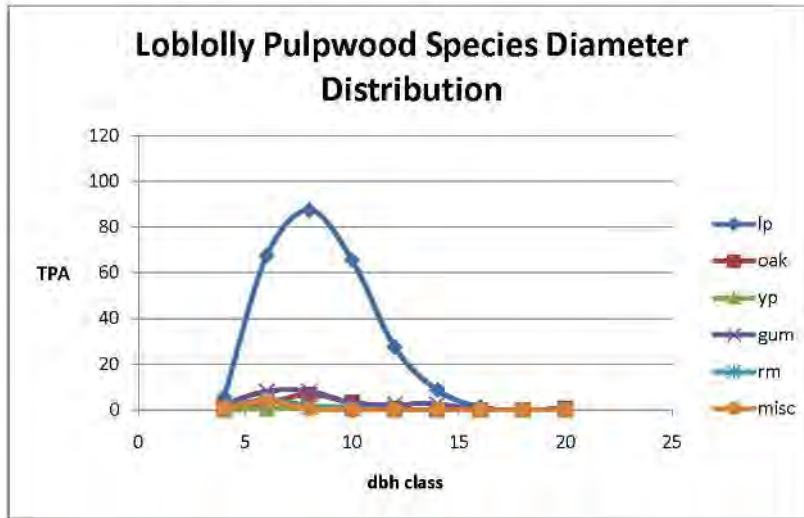


Figure 15 - Species diameter distributions for the Loblolly Pine Pulpwood condition class.

**Description of Current Conditions:**

This condition class is characterized by pulpwood sized loblolly stands. The averages for the species composition classified as pulpwood or sawtimber are shown in Table 2. On average loblolly pine pulpwood is 62% of the total basal area and loblolly sawtimber is 27%. The quality of the condition class is good with 76% of the trees classified as acceptable growing stock (AGS) and 24% unacceptable (UGS). Eight old stands, consolidated to 6 new stands, totaling 97.3 acres, make up this condition class. The diameters are distributed in a normal skewed bell shape typical of even-aged structure (Figures 14 and 15). On average, this condition class is approximately 24 years of age, 36 years from the 60 year rotation age set by previous management plans. Stand density index is at 57% of maximum which is nearing the threshold of self thinning at 60%. Self thinning by density related mortality is probably already occurring in stands of this cover type. Live crown ratios are 22% on average resulting in less than optimal growth. A live crown ratio of 40% is the recommended minimum for good tree vigor.

Table 10 - Regeneration by species for the Loblolly Pulpwood condition class.

Regeneration by Species for Forest Condition Class 4 (stems/ac)					
Ht. Class	ah	oak	pers	rm	Total
1	500	0	0	1000	1500
3	250	0	250	0	500
4	0	250	0	0	250
Total	750	250	250	1000	2250



The advance regeneration in this stand is in reality quite low. The dense nature of these stands keeps much of the understory growth to a minimum. About half of the regeneration is made up of red maple seedlings of less than a foot. Most of these were in fact only a few inches tall. The second most prevalent species is holly, a shrub species which is undesirable in terms of forest regeneration. As these stands are practically pure pine of intermediate size it is not expected to have large amounts of regeneration, nor is it desirable at this point from a timber production standpoint. Once these pines are thinned, there will be an increase in growth in the understory and many more seedlings will become established.

**Management:**

These areas are a high priority for thinning to encourage crown expansion in dominant and codominant crop trees and halt continued live crown reduction. Crown expansion will maintain individual tree vigor and overall stand health and reduce losses in productivity due to overcrowding. Thinning will provide income to offset management and capital investment costs, reduce the risk of damaging agents such as insects and fire, and improve the aesthetic, wildlife, and recreational values of these stands.

Thinning schedules in loblolly pine stands were determined based on relative stand density index. Following Dean and Baldwin (1993), the upper limit of growing stock in projected future rotations was set at 45% of maximum SDI with the understanding that yields of at least 5-7 cords per acre and a minimum height of 40 feet are necessary to sustain a commercial thinning. The lower limit of growing stock was set around 30%, 5% above canopy closure for loblolly pine (Dean and Baldwin, 1993).

**Stand Recommendations**

Stand 14 consists of 8.7 acres in Compartment A with a sampled average age of 18 years and a loblolly pine site index of 90. This stand has approximately 385 TPA yielding a basal area of 138 ft<sup>2</sup> and a QMD of 8.1. This stand is 93% pine on a basal area basis, the quality of which was sampled as 94% AGS and 6% UGS. Stand density index is at 54.4% of maximum for loblolly pine, which is considered into the range of density related mortality. This stand is a high priority for thinning to reduce the SDI to around 30% of maximum.

Stand 18 is another young pine stand of approximately 19 years of age within close proximity to Stand 14. This stand is approximately 17.8 acres with 380 TPA yielding 104ft<sup>2</sup> of basal area and a QMD of 7.1 inches. This stand is approximately 89% pine vs. 11% hardwood, by basal area. The quality was observed as 93% acceptable and 7% unacceptable. This stand is currently at 43.2% of maximum SDI for loblolly pine so it is within the range of full stocking. This stand is low priority but within the next 5-10 years it should be commercially thinned.

Stand 109 makes up 13.4 acres and is a combination of old stands 158 and 154. These stands were combined due to membership in the same condition class and their close proximity. Stand 109 has an average age of 25 years and a sampled loblolly site index of 78. On average there are 310 TPA yielding 134 ft<sup>2</sup> of basal area and a QMD of 8.9 inches. This stand was observed as 75% AGS and 25% UGS. At 51% of maximum SDI this stand is a high priority for commercial thinning to reduce the stand density

and maintain productive growth rates. It is recommended that this stand be scheduled for thinning in 2011, bringing the relative SDI down to 30%. It should then be evaluated for harvest in 2045.

Stand 114 is 26.8 acres of loblolly pine with an average age of 23 years and a sampled site index for loblolly pine of 79. This stand has 260 TPA yielding 151 ft<sup>3</sup> of basal area and a QMD of 10.3 inches. The larger diameter trees of this stand contribute a component of small sawtimber. The quality of the growing stock was observed as 77% acceptable and 23% unacceptable at 54.3% of maximum SDI for loblolly pine this stand is of the highest priority in this condition class for thinning. Thinning from below is recommended to retain the best and fastest growing dominant and codominant trees.

Stand 117 is a small stand adjacent to stand 113 and stand 118 in the northeastern portion of compartment B. This stand is differentiated from the adjacent pine in stand 113 due to its poorer quality and high density. At a sampled age of 36 years this stand is showing high rates of density related mortality. Plot averages show 260 TPA yielding 123 ft<sup>3</sup> of basal area and a QMD of 9.3 inches. This relates to 46% of maximum SDI, this is likely due to the occurrence of density related mortality causing dead trees to not be tallied. With average live crown ratios of around 20% this stand is past the point of recovery from a thinning. It is recommended that this stand be a high priority for regeneration via clearcut and plant or a seed tree harvest in order to salvage more losses to mortality.

Stand 203, previously 208, is the only stand of the loblolly pine pulpwood condition class located in Pumpkin Neck. This is a high priority stand approximately 29 years old on a site index 88 for loblolly pine. These trees have an average live crown ratio of 29% which is below optimum. On average there are 328 TPA yielding 134 ft<sup>3</sup> of basal area. This stand does have a significant component of hardwoods (36% by basal area). The quality of growing stock was observed as 60% AGS and 40% UGS. At 51.5% of maximum SDI for loblolly pine this stand needs immediate density reduction in order to maintain tree health and live crown. Thinning from below is recommended in 2011 to bring SDI back down to around 30% of maximum or around 135. This stand will grow for approximately 16-18 years before the SDI will be in the 45-50% range and need thinning to reduce back to 30%. At this point the stand will grow to the 60 year rotation age when the stand may be regenerated by a seed tree harvest leaving approximately 10 well spaced residual loblolly pines of desirable phenotype as seed trees. The removal cut should occur 5 years after the initial cut or as soon as adequate stocking is established. 400-800 TPA is adequate to regenerate a productive fully stocked stand. If adequate stocking is not regenerated, planting to bolster stocking is recommended. Management for future rotations should follow the thinning recommendations for pine, thinning when SDI reaches 45-50% of maximum down to a residual stocking of about 30% of maximum SDI. Refer to Figure 25 for a plotted thinning trajectory on a density management diagram. With roughly 400-500 TPA, a first thinning should be done around 17-22 years, a second thinning around 15 years later, and a harvest at 60 years.

Table 11 - Growth and yield tables for the Loblolly Pulpwood condition class stands.

Stand Rx Acreage	14 Let grow 13.89																				Revenue						
Year	Tpa	BA	SDI	CCF	Top:Ht	QMD	BdFt	Pulp CuFt	RtPa	RbFdT	RpPulp CuFt	RtCuFt	ATBA	ATSDI	ATCCF	ATTop:Ht	ATQMD	PrdLen	Acc Mort	MAI	ForTyp	SizeCls	StkCls	Revenue (\$/ac)	PV		
2009	365	138	274	274	66	8.1	2083	2195	2535	0	0	0	138	274	274	274	66	8.1	10	229	23	140.50	161	2	2	0.00	0.00
2019	336	184	336	338	78	10.0	8230	2196	3615	0	0	0	184	336	338	78	10.0	10	220	37	162.53	161	1	1	0.00	0.00	
2029	299	218	377	423	86	11.6	14529	1767	4377	0	0	0	218	377	423	86	11.6	10	194	45	167.82	161	1	1	0.00	0.00	
2039	270	244	404	473	92	12.9	20745	1366	4865	0	0	0	244	404	473	92	12.9	10	167	87	164.06	161	1	1	0.00	0.00	
2049	230	252	402	491	96	14.2	24797	970	5192	0	0	0	252	402	491	96	14.2	10	133	110	150.02	161	1	1	0.00	0.00	
2059	191	248	383	484	98	15.5	27060	651	5158	0	0	0	248	383	484	98	15.5	10	121	100	131.87	161	1	1	0.00	0.00	
2069	162	247	370	483	100	16.7	28813	541	5220	0	0	0	247	370	483	100	16.7	10	107	95	118.11	161	1	1	0.00	0.00	
2079	140	246	338	480	101	18.0	30162	464	5247	0	0	0	246	338	480	101	18.0	10	88	85	106.34	161	1	1	0.00	0.00	
2089	123	244	347	473	102	19.1	31088	412	5240	0	0	0	244	347	473	102	19.1	10	86	78	96.06	161	1	1	0.00	0.00	
2099	110	244	339	470	102	20.2	32119	381	5266	0	0	0	244	339	470	102	20.2	10	67	70	88.04	161	1	1	0.00	0.00	
2109	99	242	330	464	103	21.2	32616	356	5240	0	0	0	242	330	464	103	21.2	10	63	61	80.48	161	1	1	0.00	0.00	
Stand Rx Acreage	14 Let grow 13.89																				Revenue						
Year	Tpa	BA	SDI	CCF	Top:Ht	QMD	BdFt	Pulp CuFt	RtPa	RbFdT	RpPulp CuFt	RtCuFt	ATBA	ATSDI	ATCCF	ATTop:Ht	ATQMD	PrdLen	Acc Mort	MAI	ForTyp	SizeCls	StkCls	Revenue (\$/ac)	PV		
2009	365	138	274	274	66	8.1	2083	2195	2535	0	0	0	138	274	274	274	66	8.1	2	209	21	140.50	161	2	2	0.00	0.00
2011	376	147	288	290	69	8.5	2849	2316	2792	159	1511	1229	136	135	136	65	8.5	8	156	2	144.86	161	2	1	557.64	506.80	
2019	200	103	191	201	75	9.7	5091	1068	1950	0	0	0	103	191	201	75	9.7	6	173	3	147.47	161	1	2	0.00	0.00	
2025	198	129	229	251	81	11.0	8817	853	2380	81	3617	350	76	135	148	79	11.0	4	126	3	151.14	161	1	2	937.10	426.30	
2029	146	89	160	173	82	10.6	6999	424	1625	0	0	0	89	160	173	82	10.6	10	140	3	148.40	161	1	3	0.00	0.00	
2039	143	123	206	241	89	12.6	11973	302	2288	0	0	0	123	206	241	89	12.6	6	137	4	146.24	161	1	2	0.00	0.00	
2045	142	142	231	279	92	13.6	14749	303	2704	93	11444	259	382	29	52	57	51	10.5	4	29	1	144.73	161	1	2	2,834.56	489.41
2049	504	83	92	65	56	3.3	3688	62	601	10	3688	38	406	5	20	9	41	1.3	10	115	0	136.97	161	1	4	906.53	128.77
2055	407	83	184	170	53	6.1	0	1194	1194	0	0	0	83	184	170	53	6.1	7	249	2	133.86	161	2	2	0.00	0.00	
2065	401	139	278	273	61	8.0	599	2749	2853	207	309	1415	1416	67	135	132	61	8.0	3	173	2	144.14	161	2	2	292.44	18.12
2069	247	83	167	161	65	7.8	1146	1565	1766	0	0	0	83	167	161	65	7.8	8	195	2	145.16	161	2	3	0.00	0.00	
2077	244	124	231	240	75	9.7	6750	1195	2395	101	2805	487	524	73	135	140	75	9.7	2	128	2	149.45	161	1	2	761.17	27.58
2079	206	79	156	133	77	8.4	5078	566	1468	0	0	0	79	156	153	77	8.4	10	140	2	148.93	161	1	3	0.00	0.00	
2089	203	116	210	223	86	10.2	10104	363	2096	0	0	0	116	210	223	86	10.2	1	130	3	147.89	161	1	2	0.00	0.00	
2090	202	119	215	229	87	10.4	10512	366	2164	75	4914	136	188	75	135	144	87	10.4	9	113	2	147.67	161	1	2	976.75	18.77
2099	204	101	188	194	92	9.5	9945	269	1902	0	0	0	101	188	194	92	9.5	10	131	2	144.68	161	1	3	0.00	0.00	
2109	201	135	237	261	96	11.1	14289	385	2631	0	0	0	135	237	261	96	11.1	0	0	0	143.31	161	1	2	0.00	0.00	
																									7,266.21	1,617.75	

Stand	18	Thin down to Loblolly Pine SDI 135, beginning in 2013. Seed tree harvest in 2045, netting residuals in 2049													Revenue													
Rx	19.14														(\$/ac)													
Acreage	19.14																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TCuFt	RTpa	RBdFt	RPulp CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAI	ForTyp	SizeCls	SkCls	PV		
2009	380	104	218	228	61	7.1	234	1667	1709	0	0	0	0	104	218	228	61	7.1	6	164	2	0.00	0.00	161	2	2	0.00	0.00
2015	373	137	271	290	65	8.2	895	2134	2291	189	449	1072	1075	68	135	144	62	8.2	4	109	2	0.00	0.00	161	2	2	422.43	315.22
2019	215	82	162	172	65	8.4	984	1069	1239	0	0	0	0	82	162	172	65	8.4	5	119	3	0.00	0.00	161	1	3	0.00	0.00
2025	212	105	197	216	68	9.5	2077	928	1281	66	650	291	301	72	135	149	67	9.5	4	97	3	0.00	0.00	161	1	2	422.80	193.69
2029	172	84	138	173	69	9.5	2072	529	878	0	0	0	0	84	138	173	69	9.5	10	109	4	0.00	0.00	161	1	3	0.00	0.00
2039	168	117	205	243	73	11.3	3761	402	1009	0	0	0	0	117	205	243	73	11.3	6	103	6	0.00	0.00	161	1	2	0.00	0.00
2045	166	135	228	282	74	12.2	4682	379	1120	110	3675	355	389	25	47	59	44	9.1	4	18	1	0.00	0.00	161	1	2	2,196.20	379.19
2049	510	28	81	89	47	3.2	1115	30	189	10	1115	22	133	4	17	18	35	1.2	10	32	0	0.00	0.00	161	1	4	63.63	92.85
2059	489	58	144	145	42	4.7	0	346	346	0	0	0	0	58	144	145	42	4.7	7	163	0	0.00	0.00	161	3	3	0.00	0.00
2066	482	103	228	233	48	6.3	0	1533	1533	197	0	624	624	61	135	138	48	6.3	3	128	1	0.00	0.00	161	2	2	53.95	5.79
2069	355	76	163	166	51	6.4	54	1262	1271	0	0	0	0	76	163	166	51	6.4	8	153	2	0.00	0.00	161	2	3	0.00	0.00
2077	330	116	232	246	59	8.0	739	1970	2055	138	310	826	829	68	135	143	59	8.0	2	113	2	0.00	0.00	161	2	2	304.15	11.02
2079	263	75	157	138	61	7.2	752	1114	1242	0	0	0	0	75	157	158	61	7.2	10	120	3	0.00	0.00	161	1	3	0.00	0.00
2089	238	114	217	243	67	9.0	2730	741	1206	0	0	0	0	114	217	243	67	9.0	1	111	5	0.00	0.00	161	1	2	0.00	0.00
2090	257	117	223	250	68	9.1	2906	719	1212	101	1143	282	284	71	135	152	68	9.1	9	98	3	0.00	0.00	161	1	2	708.87	13.62
2099	247	98	191	210	72	8.5	3160	294	810	0	0	0	0	98	191	210	72	8.5	10	91	5	0.00	0.00	161	1	3	0.00	0.00
2109	241	126	233	279	75	9.8	4471	305	1008	0	0	0	0	126	233	279	75	9.8	0	0	0	0.00	0.00	161	1	2	0.00	0.00
Stand	18														4,801.43				1,071.38									
Rx	Let grow																											
Acreage	19.14																											

Year	10a	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TCuFt	RTba	RBdFt	RPulp CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrdLen	Acc Mort	MAI	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV	
2009	310	134	258	266	69	8.9	3188	2143	2703	0	1418	1068	1418	134	258	266	68	8.9	2	165	4	118.24	161	1	2	0.00	0.00
2011	309	144	272	284	70	9.2	3956	2119	2814	156	1992	1068	1418	71	135	141	68	9.2	3	113	2	121.41	161	1	2	671.78	609.32
2014	152	82	150	161	70	9.9	2788	1022	1508	0				82	150	161	70	9.9	5	124	3	120.37	161	1	3	0.00	0.00
2019	151	100	176	196	73	11.0	4359	949	1697	0				100	176	196	73	11.0	5	130	3	120.51	161	1	2	0.00	0.00
2024	149	118	201	231	76	12.0	6173	795	1838	0				118	201	231	76	12.0	5	133	4	121.22	161	1	2	0.00	0.00
2029	148	135	224	266	78	13.0	7938	719	2038	0				135	224	266	78	13.0	5	129	5	122.00	161	1	2	0.00	0.00
2034	147	152	245	298	80	13.8	9674	648	2234	0				152	245	298	80	13.8	5	127	6	122.18	161	1	2	0.00	0.00
2039	143	167	264	329	82	14.3	11360	587	2430	0				167	264	329	82	14.3	5	122	9	122.00	161	1	2	0.00	0.00
2044	143	181	281	358	83	15.2	12929	558	2632	0				181	281	358	83	15.2	5	112	31	121.18	161	1	1	0.00	0.00
2049	138	189	289	377	84	15.9	14175	503	2752	0				189	289	377	84	15.9	5	103	32	118.05	161	1	1	0.00	0.00
2054	133	197	296	393	85	16.3	15259	476	2875	0				197	296	393	85	16.3	5	96	31	114.71	161	1	1	0.00	0.00
2059	129	204	303	408	86	17.0	16242	468	2999	0				204	303	408	86	17.0	5	91	30	111.41	161	1	1	0.00	0.00
2064	125	210	309	423	87	17.6	17179	463	3117	0				210	309	423	87	17.6	5	87	29	108.28	161	1	1	0.00	0.00
2069	122	216	314	437	88	18.1	18110	442	3217	0				216	314	437	88	18.1	5	79	27	105.31	161	1	1	0.00	0.00
2074	119	222	319	450	88	18.5	18931	439	3318	0				222	319	450	88	18.5	5	75	26	102.36	161	1	1	0.00	0.00
2079	116	227	324	462	89	19.0	19715	436	3414	0				227	324	462	89	19.0	5	72	25	99.56	161	1	1	0.00	0.00
2084	114	233	328	473	89	19.4	20654	438	3507	0				233	328	473	89	19.4	5	66	23	96.89	161	1	1	0.00	0.00
2089	111	237	332	484	89	19.8	21148	432	3587	0				237	332	484	89	19.8	5	62	47	94.28	161	1	1	0.00	0.00
2094	107	238	331	486	89	20.2	21491	424	3610	0				238	331	486	89	20.2	5	58	52	90.65	161	1	1	0.00	0.00
2099	103	238	328	486	90	20.6	21730	417	3618	0				238	328	486	90	20.6	5	55	49	87.00	161	1	1	0.00	0.00
2104	99	238	325	486	90	20.9	21940	411	3624	0				238	325	486	90	20.9	5	52	47	83.59	161	1	1	0.00	0.00
2109	96	237	323	486	90	21.3	22140	404	3628	0				237	323	486	90	21.3	5	50	46	80.43	161	1	1	0.00	609.32



Stand	114																												
Rx	Let grow																												
Acres:	22.08																												
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TcuFt	RTba	RBdFt	RPulp CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc Mort	MAJ	ForTyp	SizeCls	StkCls	1	2	Revenue (\$/ac)	PV	
2009	260	151	274	299	74	10.3	6114	2050	3102	0	0	0	0	151	274	299	74	10.3	10	166	24	124.93	161	1	1	0.00	0.00		
2019	233	183	313	364	80	12.0	9946	1822	3496	0	0	0	0	183	313	364	80	12.0	10	154	34	129.23	161	1	1	0.00	0.00		
2029	212	210	342	415	84	13.5	13387	1593	3798	0	0	0	0	210	342	415	84	13.5	10	137	41	127.26	161	1	1	0.00	0.00		
2039	192	229	360	455	86	14.8	16486	1275	3938	0	0	0	0	229	360	455	86	14.8	10	118	30	122.13	161	1	1	0.00	0.00		
2049	181	248	379	494	88	15.8	19212	1087	4145	0	0	0	0	248	379	494	88	15.8	10	100	81	117.26	161	1	1	0.00	0.00		
2059	156	246	366	495	89	17.0	20345	887	4064	0	0	0	0	246	366	495	89	17.0	10	86	75	104.90	161	1	1	0.00	0.00		
2069	137	245	355	494	90	18.1	21201	67	4016	0	0	0	0	245	355	494	90	18.1	10	74	67	94.50	161	1	1	0.00	0.00		
2079	123	243	346	493	91	19.1	21884	662	3911	0	0	0	0	243	346	493	91	19.1	10	66	61	85.71	161	1	1	0.00	0.00		
2089	111	242	338	492	91	20.0	22421	617	3946	0	0	0	0	242	338	492	91	20.0	10	58	55	78.39	161	1	1	0.00	0.00		
2099	102	242	331	489	91	20.9	22842	586	3934	0	0	0	0	242	331	489	91	20.9	10	53	51	72.09	161	1	1	0.00	0.00		
2109	94	241	325	484	91	21.7	23240	557	3921	0	0	0	0	241	325	484	91	21.7	10	46	46	66.73	161	1	1	0.00	0.00		
2119	87	240	320	478	92	22.4	23543	533	3906	0	0	0	0	240	320	478	92	22.4	0	0	0	62.04	161	1	1	0.00	0.00		
Stand	117																												
Rx	Let grow																												
Acres:	2.64																												
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TcuFt	RTba	RBdFt	RPulp CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc Mort	MAJ	ForTyp	SizeCls	StkCls	1	2	Revenue (\$/ac)	PV	
2009	260	123	232	247	75	9.3	6432	2033	3176	0	0	0	0	123	232	247	75	9.3	10	184	7	78.57	161	1	2	0.00	0.00		
2019	251	172	301	342	81	11.2	16082	1503	4271	0	0	0	0	172	301	342	81	11.2	10	169	36	99.62	161	1	1	0.00	0.00		
2029	221	199	330	396	86	12.8	23620	1105	5092	0	0	0	0	199	330	396	86	12.8	10	162	44	105.47	161	1	1	0.00	0.00		
2039	198	221	351	444	89	14.3	30470	827	5850	0	0	0	0	221	351	444	89	14.3	10	133	30	107.25	161	1	1	0.00	0.00		
2049	186	240	371	485	92	15.4	35706	827	6629	0	0	0	0	240	371	485	92	15.4	10	117	61	106.64	161	1	1	0.00	0.00		
2059	166	247	371	503	94	16.5	39362	715	7003	0	0	0	0	247	371	503	94	16.5	10	100	82	100.85	161	1	1	0.00	0.00		
2069	144	245	359	504	95	17.6	41190	663	7121	0	0	0	0	245	359	504	95	17.6	10	95	78	92.39	161	1	1	0.00	0.00		
2079	127	245	350	507	97	18.8	42971	635	7240	0	0	0	0	245	350	507	97	18.8	10	80	73	85.38	161	1	1	0.00	0.00		
2089	113	243	340	503	97	19.9	44298	573	7265	0	0	0	0	243	340	503	97	19.9	10	61	60	78.70	161	1	1	0.00	0.00		
2099	103	241	332	498	98	20.7	45011	537	7251	0	0	0	0	241	332	498	98	20.7	10	53	54	72.54	161	1	1	0.00	0.00		
2109	95	242	327	495	98	21.6	46129	516	7306	0	0	0	0	242	327	495	98	21.6	10	54	52	67.86	161	1	1	0.00	0.00		

Stand	117	Clearcut in 2011 and plant 500loblolly pine seedlings per acre in 2012. Clearcut in 2060 and plant 500/acre in 2061																				Revenue				
Rx	2.64																					(\$/ac)				
Acreage	2.64																									
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TcuFt	RTpa	RBdFt	RPulp CuFt	RTCuFt	ATBdFt	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc Mort	MAI	ForTyp	SizeCls	ShCls	PV	
2009	260	123	232	247	75	9.3	6432	2033	3712	0	0	0	0	123	232	247	75	9.3	2	144	3	70.70	161	1	2	1,800.34
2011	259	132	246	263	76	9.7	7743	2072	3712	0	0	0	0	0	0	0	0	0.0	8	0	0	74.31	161	1	2	1,632.96
2019	490	7	25	18	14	1.6	0	0	0	0	0	0	0	7	25	18	14	1.6	10	120	0	51.66	161	3	3	0.00
2029	475	96	214	204	47	6.1	0	0	1198	0	0	0	0	95	214	204	47	6.1	10	240	11	21.02	161	2	2	0.00
2039	420	168	327	338	64	8.6	3294	4471	5194	0	0	0	0	168	327	338	64	8.6	10	235	32	52.00	161	2	1	0.00
2049	369	216	391	431	76	10.4	16206	3427	6873	0	0	0	0	216	391	431	76	10.4	10	200	44	71.62	161	1	1	0.00
2059	350	249	428	486	84	11.8	28640	2194	7983	0	0	0	0	249	428	486	84	11.8	1	149	461	81.38	161	1	1	0.00
2060	301	236	403	470	84	12.0	28040	1901	7582	298	28070	1856	7578	0	1	1	65	4.7	9	1	0	76.91	161	1	1	4,336.76
2065	478	12	39	32	22	2.1	0	18	11	0	0	0	0	12	39	32	22	2.1	10	110	0	69.86	161	3	3	0.00
2079	469	93	208	197	50	6.0	0	0	1112	0	0	0	0	93	208	197	50	6.0	10	212	9	73.62	161	2	2	0.00
2089	421	153	308	314	63	8.2	1917	4409	4825	0	0	0	0	153	308	314	63	8.2	10	257	38	84.09	161	2	1	0.00
2099	357	210	380	418	76	10.4	14507	3751	6814	0	0	0	0	210	380	418	76	10.4	10	218	41	95.31	161	1	1	0.00
2109	321	250	428	498	84	12.0	28394	2569	8181	0	0	0	0	250	428	498	84	12.0	10	165	101	101.31	161	1	1	0.00
Stand	203																					6,137.10				
Rx	Thin down to Loblolly Pine SDI 135 in 2011																					5,566.53				
Acreage	27.99																									
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CuFt	TcuFt	RTpa	RBdFt	RPulp CuFt	RTCuFt	ATBdFt	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc Mort	MAI	ForTyp	SizeCls	ShCls	PV	
2009	328	134	261	249	72	8.7	4761	8	801	0	0	0	0	134	261	249	72	8.7	2	166	3	104.57	161	2	2	0.00
2011	327	143	274	264	74	9.0	5871	9	993	166	2962	8	26	71	135	130	71	9.0	3	111	2	108.47	161	1	2	700.97
2014	160	80	150	147	74	9.6	4203	10	713	0	0	0	0	80	150	147	74	9.6	5	123	2	108.55	161	1	3	0.00
2019	158	97	174	176	78	10.6	6389	11	1106	0	0	0	0	97	174	176	78	10.6	5	134	3	110.13	161	1	2	0.00
2024	157	115	199	205	82	11.6	9542	12	1581	0	0	0	0	115	199	205	82	11.6	5	136	4	112.53	161	1	2	0.00
2029	155	132	221	234	85	12.5	12473	13	2044	0	0	0	0	132	221	234	85	12.5	5	140	5	114.48	161	1	2	0.00
2034	154	148	243	261	88	13.3	15623	14	2532	0	0	0	0	148	243	261	88	13.3	5	134	6	116.40	161	1	2	0.00
2039	152	163	261	287	90	14.0	18744	15	3008	0	0	0	0	163	261	287	90	14.0	5	137	7	117.38	161	1	2	0.00
2044	150	178	280	312	92	14.7	21934	16	3484	0	0	0	0	178	280	312	92	14.7	5	130	33	118.41	161	1	1	0.00
2049	144	188	290	328	94	15.4	24633	17	3871	0	0	0	0	188	290	328	94	15.4	5	121	35	116.84	161	1	1	0.00
2054	139	196	298	341	95	16.1	26973	18	4194	0	0	0	0	196	298	341	95	16.1	5	115	35	114.71	161	1	1	0.00
2059	134	204	305	353	96	16.7	29165	19	4493	0	0	0	0	204	305	353	96	16.7	5	112	35	112.53	161	1	1	0.00
2064	129	211	312	363	97	17.3	31416	20	4793	0	0	0	0	211	312	363	97	17.3	5	106	34	110.42	161	1	1	0.00
2069	126	218	318	375	98	17.8	34817	21	5053	0	0	0	0	218	318	375	98	17.8	5	100	32	108.24	161	1	1	0.00
2074	122	225	324	385	99	18.4	35358	22	5303	0	0	0	0	225	324	385	99	18.4	5	97	32	106.05	161	1	1	0.00
2079	119	231	330	395	100	18.9	37216	23	5537	0	0	0	0	231	330	395	100	18.9	5	91	31	103.95	161	1	1	0.00
2084	116	237	335	404	100	19.4	38984	24	5757	0	0	0	0	237	335	404	100	19.4	5	84	38	101.83	161	1	1	0.00
2089	111	239	334	404	100	19.9	40051	25	5862	0	0	0	0	239	334	404	100	19.9	5	79	69	98.34	161	1	1	0.00
2094	106	239	330	401	101	20.4	40781	26	5924	0	0	0	0	239	330	401	101	20.4	5	76	66	94.44	161	1	1	0.00
2099	101	239	327	399	101	20.9	41451	27	5973	0	0	0	0	239	327	399	101	20.9	5	69	63	90.96	161	1	1	0.00
2104	96	238	324	395	101	21.3	41988	28	6005	0	0	0	0	238	324	395	101	21.3	5	68	60	87.41	161	1	1	0.00
2109	92	238	321	392	102	21.8	42755	29	6045	0	0	0	0	238	321	392	102	21.8	5	65	59	84.30	161	1	1	0.00
Stand	203																					700.97				
Rx	Thin down to Loblolly Pine SDI 135 in 2011																					635.80				
Acreage	27.99																									



Year	203 Left grow Average: 27.99	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp CufT	TCuFt	RTba	RBdFt	RPulp CufT	RTCuFt	ATBA	ATSDI	ATCCF	ATTophT	ATQMD	PrdLen	Acc Mort	MAI	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV
2009	328	134	261	249	72	8.7	4761	1971	2764	0	0	0	0	134	261	249	72	8.7	10	182	13	104.57	161	2	0.00	0.00
2019	299	173	317	315	81	10.4	11731	1945	3896	0	0	0	0	173	317	315	81	10.4	10	180	32	120.87	161	1	0.00	0.00
2029	267	205	352	362	88	11.9	18730	1771	4842	0	0	0	0	205	352	362	88	11.9	10	178	43	126.42	161	1	0.00	0.00
2039	238	231	378	401	93	13.3	25733	1563	5883	0	0	0	0	231	378	401	93	13.3	10	157	43	127.76	161	1	0.00	0.00
2049	218	252	398	432	96	14.5	31931	1377	6394	0	0	0	0	252	398	432	96	14.5	10	124	101	123.72	161	1	0.00	0.00
2059	181	248	379	421	98	15.8	34741	1097	6444	0	0	0	0	248	379	421	98	15.8	10	115	91	112.54	161	1	0.00	0.00
2069	134	247	366	415	100	17.1	37493	887	6323	0	0	0	0	247	366	415	100	17.1	10	99	86	102.43	161	1	0.00	0.00
2079	134	243	354	408	101	18.3	39353	749	6360	0	0	0	0	243	354	408	101	18.3	10	88	79	93.28	161	1	0.00	0.00
2089	118	244	344	401	101	19.5	41040	635	6582	0	0	0	0	244	344	401	101	19.5	10	82	74	85.53	161	1	0.00	0.00
2099	105	244	336	394	102	20.6	42572	535	6596	0	0	0	0	244	336	394	102	20.6	10	66	66	78.93	161	1	0.00	0.00
2109	96	242	328	384	102	21.3	43452	485	6380	0	0	0	0	242	328	384	102	21.3	10	66	60	72.80	161	1	0.00	0.00

### Loblolly Sawtimber Condition Class

Classification under previous system: PH3

QMD = 12.8 inches

Old Stands: 7, 8, 13, 15, 25, 26, 30, 46, 50, 107, 108, 109, 115, 118, 119, 120, 121, 122, 123, 125, 127, 134, 135, 136, 140, 143, 146, 153, 159, 204, 207, 209, 213, 214, 215, 413, 414, 415, 417, 420

% BA Pine/HW = 66/34

% AGS/UGS = 79/21

Sawtimber (MBF/Acre) = 15.66 (13.76 pine, 1.89 hardwood)

New Stands: 4, 12, 108, 112, 113, 121, 122, 202, 204, 401, 405

Pulpwood (ft<sup>3</sup>/acre) = 642 (190 pine, 439 hardwood, 1.1 shrub)

Acres = 478.8

Average Age of Dominants = 55 years

Hardwood and Pine TPA=149

Average Height = 88 ft.

Shrub TPA = 6

Loblolly Pine Site Index<sub>50</sub> = 92

BA/Acre = 121 ft<sup>2</sup>

White Oak Site Index<sub>50</sub> = 77

Shrub BA/Acre = 1 ft<sup>2</sup>

Average Live Crown Ratio = 42%

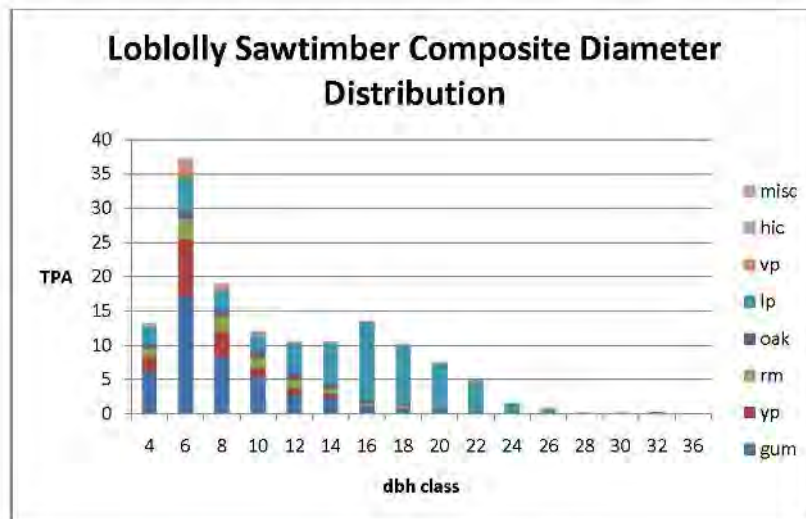


Figure 16 - Composite diameter distribution for the Loblolly Sawtimber condition class.

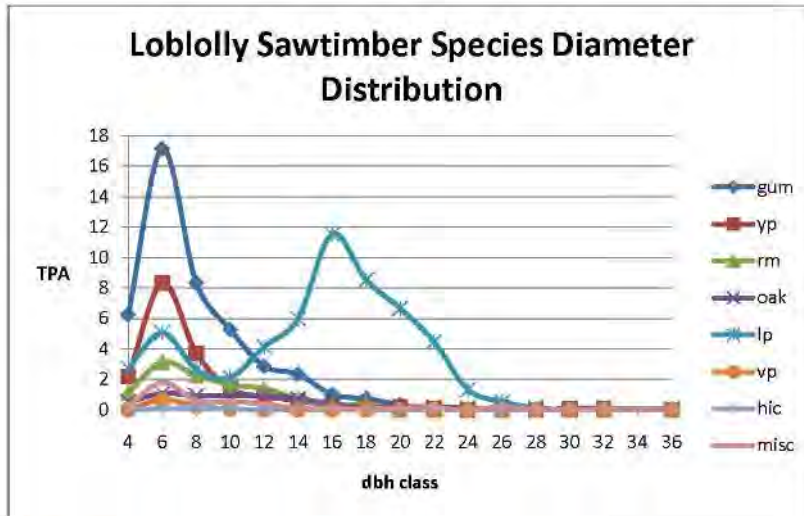


Figure 17 - Species diameter distribution for the Loblolly Sawtimber condition class.

**Description of Current Conditions:**

These areas are dominated by loblolly pine sawtimber in the overstory with a hardwood component dominating the understory. The cluster centers for the species and product composition are shown in Table 2. On average loblolly pine sawtimber forms 65% of the total BA. The dominant sawtimber species categories make up 76% of the total BA. The next highest sawtimber component is gum at 5% of the total BA. The pulpwood is a mix of hardwoods and pine, dominated by gum, poplar, and loblolly and deficient in oak. These stands are generally high quality with 80% acceptable (AGS) and 20% unacceptable (UGS) growing stock. Forty old stands comprising a total of approximately 492.4 acres are classified as Loblolly Pine Sawtimber and consolidated into 11 new stands.

The diameter distributions shown in Figures 16 and 17 are somewhere between an inverse J shape indicative of an uneven-aged stand and a bimodal distribution characteristic of a two-aged stand. This is likely due to the fact that many of these stands are mature loblolly stands which were thinned heavily and a new age class regenerated underneath creating a two-aged structure. In fact the harvest records show that 32 out of the 40 stands have been thinned at least once between 1992 and 1999. Under the previous classification system this cover type is considered a mature pine-hardwood stand (PH3).

Table 12 - Regeneration by species for the Loblolly Sawtimber condition class.

Regeneration by Species for Forest Condition Class 5 (stems/ac)											
Ht. Class	ah	bc	gum	oak	hick	lp	pers	rm	vp	yp	Total
1	153	71	653	255	41	643	31	806	0	10	2663
2	133	10	469	153	0	255	61	10	0	0	1092
3	82	10	388	61	0	102	10	10	0	0	663
4	184	51	776	133	0	602	51	82	20	51	1949
Total	551	143	2286	602	41	1602	153	908	20	61	6367

The advance regeneration in this stand is abundant, resulting from previous thinning opening up the canopy and creating disturbed ground ideal for seedling establishment. Gum dominates the regeneration with loblolly pine not far behind. As this is a two age stand, this regeneration is the growing stock of the future overstory.

**Management:**

Management of stands in this cover type should focus on harvest of the mature loblolly pine and hardwoods in the overstory and releasing the understory. On average this condition class is five years from the 60 year rotation age. A documented management goal is to avoid conversion of pine to hardwood. The current dominance of hardwoods (gum and yellow poplar) over loblolly pine in the understory will make it difficult to maintain a dominant loblolly pine component in future stands. Management must encourage succession of loblolly pine in stands of this cover type.

**Stand Recommendations**

Stand 4 is a consolidation of 9 of the old stands (7, 8, 13, 15, 17, 25, 26, 30, and 50) and makes up a total of 79.4 acres. On average the sampled age of dominants and codominants in this stand is 52 years. The average sampled site index is 86 for loblolly pine. This stand averages 125 TPA yielding 108 ft<sup>2</sup> of basal area per acre and a QMD of 12.9 inches. It is dominated by pine (70%), but has a significant component of hardwood (30%) by basal area. The quality of the stand was generally good, observed as 84% AGS and 16% UGS. At 35.6% maximum SDI for loblolly pine, this stand is at the lower end of the range of stocking maintaining full site utilization. As noted in the description of the condition class, this stand structure is the result of heavy thinning around 10 years ago. Consequently, heavy ingrowth has occurred in the understory creating a two aged stand. This stand has very high sawtimber yield with approximately 14 MBF/acre and comparatively lower pulpwood volume with only 497 ft<sup>3</sup>/acre. Management alternatives include: (1) removal of the pine overstory, releasing the understory, and subsequent TSI; (2) let grow and implement competition control in the form of TSI in the understory; (3) site prep burn or chemical control of understory and removal of the overstory at various rotation ages.

Stand 12, previously 46, is one of the more noticeable pine stands on the forest. It is adjacent to the airfield and consists of approximately 23 acres of mature loblolly pine sawtimber averaging 43 years of age. The site index for loblolly pine was sampled as 94 feet. These pines have a healthy live crown ratio averaging 47%. On average there are 72 TPA yielding 79 ft<sup>2</sup> of basal area per acre and a QMD of 14.2 inches. The quality of the growing stock was observed as 98% AGS and 2% UGS. This is one of the highest yielding sawtimber stands with roughly 15 MBF/acre with only 70 ft<sup>3</sup> of pulpwood/acre. At

25.1% of maximum SDI for loblolly pine this stand is at the low end of full stocking, basically right at canopy closure. This stand is in good shape and is a low priority for management within the 10 year planning horizon.

Stand 108 is a 9.8 acre stand in compartment B that is poor from an overall timber quality, recreation, and aesthetic perspective. About a third of this stand can be characterized as old field. Some disturbance has created a fairly open stocking in these areas. Most of this old field area is in the northern leg of the stand and the area which borders Gambo Creek. This riparian area will be treated as an SMZ during forestry operations. The sampled age of dominants and co-dominants is 79 years, however various age classes are present. Average live crown ratio is very good at 48%. With an average of 105 TPA yielding a basal area of 104 ft<sup>2</sup> per acre and a QMD of 13.8 this stand is at 33.2% of maximum SDI for loblolly pine. The quality of growing stock in the two plots taken in the fully stocked pine areas was observed as 55% AGS and 45% UGS. This stand is a low priority for thinning; however some TSI could be implemented in the old field areas to improve the quality of the growing stock present.

Stand 112 consists of old stands 146 and 153, which were combined due to close proximity and condition class membership. These two areas are divided by a wetland, but are both accessible from the same road. This pine stand is approximately 22.3 acres of 55 year old loblolly (66% of the stand) with a 33% by basal area component of hardwoods. A live crown ratio of 54% indicates good health and adequate density. The stand averages 123 TPA yielding 96 ft<sup>2</sup> of basal area per acre and a QMD of 12.1 inches. This corresponds to a stand density index of 32.4% of maximum for loblolly pine. The quality of the growing stock was observed as 67% AGS and 33% UGS. This stand is a low priority for management within the 10 year planning horizon. A thinning or regeneration harvest will be recommended once the SDI reaches 45-50% of maximum.

Stand 113 is the largest consolidation of stands in this loblolly pine sawtimber condition class. Stand 113 composed of 10 old stands and makes up 141.4 acres. These stands were combined based on operational proximity and condition class membership. On average this stand is 57 years of age and has a sampled site index of 88 feet for loblolly pine. The live crown ratio average is 39% which is very close to the recommended ratio of 40% for ideal tree vigor. There are 174 TPA on average yielding a basal area of 128 ft<sup>2</sup> and a QMD of 11.8 inches. With an SDI of 43.4% of maximum, this stand is the highest priority of all stands of this condition class on Mainside for treatment. This stand should undergo a density reduction via a thinning or a regeneration harvest via shelterwood or seed tree within the 10 year planning horizon. The proximity of much of Stand 113 to the perimeter road lends management of this stand to more aesthetically pleasing treatments which do not remove all trees at once.

Stand 121 is a consolidation of old stands 134, 135, 136, and 127. This stand borders the east shore of Hideaway Pond and thus will require an SMZ to buffer the pond for forestry operations implemented in this stand. This stand is approximately 46.2 acres of 48 year old loblolly pine on average. There is a 22% of BA component of hardwoods in this stand. On average there are 89 TPA yielding 120 ft<sup>2</sup> of basal area and a QMD of 16 inches. This stand has very high sawtimber yields averaging 20MBF/acre. Of this timber the quality was observed as 95% AGS and 5% UGS. Live crown ratio averages to 40% indicating good tree

health and density. Stand density index was calculated as 36.3% of maximum for loblolly pine which is the low end of full stocking. This stand is a low priority for management in the 10 year planning horizon.

Stand 122, consolidated from previous stands 120, 121, and 123, is just to the east of stand 121 across the road. This stand borders the western shore of the Potomac River and operations will need to be mindful of the steep drop off of the bank down to the shore. A no harvest buffer is recommended for safety, aesthetics and erosion control. Stand 122 was not combined with Stand 121 for reasons of mixed stand composition. There are several areas throughout stand 122 that are old field pockets which lend a high shrub component to the average basal area composition (9%), as well as patches of hardwood (23%). Pine makes up about 68% of the basal area. Likely for this reason the per acre sawtimber yield is not as high, averaging about 10MBF/acre. Nonetheless observed quality of growing stock was 96% AGS and 4% UGS but this was likely due to few plots landing in the old field areas. On average there are 131 TPA, 131 ft<sup>2</sup> of basal area/acre and a QMD of 13.8. The stand density index is also a little higher at 42% of maximum. This stand is therefore of medium priority for management during the 10 year planning horizon. A thinning from below would to maintain high rates of growth, combined with a timber stand improvement of the old field patches is recommended within the next 5 years.

Stand 202, previously stand 204, is located in compartment C on Pumpkin neck. This stand is approximately 30.2 acres with a significant loblolly pine sawtimber, but roughly even balance between hardwood (51%) and pine (49%) on a basal area basis. Pine sawtimber accounts for approximately 15MBF/ac or 72% of the 21MBF/acre total. This stand has the highest sawtimber yield of all stands with only 847 ft<sup>3</sup>/ac of pulpwood. On average this stand has 177 TPA, 164 ft<sup>2</sup>/ac of basal area, and a QMD of 13 inches. The quality of the growing stock is 68% AGS and 32% UGS. Average live crown ratio is 33% which is below the recommended level for vigor. This low live crown ratio is likely related to the high stand density index of 53.5% of maximum for loblolly pine. This stand is a high priority for management within the 10 year planning horizon. The average age of 74 years suggests that it is time to implement an area wide regeneration cut via shelterwood or seed tree.

Stand 204 is a consolidation of previous stands 207, 209, 213, 214, and 215 in compartment C of Pumpkin Neck. These stands are all very close in proximity, access, and had the same condition class membership. Combined these form a 49.3 acre stand which averages 52 years of age. The sampled site index averaged to 105 for loblolly pine. Live crown ratios averaged to 45% indicating good stand density and tree vigor. On average the stand has 197 TPA, 135 ft<sup>2</sup> of basal area, and a QMD of 11.4 inches. Growing stock quality was observed as 81% acceptable and 19% unacceptable. The SDI was calculated at 46.7% of maximum for loblolly pine. This stand is located on the upper end of the range of desirable stocking levels. Management to reduce stand density is recommended within the next 5 years. Thinning from below is recommended to maintain high rates of growth and healthy crowns of the dominant and co-dominant crown classes. This thinning can be scheduled at the same time as thinning of stand 203 or harvest of stand 202.

Stand 401 is a loblolly pine stand very similar to stand 204 but was separated for the simple reason of not consolidating stands across compartments for base operational reasons. It is possible that this side of the road could be off-limits on days due to base operations and compartment C could be accessible.

Stand 401 is a consolidation of old stands 413, 414, 415, and 417. On average this stand is 55 years of age and has a loblolly pine site index of 90 feet. Live crown ratios average at 50%, indicating strong tree health and vigor and adequate spacing. There is an average of 145 TPA, 103 ft<sup>2</sup> of basal area/ac, and a QMD of 11.4. SDI was calculated as 35.5% of maximum for loblolly pine. The quality of growing stock was observed as 82% AGS and 18% UGS. This stand ranks as low for priority for management within the 10 year planning horizon.

Stand 405, previously stand 420, is a 16.6 acre stand unique in that it has a significant component of mature eastern white pine. This white pine is not natural, but was planted, and this is the only stand where it occurs. This stand is variable due to areas where there is evidence of blow down. The stand is also composed of loblolly pine and mixed hardwoods. Pine comprises 64% of the basal area and hardwood makes up the remaining 36%. On average the sampled age is 61 years and the sampled site index is 110 for loblolly pine. Average live crown ratio is 38%, just below the recommended level of 40%. There is an average of 250 TPA, 128 ft<sup>2</sup> of basal area per acre and a QMD of 9.7 inches. The quality of growing stock is somewhat poor, lending to the variability of the stand, observed as 56% AGS and 44% UGS. Relatively all of the sawtimber is pine (97%), with the pulpwood about 60% hardwoods and 40% pine. SDI was calculated at 45.7% for white pine which is on the high end of the desired range. To re-establish native vegetation on this stand the white pine should be harvested. Clearcutting followed by planting loblolly is the most predictable method of converting this stand back to native species. A prescribed burn may be implemented to destroy the seedbank and prevent white pine regeneration.

Table 13 - Growth and yield tables for the Loblolly Sawtimber condition class stands.

Stand Rx Acreage	Year	Stand 4										Stand 4										Revenue (\$/ac)	PV						
		Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp	CuFt	TCuFt	RTpa	RBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD			PrLen	Acc	Mort	MAI	ForTyp	SizeCls
82.59	2009	125	108	181	206	84	12.6	14372	497	2747	0	0	0	0	0	108	181	206	84	12.6	10	108	4	65.20	161	1	2	0.00	0.00
	2019	122	134	214	252	89	14.2	19836	590	3622	0	0	0	0	0	134	214	252	89	14.2	10	106	6	71.69	161	1	2	0.00	0.00
	2029	120	158	243	293	92	15.6	25336	671	4468	0	0	0	0	0	158	243	293	92	15.6	10	98	7	75.86	161	1	2	0.00	0.00
	2039	117	179	267	327	95	16.7	30610	686	5218	0	0	0	0	0	179	267	327	95	16.7	10	90	14	77.70	161	1	2	0.00	0.00
	2049	113	195	285	353	96	17.8	35231	704	5845	0	0	0	0	0	195	285	353	96	17.8	10	82	28	77.49	161	1	1	0.00	0.00
	2059	107	206	294	367	98	18.8	39003	655	6280	0	0	0	0	0	206	294	367	98	18.8	10	74	22	75.13	161	1	1	0.00	0.00
	2069	102	217	304	379	98	19.7	42484	637	6701	0	0	0	0	0	217	304	379	98	19.7	10	65	23	72.98	161	1	1	0.00	0.00
	2079	98	225	311	387	99	20.5	45399	621	7044	0	0	0	0	0	225	311	387	99	20.5	10	61	22	70.39	161	1	1	0.00	0.00
	2089	95	233	318	393	100	21.2	48271	589	7357	0	0	0	0	0	233	318	393	100	21.2	10	56	21	67.94	161	1	1	0.00	0.00
	2099	92	241	324	397	100	21.9	50915	556	7636	0	0	0	0	0	241	324	397	100	21.9	10	48	47	65.55	161	1	1	0.00	0.00
2109	86	240	318	387	100	22.6	51669	507	7634	0	0	0	0	0	240	318	387	100	22.6	10	45	41	61.23	161	1	1	0.00	0.00	
82.59	2009	125	108	181	206	84	12.6	14372	497	2747	0	0	0	0	0	108	181	206	84	12.6	6	101	4	65.20	161	1	2	0.00	0.00
	2015	123	123	200	232	87	13.5	17428	545	3239	24	9842	75	485	0	79	136	145	83	11.4	4	85	3	68.69	161	1	2	1,541.79	1,150.51
	2019	107	79	136	145	83	11.6	9197	517	1983	0	0	0	0	0	79	136	145	83	11.6	10	95	3	69.61	161	1	3	0.00	0.00
	2029	105	103	168	186	88	13.4	14122	601	2766	0	0	0	0	0	103	168	186	88	13.4	10	98	4	72.94	161	1	3	0.00	0.00
	2039	102	126	197	225	92	15.0	19523	626	3542	0	0	0	0	0	126	197	225	92	15.0	10	90	6	75.54	161	1	2	0.00	0.00
	2049	100	146	221	257	94	16.4	24556	638	4241	0	0	0	0	0	146	221	257	94	16.4	10	86	7	76.55	161	1	2	0.00	0.00
	2059	98	164	241	283	96	17.5	29447	627	4883	0	0	0	0	0	164	241	283	96	17.5	10	80	9	76.72	161	1	2	0.00	0.00
	2069	96	180	258	304	98	18.6	34048	596	5455	0	0	0	0	0	180	258	304	98	18.6	10	73	1	76.14	161	1	2	0.00	0.00
	2079	95	197	278	325	99	19.5	38722	576	6047	0	0	0	0	0	197	278	325	99	19.5	10	69	24	75.82	161	1	1	0.00	0.00
	2089	91	206	286	331	99	20.4	41990	548	6408	0	0	0	0	0	206	286	331	99	20.4	10	61	20	73.40	161	1	1	0.00	0.00
2099	88	215	294	336	100	21.2	44947	533	6741	0	0	0	0	0	215	294	336	100	21.2	10	52	20	71.06	161	1	1	0.00	0.00	
2109	85	222	299	339	100	21.9	47391	513	7000	0	0	0	0	0	222	299	339	100	21.9	0	0	0	68.44	161	1	1	0.00	0.00	



Stand Rx Acreage	12 Let grow 23-71																																																																	
Year	Top	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV																																						
2009	71	79	127	161	84	14.2	14689	70	2344	0	0	0	0	0	79	127	161	84	14.2	10	100	3	58.86	161	1	3	0.00	0.00																																						
2019	71	101	153	206	92	16.1	20517	108	3227	0	0	0	0	0	101	153	206	92	16.1	10	95	4	66.04	161	1	3	0.00	0.00																																						
2029	69	119	175	245	97	17.8	26279	130	4069	0	0	0	0	0	119	175	245	97	17.8	10	89	5	69.94	161	1	2	0.00	0.00																																						
2039	68	136	193	277	101	19.2	31867	140	4858	0	0	0	0	0	136	193	277	101	19.2	10	79	7	71.77	161	1	2	0.00	0.00																																						
2049	67	150	208	302	104	20.3	36950	134	5554	0	0	0	0	0	150	208	302	104	20.3	10	68	8	71.76	161	1	2	0.00	0.00																																						
2059	65	162	220	319	106	21.3	41332	127	6145	0	0	0	0	0	162	220	319	106	21.3	10	60	9	70.54	161	1	2	0.00	0.00																																						
2069	64	171	229	331	107	22.2	44999	127	6632	0	0	0	0	0	171	229	331	107	22.2	10	55	10	68.60	161	1	2	0.00	0.00																																						
2079	63	180	238	340	108	23.0	48342	128	7064	0	0	0	0	0	180	238	340	108	23.0	10	49	11	66.52	161	1	2	0.00	0.00																																						
2089	61	187	244	346	108	23.7	51302	126	7483	0	0	0	0	0	187	244	346	108	23.7	10	42	12	64.21	161	1	2	0.00	0.00																																						
2099	60	193	249	350	109	24.3	53677	124	7722	0	0	0	0	0	193	249	350	109	24.3	10	41	13	61.62	161	1	2	0.00	0.00																																						
2109	59	199	254	353	109	24.9	55979	124	7994	0	0	0	0	0	199	254	353	109	24.9	10	37	13	59.29	161	1	2	0.00	0.00																																						
2119	58	204	258	354	109	25.5	57988	123	8226	0	0	0	0	0	204	258	354	109	25.5	0	0	0	56.98	161	1	1	0.00	0.00																																						
Stand Rx Acreage	108 Let grow 11.5																																																																	
Year	Top	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV																																						
2009	103	104	169	194	80	13.5	9657	610	2142	0	0	0	0	0	104	169	194	80	13.5	10	77	3	31.56	161	1	3	0.00	0.00																																						
2019	103	127	198	235	81	15.0	12626	708	2634	0	0	0	0	0	127	198	235	81	15.0	10	73	4	35.58	161	1	2	0.00	0.00																																						
2029	101	147	222	272	82	16.3	15845	706	3030	0	0	0	0	0	147	222	272	82	16.3	10	66	5	38.41	161	1	2	0.00	0.00																																						
2039	99	166	243	301	82	17.5	18572	711	3385	0	0	0	0	0	166	243	301	82	17.5	10	65	6	40.17	161	1	2	0.00	0.00																																						
2049	97	183	262	328	82	18.5	21341	696	3717	0	0	0	0	0	183	262	328	82	18.5	10	61	5	41.55	161	1	2	0.00	0.00																																						
2059	96	199	280	351	84	19.5	24045	666	4025	0	0	0	0	0	199	280	351	84	19.5	10	52	18	42.56	161	1	1	0.00	0.00																																						
2069	92	208	288	363	84	20.4	25836	635	4203	0	0	0	0	0	208	288	363	84	20.4	10	43	13	42.01	161	1	1	0.00	0.00																																						
2079	89	216	295	371	84	21.1	27301	633	4373	0	0	0	0	0	216	295	371	84	21.1	10	43	18	41.26	161	1	1	0.00	0.00																																						
2089	85	222	300	375	83	21.8	28757	577	4486	0	0	0	0	0	222	300	375	83	21.8	10	38	13	40.36	161	1	1	0.00	0.00																																						
2099	83	230	306	380	82	22.5	30191	522	4598	0	0	0	0	0	230	306	380	82	22.5	10	36	14	39.55	161	1	1	0.00	0.00																																						
2109	81	236	310	382	82	23.1	31402	505	4717	0	0	0	0	0	236	310	382	82	23.1	10	33	19	38.67	161	1	1	0.00	0.00																																						

Stand	108																																
Rx	Thin from above to 70sq. ft./acre at 2015																																
Acres	11.5																																
Year	Top	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTuFt	RTuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV								
2009	105	104	169	194	80	13.5	9657	610	2142	0	0	104	169	194	80	13.5	6	73	3	31.56	161	1	3	0.00	0.00								
2015	104	117	186	217	81	14.4	11447	696	24939	21	5943	70	118	127	75	12.4	4	61	2	33.82	161	1	2	1,321.19	985.90								
2019	91	78	131	139	75	12.5	6420	630	1637	0	0	78	131	139	75	12.5	10	69	2	34.77	161	1	3	0.00	0.00								
2029	90	100	159	176	76	14.3	9437	585	1997	0	0	100	159	176	76	14.3	10	67	3	37.55	161	1	3	0.00	0.00								
2039	88	120	184	210	77	15.8	12289	599	2378	0	0	120	184	210	77	15.8	10	55	4	39.66	161	1	2	0.00	0.00								
2049	87	137	203	235	77	17.0	14758	547	2640	0	0	137	203	235	77	17.0	10	57	5	40.47	161	1	2	0.00	0.00								
2059	85	153	222	259	77	18.2	17263	527	2950	0	0	153	222	259	77	18.2	10	48	6	41.27	161	1	2	0.00	0.00								
2069	83	166	236	275	77	19.1	19361	510	3169	0	0	166	236	275	77	19.1	10	48	6	41.38	161	1	2	0.00	0.00								
2079	82	179	249	290	77	20.1	21468	476	3387	0	0	179	249	290	77	20.1	10	49	7	41.37	161	1	2	0.00	0.00								
2089	80	192	263	302	77	21.0	23547	477	3632	0	0	192	263	302	77	21.0	10	43	0	41.41	161	1	2	0.00	0.00								
2099	80	206	278	315	77	21.7	25610	490	3889	0	0	206	278	315	77	21.7	10	39	13	41.49	161	1	1	0.00	0.00								
2109	77	214	284	318	78	22.5	27068	462	4024	0	0	214	284	318	78	22.5	0	0	0	40.71	161	1	1	0.00	0.00								
Stand	112																																
Rx	Let grow																																
Acres	24.22																																
Year	Top	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTuFt	RTuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV								
2009	123	96	165	183	89	12.0	11746	470	2266	0	0	96	165	183	89	12.0	10	95	3	55.87	161	1	3	0.00	0.00								
2019	121	118	193	218	94	13.4	15607	633	2965	0	0	118	193	218	94	13.4	10	95	4	61.50	161	1	2	0.00	0.00								
2029	119	139	220	248	98	14.7	19482	809	3663	0	0	139	220	248	98	14.7	10	92	5	65.50	161	1	2	0.00	0.00								
2039	116	159	243	273	101	15.8	23248	960	4319	0	0	159	243	273	101	15.8	10	95	7	67.99	161	1	2	0.00	0.00								
2049	114	178	265	293	103	16.9	27496	1035	4955	0	0	178	265	293	103	16.9	10	87	9	70.12	161	1	2	0.00	0.00								
2059	111	194	283	308	104	17.9	31422	1068	5503	0	0	194	283	308	104	17.9	10	77	24	70.85	161	1	1	0.00	0.00								
2069	105	204	292	315	106	18.9	34597	1002	5847	0	0	204	292	315	106	18.9	10	77	24	69.34	161	1	1	0.00	0.00								
2079	100	215	300	319	107	19.8	37939	905	6174	0	0	215	300	319	107	19.8	10	70	23	68.03	161	1	1	0.00	0.00								
2089	96	224	308	322	107	20.7	41003	821	6467	0	0	224	308	322	107	20.7	10	63	21	66.49	161	1	1	0.00	0.00								
2099	93	232	315	324	108	21.5	43849	726	6719	0	0	232	315	324	108	21.5	10	59	18	64.80	161	1	1	0.00	0.00								
2109	90	241	323	326	109	22.2	46384	697	6989	0	0	241	323	326	109	22.2	10	51	48	63.25	161	1	1	0.00	0.00								
2119	83	240	317	317	109	22.9	47224	612	6971	0	0	240	317	317	109	22.9	0	0	0	59.52	161	1	1	0.00	0.00								
Stand	112																																
Rx	Let grow																																
Acres	24.22																																
Year	Top	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTuFt	RTuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	ShCls	Revenue (\$/ac)	PV								
2009	123	96	165	183	89	12.0	11746	470	2266	0	0	96	165	183	89	12.0	10	95	3	55.87	161	1	3	0.00	0.00								
2019	121	118	193	218	94	13.4	15607	633	2965	0	0	118	193	218	94	13.4	10	95	4	61.50	161	1	2	0.00	0.00								
2029	119	139	220	248	98	14.7	19482	809	3663	0	0	139	220	248	98	14.7	10	92	5	65.50	161	1	2	0.00	0.00								
2039	116	159	243	273	101	15.8	23248	960	4319	0	0	159	243	273	101	15.8	10	95	7	67.99	161	1	2	0.00	0.00								
2049	114	178	265	293	103	16.9	27496	1035	4955	0	0	178	265	293	103	16.9	10	87	9	70.12	161	1	2	0.00	0.00								
2059	111	194	283	308	104	17.9	31422	1068	5503	0	0	194	283	308	104	17.9	10	77	24	70.85	161	1	1	0.00	0.00								
2069	105	204	292	315	106	18.9	34597	1002	5847	0	0	204	292	315	106	18.9	10	77	24	69.34	161	1	1	0.00	0.00								
2079	100	215	300	319	107	19.8	37939	905	6174	0	0	215	300	319	107	19.8	10	70	23	68.03	161	1	1	0.00	0.00								
2089	96	224	308	322	107	20.7	41003	821	6467	0	0	224	308	322	107	20.7	10	63	21	66.49	161	1	1	0.00	0.00								
2099	93	232	315	324	108	21.5	43849	726	6719	0	0	232	315	324	108	21.5	10	59	18	64.80	161	1	1	0.00	0.00								
2109	90	241	323	326	109	22.2	46384	697	6989	0	0	241	323	326	109	22.2	10	51	48	63.25	161	1	1	0.00	0.00								
2119	83	240	317	317	109	22.9	47224	612	6971	0	0	240	317	317	109	22.9	0	0	0	59.52	161	1	1	0.00	0.00								

Stand Rx Acreage	Year	112 Thin down to Loblolly Pine SDI 135 in 2018 24.22										113 Let grow 136.23										Revenue (\$/ac)	PV					
		Topa	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen			Acc	Mort	MAL	ForTyp	SizeCls
2009	123	96	165	183	89	12.0	11746	470	2266	0	0	0	0	0	96	165	183	89	12.0	9	93	3	55.87	161	1	3	0.00	0.00
2018	121	116	190	215	93	13.2	15180	610	2884	35	4410	177	303	82	135	152	88	13.2	1	67	3	60.83	161	1	2	844.29	544.24	
2019	86	84	137	155	89	13.4	11018	450	2097	0	0	0	0	84	137	155	89	13.4	10	76	3	60.88	161	1	3	0.00	0.00	
2029	84	101	159	180	94	14.8	14065	608	2864	0	0	0	0	101	159	180	94	14.8	10	78	4	62.53	161	1	3	0.00	0.00	
2039	82	118	179	199	98	16.2	17558	691	3209	0	0	0	0	118	179	199	98	16.2	10	77	5	63.92	161	1	2	0.00	0.00	
2049	81	134	197	213	102	17.4	21094	748	3726	0	0	0	0	134	197	213	102	17.4	10	76	6	64.76	161	1	2	0.00	0.00	
2059	79	149	214	226	104	18.6	24637	787	4219	0	0	0	0	149	214	226	104	18.6	10	74	8	65.19	161	1	2	0.00	0.00	
2069	77	163	229	237	106	19.7	28529	709	4643	0	0	0	0	163	229	237	106	19.7	10	65	9	65.26	161	1	2	0.00	0.00	
2079	75	175	241	243	108	20.6	31847	654	5005	0	0	0	0	175	241	243	108	20.6	10	60	11	64.50	406	1	2	0.00	0.00	
2089	74	185	251	248	109	21.5	34630	599	5327	0	0	0	0	185	251	248	109	21.5	10	54	4	63.41	406	1	2	0.00	0.00	
2099	73	196	263	254	109	22.2	38034	521	5638	0	0	0	0	196	263	254	109	22.2	10	51	19	62.45	406	1	2	0.00	0.00	
2109	71	203	268	254	110	22.9	40182	483	5843	0	0	0	0	203	268	254	110	22.9	0	0	0	60.47	406	1	1	0.00	0.00	
844.29																											544.24	
2009	174	128	221	235	89	11.6	15656	789	3160	0	0	0	0	128	221	235	89	11.6	10	110	4	62.92	161	1	2	0.00	0.00	
2019	171	154	256	278	93	12.9	20434	998	4044	0	0	0	0	154	256	278	93	12.9	10	110	6	69.07	161	1	2	0.00	0.00	
2029	165	178	285	315	95	14.1	25477	1119	4871	0	0	0	0	178	285	315	95	14.1	10	101	25	73.11	161	1	1	0.00	0.00	
2039	153	193	300	346	98	15.2	29802	1115	5462	0	0	0	0	193	300	346	98	15.2	10	96	25	73.37	161	1	1	0.00	0.00	
2049	144	207	314	355	99	16.3	34089	1086	6016	0	0	0	0	207	314	355	99	16.3	10	91	25	73.16	161	1	1	0.00	0.00	
2059	136	221	326	370	100	17.2	38207	1044	6525	0	0	0	0	221	326	370	100	17.2	10	83	23	72.51	161	1	1	0.00	0.00	
2069	130	233	337	384	101	18.1	42077	982	6976	0	0	0	0	233	337	384	101	18.1	10	77	25	71.42	161	1	1	0.00	0.00	
2079	124	243	346	393	102	18.9	45554	918	7364	0	0	0	0	243	346	393	102	18.9	10	67	59	69.87	161	1	1	0.00	0.00	
2089	112	242	338	385	102	19.9	47169	774	7395	0	0	0	0	242	338	385	102	19.9	10	63	54	65.48	161	1	1	0.00	0.00	
2099	103	241	332	377	103	20.7	48599	671	7434	0	0	0	0	241	332	377	103	20.7	10	59	52	61.65	161	1	1	0.00	0.00	
2109	95	241	326	369	103	21.6	49799	601	7470	0	0	0	0	241	326	369	103	21.6	10	54	50	58.22	161	1	1	0.00	0.00	

Stand Rx Acreage	Year	RPulp										Revenue																
		BA	SDI	CCF	TopHt	QMD	BefT	PulpCuFT	TCuFT	RTpa	RBdft	CuFT	RTCuFT	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	SHCls	Revenue (\$/ac)	PV	
113 Seed tree harvest in 2012. Thinning to SDI 135 in 2031, 2041, 2051, 2060. Seed tree 2074, remove residuals 2079. Thin to SDI 135 in 2100																												
136.23																												
	2009	128	221	235	89	11.6	15656	789	3160	0	0	0	128	221	235	89	11.6	3	99	4	62.92	161	1	2	0.00	0.00		
	2019	173	135	230	247	12.0	16867	855	3399	166	16867	850	951	1	2	3	40	4.8	7	2	0	64.43	161	1	2	2.876.81	2,485.10	
	2029	577	7	19	23	1.5	0	18	18	0	0	0	7	27	19	23	1.5	10	86	0	58.16	161	3	4	0.00	0.00		
	2039	567	78	187	171	48	50	11	906	907	0	0	0	78	187	171	48	50	2	176	1	61.60	161	2	3	0.00	0.00	
	2049	564	91	213	198	51	5.4	28	1266	1271	206	10	462	462	1271	206	5.4	5	148	1	64.38	161	2	2	71.02	24.28		
	2059	509	84	196	177	58	5.5	266	1515	1559	0	0	0	84	196	177	58	5.5	3	186	2	69.15	161	2	3	0.00	0.00	
	2069	506	102	227	212	62	6.1	952	1929	2094	0	0	0	102	227	212	62	6.1	2	191	2	72.98	161	2	2	0.00	0.00	
	2079	504	114	249	236	65	6.4	2013	2071	2425	230	946	950	62	135	128	65	6.4	8	156	1	75.49	161	2	2	291.91	61.26	
	2089	528	100	226	204	75	5.9	7953	799	2208	0	0	0	100	226	204	75	5.9	2	152	2	81.80	161	1	2	0.00	0.00	
	2099	526	109	242	222	77	6.2	9618	728	2427	232	4249	321	349	61	135	124	77	6.2	8	121	2	83.14	161	1	2	740.81	95.45
	2059	649	92	220	189	84	5.1	10210	358	2095	0	0	0	92	220	189	84	5.1	1	109	2	85.78	161	1	3	0.00	0.00	
	2060	648	96	227	196	84	5.2	10722	363	2180	263	4342	146	163	57	135	117	84	5.2	9	84	1	85.97	161	1	3	729.75	60.61
	2069	851	87	222	183	89	4.3	9625	357	1919	0	0	0	87	222	183	89	4.3	5	96	2	85.75	161	1	3	0.00	0.00	
	2074	843	108	264	231	92	4.9	11717	467	2326	89	7397	406	489	47	132	112	55	3.4	5	42	0	86.19	161	1	2	1,266.57	53.13
	2079	868	67	180	162	60	3.8	5945	153	896	13	5045	43	431	40	118	105	48	2.9	10	85	0	84.48	508	3	2	828.73	27.24
	2089	809	97	239	233	63	4.7	0	989	989	0	0	0	97	239	233	63	4.7	5	129	7	84.49	508	2	2	0.00	0.00	
	2084	745	116	272	261	69	5.3	11	1622	1623	0	0	0	116	272	261	69	5.3	5	152	13	85.79	508	2	2	0.00	0.00	
	2099	689	133	300	282	73	6.0	116	2322	2340	0	0	0	133	300	282	73	6.0	1	154	26	87.56	508	2	2	0.00	0.00	
	2100	677	136	304	284	74	6.1	123	2454	2473	376	68	1363	60	135	126	72	6.1	9	106	1	87.83	508	2	2	215.62	2.54	
	2109	1047	89	236	162	81	4.0	585	2046	0	0	0	89	236	162	81	4.0	0	0	0	80.46	508	2	2	0.00	0.00		
																											7,021.20	2,809.60
Stand Rx Acreage	121 Let grow 48.3																											
	Year	BA	SDI	CCF	TopHt	QMD	BefT	PulpCuFT	TCuFT	RTpa	RBdft	CuFT	RTCuFT	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrLen	Acc	Mort	MAL	ForTyp	SizeCls	SHCls	Revenue (\$/ac)	PV	
	2009	89	120	184	235	91	15.8	20330	300	3375	0	0	0	120	184	235	91	15.8	10	105	6	83.27	161	1	2	0.00	0.00	
	2019	87	140	207	273	97	17.2	25927	337	4202	0	0	0	140	207	273	97	17.2	10	96	8	85.84	161	1	2	0.00	0.00	
	2029	85	157	226	304	101	18.4	31069	375	4943	0	0	0	157	226	304	101	18.4	10	91	10	86.16	161	1	2	0.00	0.00	
	2039	83	172	243	329	104	19.6	35898	418	5621	0	0	0	172	243	329	104	19.6	10	78	12	85.42	161	1	2	0.00	0.00	
	2049	81	185	255	346	106	20.5	40065	429	6171	0	0	0	185	255	346	106	20.5	10	71	14	83.16	161	1	2	0.00	0.00	
	2059	79	196	266	358	108	21.3	43795	438	6651	0	0	0	196	266	358	108	21.3	10	63	4	80.50	161	1	1	0.00	0.00	
	2069	78	208	279	371	109	22.0	47629	448	7150	0	0	0	208	279	371	109	22.0	10	59	21	78.55	161	1	1	0.00	0.00	
	2079	76	215	284	374	110	22.8	50336	444	7465	0	0	0	215	284	374	110	22.8	10	50	20	75.07	161	1	1	0.00	0.00	
	2089	74	220	289	374	110	23.4	52653	421	7713	0	0	0	220	289	374	110	23.4	10	47	20	71.53	161	1	1	0.00	0.00	
	2099	72	225	293	374	111	24.0	54863	396	7943	0	0	0	225	293	374	111	24.0	10	45	19	68.35	161	1	1	0.00	0.00	
	2109	70	230	296	373	111	24.5	56908	384	8158	0	0	0	230	296	373	111	24.5	10	40	17	65.47	161	1	1	0.00	0.00	
	2119	69	235	300	371	112	25.0	58739	374	8349	0	0	0	235	300	371	112	25.0	0	0	0	62.77	161	1	1	0.00	0.00	

Stand Rx Acreage	122 Let grow 28.28	RPulp														Revenue														
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BeFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAL	ForTyp	SizeCls	SHCls	Revenue (\$/ac)	PV	
2009	170	131	224	246	82	11.9	10198	947	2522	0	0	0	0	0	131	224	246	82	11.9	10	136	3	111.76	161	1	2	0.00	0.00		
2019	167	160	263	297	90	13.2	14302	1111	3304	0	0	0	0	0	160	263	297	90	13.2	10	128	8	116.47	161	1	2	0.00	0.00		
2029	162	185	293	340	96	14.4	18321	1153	3941	0	0	0	0	0	185	293	340	96	14.4	10	117	35	117.11	161	1	1	0.00	0.00		
2039	148	198	303	361	101	15.7	21314	1161	4362	0	0	0	0	0	198	303	361	101	15.7	10	106	27	111.52	161	1	1	0.00	0.00		
2049	139	212	317	381	104	16.7	24289	1166	4768	0	0	0	0	0	212	317	381	104	16.7	10	90	24	107.12	161	1	1	0.00	0.00		
2059	132	223	328	397	106	17.6	26857	1140	5086	0	0	0	0	0	223	328	397	106	17.6	10	85	24	102.19	161	1	1	0.00	0.00		
2069	127	235	338	411	108	18.4	29329	1098	5367	0	0	0	0	0	235	338	411	108	18.4	10	76	31	97.78	161	1	1	0.00	0.00		
2079	120	242	343	417	109	19.2	31280	1054	5562	0	0	0	0	0	242	343	417	109	19.2	10	66	57	92.60	161	1	1	0.00	0.00		
2089	110	241	336	407	109	20.1	32145	960	5544	0	0	0	0	0	241	336	407	109	20.1	10	60	53	85.21	161	1	1	0.00	0.00		
2099	101	241	330	399	110	20.9	32914	865	5315	0	0	0	0	0	241	330	399	110	20.9	10	51	48	78.87	161	1	1	0.00	0.00		
2109	94	240	324	390	111	21.6	33502	786	5479	0	0	0	0	0	240	324	390	111	21.6	10	51	45	73.22	161	1	1	0.00	0.00		
Stand Rx Acreage	122	Thin down to Loblolly Pine SDI 135 in 2018																												
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BeFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAL	ForTyp	SizeCls	SHCls	Revenue (\$/ac)	PV			
2009	170	131	224	246	82	11.9	10198	947	2522	0	0	0	0	131	224	246	82	11.9	9	134	3	111.76	161	1	2	0.00	0.00			
2018	167	137	258	292	90	13.1	13794	1117	3233	80	6381	533	616	82	135	152	85	13.1	1	81	3	115.69	161	1	2	1,714.12	1,104.94			
2019	87	84	137	156	85	13.3	7498	568	1718	0	0	0	0	84	137	156	85	13.3	10	96	3	114.81	161	1	3	0.00	0.00			
2029	86	105	165	194	92	15.0	10668	618	2225	0	0	0	0	105	165	194	92	15.0	10	90	4	110.72	161	1	2	0.00	0.00			
2039	84	124	187	225	97	16.4	13723	651	2686	0	0	0	0	124	187	225	97	16.4	10	86	5	106.87	161	1	2	0.00	0.00			
2049	83	142	207	251	101	17.7	16653	680	3115	0	0	0	0	142	207	251	101	17.7	10	78	6	103.29	161	1	2	0.00	0.00			
2059	81	157	224	273	104	18.8	19375	667	3468	0	0	0	0	157	224	273	104	18.8	10	70	7	99.45	161	1	2	0.00	0.00			
2069	80	170	238	290	106	19.7	21823	646	3770	0	0	0	0	170	238	290	106	19.7	10	66	8	95.46	161	1	2	0.00	0.00			
2079	78	182	251	303	107	20.6	24172	602	4031	0	0	0	0	182	251	303	107	20.6	10	58	9	91.76	161	1	2	0.00	0.00			
2089	77	192	261	314	108	21.4	26195	582	4267	0	0	0	0	192	261	314	108	21.4	10	53	10	87.99	161	1	1	0.00	0.00			
2099	76	201	270	322	109	22.1	27998	561	4469	0	0	0	0	201	270	322	109	22.1	10	48	5	84.31	161	1	1	0.00	0.00			
2109	75	211	279	330	110	22.7	29814	550	4683	0	0	0	0	211	279	330	110	22.7	0	0	0	81.26	161	1	1	0.00	0.00			
																											1,714.12	1,104.94		

Stand Rx Acreage	202 Let grow 28-31	RPulp															Revenue											
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	Beft	PulpCuFT	Tcuft	Rtpa	Rbft	Cuft	RTCuFT	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	Prelen	Acc	Mort	MAI	ForTyp	SizeCls	SHCls	Revenue (\$/ac)
2009	177	164	270	284	98	13.0	21318	847	4005	0	0	0	0	0	164	270	284	98	13.0	10	145	17	66.06	161	1	2	0.00	0.00
2019	166	189	300	318	103	14.4	27623	955	4960	0	0	0	0	0	189	300	318	103	14.4	10	139	31	72.99	161	1	2	0.00	0.00
2029	152	208	318	339	108	15.8	33702	949	5742	0	0	0	0	0	208	318	339	108	15.8	10	131	40	76.52	161	1	1	0.00	0.00
2039	139	223	331	351	111	17.2	39237	925	6398	0	0	0	0	0	223	331	351	111	17.2	10	118	30	77.87	161	1	1	0.00	0.00
2049	131	238	345	364	114	18.3	44476	918	7030	0	0	0	0	0	238	345	364	114	18.3	10	112	59	78.66	161	1	1	0.00	0.00
2059	118	246	346	363	116	19.5	48629	827	7393	0	0	0	0	0	246	346	363	116	19.5	10	85	131	76.68	406	1	1	0.00	0.00
2069	95	229	313	328	117	21.0	48227	604	6996	0	0	0	0	0	229	313	328	117	21.0	10	94	16	67.80	161	1	2	0.00	0.00
2079	93	245	328	339	118	22.0	53482	545	7543	0	0	0	0	0	245	328	339	118	22.0	10	69	129	68.44	406	1	1	0.00	0.00
2089	76	227	298	305	119	23.4	51937	395	7069	0	0	0	0	0	227	298	305	119	23.4	10	65	59	60.36	406	1	2	0.00	0.00
2099	70	227	293	295	119	24.4	53424	323	7097	0	0	0	0	0	227	293	295	119	24.4	10	57	55	57.17	406	1	2	0.00	0.00
2109	65	226	287	285	120	25.3	54451	279	7102	0	0	0	0	0	226	287	285	120	25.3	10	53	50	54.11	406	1	2	0.00	0.00
Stand Rx Acreage	202	Seed tree harvest in 2011, remove residuals in 2016, thin from below in 2045, seed tree harvest in 2105.																										
2009	177	164	270	284	98	13.04	21318	847	4005	0	0	0	0	0	164	270	284	98	13.0357	2	132	6	66.063	161	1	2	0.00	0.00
2011	176	169	277	292	99	13.27	22491	876.76707	4196.6	135	17316	797.8	3407.6	30	52	59	11.667	5	31	1	67.556	161	1	2	1,431.21	1,288.15		
2016	234	34	81	66	66	5.15	5738.8	133.61189	911.85	27	5738.8	102.4	880.64	2	9	6	20	1.43698	3	6	0	65.372	161	1	4	356.57	323.42	
2019	242	5	16	13	33	1.847	0	0	0	0	0	0	0	0	5	16	13	33	1.84743	10	52	0	63.36	511	3	4	0.00	0.00
2029	238	41	94	102	64	5.59	0	552.0024	552	0	0	0	0	0	41	94	102	64	5.5897	10	118	1	62.182	511	2	4	0.00	0.00
2039	234	76	155	142	80	7.738	745.57	1545.8018	1657.6	0	0	0	0	0	76	155	142	80	7.73761	6	162	2	67.239	511	2	3	0.00	0.00
2045	232	103	196	167	89	9.023	3754	1885.1955	2441.3	61	1088.2	545.2	706.34	74	141	120	89	8.89356	4	139	2	72.078	511	2	3	345.34	313.23	
2049	291	88	181	133	93	7.444	5252.4	1365.3028	2140	0	0	0	0	0	88	181	133	93	7.44375	10	189	14	74.261	511	1	3	0.00	0.00
2059	258	139	256	199	104	9.944	14559	1331.2425	3395.2	0	0	0	0	0	139	256	199	104	9.94447	10	205	23	82.008	511	1	2	0.00	0.00
2069	232	181	309	228	111	11.97	24461	1427.7942	4734.6	0	0	0	0	0	181	309	228	111	11.9696	10	197	36	89.137	511	1	2	0.00	0.00
2079	207	215	347	247	116	13.79	34230	1440.4727	5905.2	0	0	0	0	0	215	347	247	116	13.7913	10	175	76	93.946	511	1	2	0.00	0.00
2089	172	230	354	246	120	15.69	42326	1204.4575	6564.3	0	0	0	0	0	230	354	246	120	15.691	10	140	121	94.27	511	1	2	0.00	0.00
2099	131	226	330	227	122	17.77	46724	847.50899	6605.9	0	0	0	0	0	226	330	227	122	17.768	6	114	139	89.775	511	1	2	0.00	0.00
2105	111	218	311	213	123	18.95	47496	680.73794	6450.8	105	38629	685.6	5597.5	28	35	22	109	27.6327	4	11	3	85.811	511	1	2	2,270.90	2,039.77	
2108	215	29	70	22	21	4.961	8113.5	4.876346	875.73	0	0	0	0	0	29	70	22	21	4.96148	0	0	0	42.341	999	5	5	0.00	4,404.02
																												3,994.58

Stand Rx Acreage	204 Let grow 46.58	RPulp															Revenue											
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAL	ForTyp	SizeCls	SHKcls	Revenue (\$/ac)
2009	197	135	237	267	93	11.2	14948	1941	4206	0	0	0	0	0	135	237	267	93	11.2	10	166	4	93.95	161	1	2	0.00	0.00
2019	193	169	283	316	103	12.7	20599	2963	6042	0	0	0	0	0	169	283	316	103	12.7	10	168	15	106.56	161	1	2	0.00	0.00
2029	184	198	317	352	110	14.1	26864	3533	7893	0	0	0	0	0	198	317	352	110	14.1	10	158	40	113.84	161	1	1	0.00	0.00
2039	166	216	333	367	114	15.5	32809	3511	8285	0	0	0	0	0	216	333	367	114	15.5	10	152	33	114.47	161	1	1	0.00	0.00
2049	154	235	352	384	118	16.7	39115	3379	8995	0	0	0	0	0	235	352	384	118	16.7	10	137	52	114.93	161	1	1	0.00	0.00
2059	141	247	359	388	121	17.9	44304	3114	9383	0	0	0	0	0	247	359	388	121	17.9	10	115	95	111.72	161	1	1	0.00	0.00
2069	121	245	346	373	123	19.3	47431	2398	9008	0	0	0	0	0	245	346	373	123	19.3	10	105	87	102.94	161	1	1	0.00	0.00
2079	106	244	337	360	125	20.6	50068	1948	8806	0	0	0	0	0	244	337	360	125	20.6	10	92	82	95.46	161	1	1	0.00	0.00
2089	94	243	328	347	126	21.7	52085	1616	8635	0	0	0	0	0	243	328	347	126	21.7	10	86	76	88.56	161	1	1	0.00	0.00
2099	85	243	321	335	127	22.9	54079	1320	8489	0	0	0	0	0	243	321	335	127	22.9	10	77	72	82.67	161	1	1	0.00	0.00
2109	78	242	314	323	128	23.9	55630	1109	8370	0	0	0	0	0	242	314	323	128	23.9	10	69	66	77.26	161	1	1	0.00	0.00
Stand Rx Acreage	204 Let grow 46.58																											
Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	PulpCuFt	TCuFt	RTpa	RBdFt	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAL	ForTyp	SizeCls	SHKcls	Revenue (\$/ac)	PV	
2009	197	135	237	267	93	11.2	14948	1941	4206	0	0	0	0	135	237	267	93	11.2	6	155	4	93.95	161	1	2	0.00	0.00	
2015	195	155	263	296	99	12.1	17998	2551	5261	95	8765	1243	1336	79	135	152	89	12.1	4	104	2	100.80	161	1	2	1,730.25	1,291.14	
2019	240	88	175	164	94	8.2	10646	1575	3165	0	0	0	0	88	175	164	94	8.2	8	136	2	100.83	161	1	3	0.00	0.00	
2027	397	123	253	237	102	7.5	14444	2275	4399	154	10585	2198	2267	23	60	46	45	4.2	2	21	1	105.16	406	1	2	2,134.53	886.94	
2029	508	27	79	57	49	3.1	4005	113	663	5	4005	60	861	8	30	22	40	1.7	10	174	0	102.52	161	3	4	757.67	285.56	
2039	427	102	221	214	67	6.6	39	4225	4231	0	0	0	0	102	221	214	67	6.6	7	243	11	112.23	406	2	2	0.00	0.00	
2046	396	145	287	264	84	8.2	699	7777	7882	210	370	4119	4121	68	135	124	82	8.2	3	156	2	122.56	406	2	2	336.67	55.36	
2049	475	80	186	140	88	5.6	1619	4062	4311	0	0	0	0	80	186	140	88	5.6	7	186	6	123.68	406	2	3	0.00	0.00	
2056	453	128	268	244	98	7.2	7241	3922	5069	224	3588	1943	1959	65	135	123	95	7.2	3	125	1	128.01	406	1	2	801.14	80.87	
2059	622	75	186	140	99	4.7	5617	1765	2658	0	0	0	0	75	186	140	99	4.7	6	152	2	127.88	406	1	3	0.00	0.00	
2065	612	116	262	234	106	5.9	9737	1729	3245	297	4724	839	855	60	135	121	98	5.9	4	115	1	129.22	511	1	2	943.49	61.40	
2069	881	76	200	151	103	4.0	6783	1101	2134	0	0	0	0	76	200	151	103	4.0	7	152	16	128.64	511	1	3	0.00	0.00	
2076	727	130	298	299	107	5.7	9762	2037	3452	397	5333	1111	1124	59	135	136	88	5.7	3	110	1	129.11	511	1	2	1,075.67	40.93	
2079	1108	71	198	159	92	3.4	5182	1368	2108	0	0	0	0	71	198	159	92	3.4	7	139	13	128.59	511	2	3	0.00	0.00	
2086	890	136	321	334	99	5.3	7130	2955	3941	181	3690	2496	2517	67	174	192	57	4.2	3	104	0	129.58	511	2	2	856.21	20.00	
2089	1058	83	222	236	65	3.8	3746	1092	1562	5	3746	34	783	66	186	218	56	3.4	10	254	7	128.96	511	3	2	707.26	14.27	
2099	595	140	303	326	68	6.6	0	6995	6995	0	0	0	0	140	303	326	68	6.6	5	291	31	137.76	511	2	2	0.00	0.00	
2104	548	169	347	346	81	7.5	20	10105	10108	335	12	6178	6178	66	135	134	85	7.5	5	165	2	142.14	511	2	1	402.67	3.91	
2109	880	87	223	155	96	4.2	1531	5072	5302	0	0	0	0	87	223	155	96	4.2	0	0	0	124.99	511	2	3	0.00	0.00	
																											9,745.58	2,740.37





Year	Ipa	BA	SDI	CCF	TopHt	QMD	BelFt	PulpCuFT	TCuFT	RTpa	RBdFt	CuFT	RTCuFT	ATBA	ATSDI	ATCCF	ATTophT	ATQMD	PretLen	Acc	Mort	MAL	ForTyp	SizeCls	SHCls	Revenue	
																										(\$/ac)	PV
2009	250	128	238	217	83	9.7	5670	1340	2135	0	0	0	0	128	238	217	83	9.7	6	199	3	55.95	161	1	2	0.00	0.00
2015	247	153	274	246	94	10.7	7862	1723	2838	228	2440	1651	1661	55	73	58	95	22.7	4	61	3	69.13	161	1	2	1,059.79	790.83
2019	321	59	134	61	51	5.8	6089	80	881	17	6089	74	432	0	3	2	6	0.5	10	169	0	68.49	103	1	4	2,139.05	1,313.19
2029	233	81	162	148	72	8.0	0	2114	2114	0	0	0	0	81	162	148	72	8.0	10	236	2	81.36	511	2	3	0.00	0.00
2039	229	137	246	198	98	10.5	5236	2404	3178	0	0	0	0	137	246	198	98	10.5	10	271	20	98.76	511	1	2	0.00	0.00
2049	211	185	308	230	116	12.7	12908	1829	3693	0	0	0	0	185	308	230	116	12.7	10	271	43	114.35	511	1	2	0.00	0.00
2059	189	223	351	248	128	14.7	20359	1419	4238	0	0	0	0	223	351	248	128	14.7	10	230	123	124.87	511	1	2	0.00	0.00
2069	148	232	345	236	137	17.0	25187	1036	4360	0	0	0	0	232	345	236	137	17.0	10	181	151	123.36	511	1	2	0.00	0.00
2079	113	227	322	216	142	19.2	27886	737	4259	0	0	0	0	227	322	216	142	19.2	10	147	127	116.06	511	1	2	0.00	0.00
2089	92	224	306	203	146	21.1	29998	536	4205	0	0	0	0	224	306	203	146	21.1	10	135	114	109.12	511	1	2	0.00	0.00
2099	77	223	294	194	149	23.0	32036	414	4181	0	0	0	0	223	294	194	149	23.0	10	109	102	103.16	511	1	3	0.00	0.00
2109	67	221	284	186	151	24.6	33421	299	4124	0	0	0	0	221	284	186	151	24.6	0	0	0	97.04	511	1	3	0.00	0.00
																							3,156.84		2,104.02		

### Yellow Poplar Sawtimber Condition Class

Classification under previous system: H3

% AGS/UGS = 51/49

Old Stands: 103, 104, 201, 202, 203, 205, 206, 211, 217, 218, 219

Sawtimber (MBF/Acre) = 18.70 (2.54 pine, 16.17 hardwood)

New Stands: 116, 201

Pulpwood (ft<sup>3</sup>/acre) = 795 (31 pine, 679 hardwood, 86 shrub)

Acres = 212.8

Average Age = 75 years

Hardwood and Pine TPA= 113

Average Height = 106 ft.

Shrub TPA = 39

Loblolly Pine Site Index<sub>50</sub> = 95

Hardwood and Pine BA/Acre = 154 ft<sup>2</sup>

White Oak Site Index<sub>50</sub> = 80

Shrub BA/Acre = 9 ft<sup>2</sup>

Yellow Poplar Site Index<sub>50</sub> = 96

QMD = 16 inches

Average Live Crown Ratio = 44%

% BA Pine/HW = 9/91

Gingrich Stocking (Upland Oaks) = 105% (above A line)

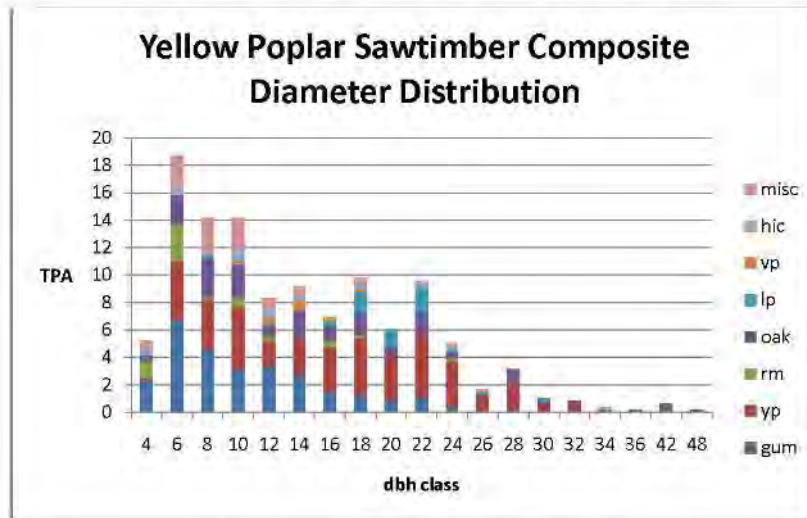


Figure 18 - Composite diameter distribution for the Yellow Poplar Sawtimber condition class.

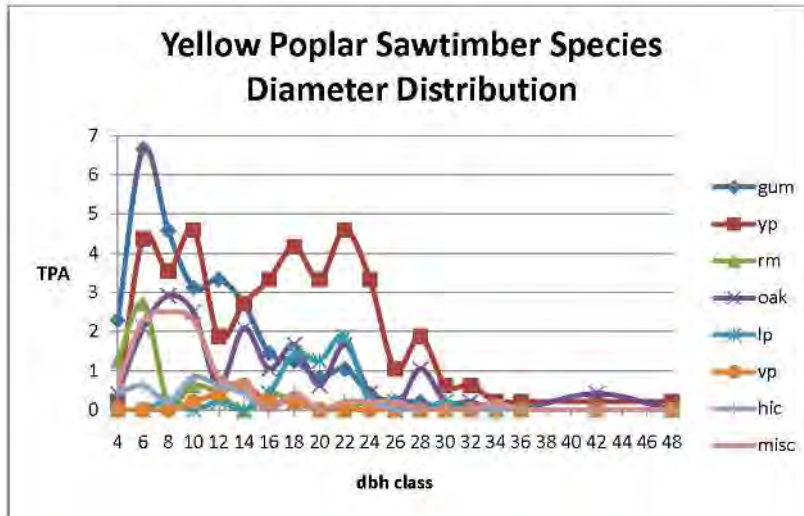


Figure 19 - Species diameter distribution for the Yellow Poplar Sawtimber condition class.

**Description of Current Conditions:**

This cover type is characterized by yellow poplar dominance in the overstory. The cluster centers for the species and product composition are shown in Table 2. Yellow poplar sawtimber makes up about 40% of the total BA of this cover type, with loblolly pine sawtimber making up about 13 % of the total BA. As with most of the other cover types, gum makes up a significant component of the smaller diameter classes.

Figure 18 shows the composite stand diameter distribution. Figure 19 shows the species diameter distributions. While it is not quite as distinct as in the Loblolly Pine Sawtimber condition class, this distribution has somewhat of a bimodal shape tending towards an inverse-j shape. The bimodal distribution is due to the yellow poplar distribution having two modes, one around 18-22 inches and the other around 6-10 inches. Taking the other species into account we see more of an inverse-j shape.

**Management:** The goal for management of this stand should be to maintain the dominance of yellow poplar, improve the species composition, and maintain production of high quality sawtimber.

Table 1A - Regeneration by species for the Yellow Poplar Sawtimber condition class.

Regeneration by Species for Forest Condition Class 6 (stems/ac)												
Ht. Class	ab	ah	ail	bc	gum	oak	hick	lp	pers	rm	yp	Total
1	33	333	0	100	400	800	233	33	0	1900	733	4567
2	0	167	0	0	133	0	33	33	0	0	0	367
3	0	33	67	0	0	0	0	0	33	0	0	133
4	0	67	133	0	33	0	0	0	0	0	0	233
Total	33	600	200	100	567	800	267	67	33	1900	733	5300

This condition class has a significant amount of regeneration. Oak and yellow poplar regeneration is most desired, however there is a significant component of red maple and gum which will compete with these preferred crop trees for dominance.

**Stand Recommendations:**

Stand 116 is a consolidation of stands 103 and 104 in compartment B. These were the only two stands of the yellow poplar condition class on Mainside and they happened to be located side by side, divided only by a cleared right of way. When combined this stand comprises 26 acres bordering the perimeter road to the north and drainage to the west. This drainage will be buffered by an SMZ which will limit the harvesting activity in this area in order to protect water quality. The sampled average age of dominants and co-dominants is 77 years and the sampled site index for yellow poplar was 84 feet. This stand has on average 160 TPA, 144 ft<sup>2</sup> of basal area, and a QMD of 14.5 inches. This stand is dominated by hardwoods (84%), with a minor component of pine (12%) by basal area. Quality was observed as 55% AGS and 45% UGS. Stocking, plotted on the upland hardwood stocking guide is 118%. SDI was calculated as 52% of maximum for yellow poplar which is very near to the level of density related mortality. This stand is of high priority for density reduction or regeneration within the 10 year planning horizon.

Stand 201 is a large consolidation of 9 stands within compartment C of Pumpkin Neck (Old Stands 201, 202, 203, 205, 206, 211, 217, 219). These stands all had membership in the yellow poplar sawtimber condition class and were all connected to one another. These stands border the shore of Machodoc Creek and will employ SMZ's to protect water quality, prevent erosion of the banks, and serve as visual buffers of any harvesting activity. Stand 201 comprises 186.7 acres and is the largest single stand on the forest. Average age is 74 years and average site index for Yellow poplar is 98 feet. On average there are 149 TPA yielding 168 ft<sup>2</sup> of basal area and a QMD of 16.5 inches. This stand has a considerable sawtimber yield of about 20MBF/acre and 787 ft<sup>3</sup> of pulpwood/acre. The quality of growing stock was observed as 67% AGS and 33% UGS. Plotted on the hardwood stocking guide, stocking is at 120% and SDI was calculated at 57.5% of maximum for yellow poplar. This stand is overstocked and is a high priority for a density reduction or regeneration within the 10 year planning horizon.

Table 15 - Growth and yield tables for the Yellow Poplar condition class stands.

Stand Rx Acreage	116 Let grow 26.06	Pulp															RPulp					Revenue							
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TcuFt	RtPa	RbDft	CuFt	RtCuFt	ATBA	ATSDI	ATCCF	ATTOPHT	ATQMD	PrLen	Acc	Mort	MAI	Fortyp	SizeCls	StkCls	Revenue (\$/ac)	PV
		2009	160	144	240	189	94	12.9	13113	793	2623	0	0	0	144	240	189	94	12.9	10	95	18	51.11	508	1	2	0.00	0.00	
		2019	150	164	262	205	96	14.2	16258	816	3028	0	0	0	164	262	205	96	14.2	10	83	27	53.83	508	1	2	0.00	0.00	
		2029	138	178	277	215	97	15.4	19167	816	3366	0	0	0	178	277	215	97	15.4	10	86	33	55.01	508	1	2	0.00	0.00	
		2039	127	191	287	222	97	16.6	21661	791	3623	0	0	0	191	287	222	97	16.6	10	82	24	54.83	508	1	2	0.00	0.00	
		2049	120	205	300	231	98	17.7	24369	771	3911	0	0	0	205	300	231	98	17.7	10	74	35	55.14	508	1	2	0.00	0.00	
		2059	112	214	306	234	98	18.7	26383	744	4099	0	0	0	214	306	234	98	18.7	10	64	58	53.98	508	1	1	0.00	0.00	
		2069	101	212	298	226	99	19.6	27116	698	4103	0	0	0	212	298	226	99	19.6	10	60	53	50.62	508	1	2	0.00	0.00	
		2079	92	212	292	220	99	20.5	27857	673	4125	0	0	0	212	292	220	99	20.5	10	52	49	47.79	508	1	2	0.00	0.00	
		2089	85	211	286	214	99	21.3	28337	650	4129	0	0	0	211	286	214	99	21.3	10	46	42	45.07	520	1	2	0.00	0.00	
		2099	79	210	282	209	99	22.0	28776	633	4136	0	0	0	210	282	209	99	22.0	10	43	39	42.66	520	1	2	0.00	0.00	
		2109	75	209	278	204	99	22.6	29247	611	4148	0	0	0	209	278	204	99	22.6	10	39	36	40.60	520	1	2	0.00	0.00	
		2119	71	209	274	200	100	23.2	29600	603	4160	0	0	0	209	274	200	100	23.2	0	0	0	38.66	520	1	2	0.00	0.00	
Stand Rx Acreage	116 Seed tree in 2014, removal cut in 2019 26.06																												
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt <td>CuFt <td>TcuFt <td>RtPa <td>RbDft <td>CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td></td></td></td></td></td>	CuFt <td>TcuFt <td>RtPa <td>RbDft <td>CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td></td></td></td></td>	TcuFt <td>RtPa <td>RbDft <td>CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td></td></td></td>	RtPa <td>RbDft <td>CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td></td></td>	RbDft <td>CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td></td>	CuFt <td>RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td> </td>	RtCuFt <td>ATBA</td> <td>ATSDI</td> <td>ATCCF</td> <td>ATTOPHT</td> <td>ATQMD</td> <td>PrLen</td> <td>Acc</td> <td>Mort</td> <td>MAI</td> <td>Fortyp</td> <td>SizeCls</td> <td>StkCls</td> <td>Revenue (\$/ac)</td> <td>PV</td>	ATBA	ATSDI	ATCCF	ATTOPHT	ATQMD	PrLen	Acc	Mort	MAI	Fortyp	SizeCls	StkCls	Revenue (\$/ac)	PV
		2009	160	144	240	189	94	12.9	13113	793	2623	0	0	0	144	240	189	94	12.9	5	90	16	51.11	508	1	2	0.00	0.00	
		2014	156	154	251	197	95	13.5	14613	804	2819	110	10294	734	827	36	61	48	51	12.0	5	23	2	52.42	508	1	2	2,684.26	2,103.18
		2019	237	39	90	51	56	5.5	4672	103	696	17	4672	54	328	5	16	12	29	2.0	10	7	0	50.72	520	1	4	1,179.16	723.90
		2029	249	15	42	41	50	3.3	0	128	128	0	0	0	15	42	41	50	3.3	10	30	0	46.53	508	3	4	0.00	0.00	
		2039	245	33	80	79	62	5.0	0	464	464	0	0	0	33	80	79	62	5.0	10	69	0	45.09	508	3	4	0.00	0.00	
		2049	240	60	128	115	74	6.8	576	1045	1129	0	0	0	60	128	115	74	6.8	10	116	1	46.98	508	2	3	0.00	0.00	
		2059	236	98	189	153	81	8.7	3623	1424	1920	0	0	0	98	189	153	81	8.7	10	144	5	52.02	508	2	3	0.00	0.00	
		2069	226	139	249	186	86	10.6	8189	1728	2794	0	0	0	139	249	186	86	10.6	10	140	29	58.06	508	2	2	0.00	0.00	
		2079	198	166	280	200	90	12.4	12924	1703	3344	0	0	0	166	280	200	90	12.4	10	129	31	61.45	508	1	2	0.00	0.00	
		2089	180	191	306	213	92	13.9	17463	1636	3811	0	0	0	191	306	213	92	13.9	10	123	32	63.71	508	1	2	0.00	0.00	
		2099	166	213	329	224	94	15.3	22105	1486	4196	0	0	0	213	329	224	94	15.3	10	104	68	65.29	508	1	2	0.00	0.00	
		2109	143	218	326	219	95	16.7	24963	1235	4245	0	0	0	218	326	219	95	16.7	0	0	0	63.71	508	1	2	0.00	0.00	
																												3,863.41	2,827.08

Stand Rx Acreage	201 Let grow 189.03																					Revenue (\$/ac)	PV					
Year	Tpa	BA	SDI	CCF	TophHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrLen	Acc	Mort	MAI	ForTyp	SizeCl	StkCl	Revenue (\$/ac)	PV
2009	149	168	267	209	102	14.4	20347	787	3355	0	0	0	0	0	168	267	209	102	14.4	10	95	26	61.99	508	1	2	0.00	0.00
2019	138	182	281	218	105	15.5	23357	834	3749	0	0	0	0	0	182	281	218	105	15.5	10	93	32	62.77	508	1	2	0.00	0.00
2029	128	194	291	224	107	16.7	26116	857	4081	0	0	0	0	0	194	291	224	107	16.7	10	87	23	62.56	508	1	2	0.00	0.00
2039	122	208	304	233	109	17.7	29040	856	4418	0	0	0	0	0	208	304	233	109	17.7	10	83	45	62.66	508	1	2	0.00	0.00
2049	112	214	306	233	110	18.7	31163	796	4582	0	0	0	0	0	214	306	233	110	18.7	10	71	62	60.71	508	1	2	0.00	0.00
2059	100	212	298	225	111	19.7	32115	721	4587	0	0	0	0	0	212	298	225	111	19.7	10	65	57	56.98	508	1	2	0.00	0.00
2069	92	212	292	218	111	20.6	32951	678	4607	0	0	0	0	0	212	292	218	111	20.6	10	55	50	53.72	506	1	2	0.00	0.00
2079	85	210	286	212	111	21.3	33486	655	4616	0	0	0	0	0	210	286	212	111	21.3	10	50	44	50.59	506	1	2	0.00	0.00
2089	80	210	282	207	111	22.0	34084	618	4624	0	0	0	0	0	210	282	207	111	22.0	10	46	41	47.92	506	1	2	0.00	0.00
2099	75	209	278	203	112	22.6	34627	595	4637	0	0	0	0	0	209	278	203	112	22.6	10	41	38	45.53	506	1	2	0.00	0.00
2109	71	209	275	199	111	23.2	35067	563	4636	0	0	0	0	0	209	275	199	111	23.2	10	40	36	43.29	506	1	2	0.00	0.00
Stand Rx Acreage	201 Let grow 189.03																					Revenue (\$/ac)	3,885.07					
Year	Tpa	BA	SDI	CCF	TophHt	QMD	BdFt	CuFt	TCuFt	RTpa	RbBdFt	CuFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrLen	Acc	Mort	MAI	ForTyp	SizeCl	StkCl	Revenue (\$/ac)	PV
2009	149	168	267	209	102	14.4	20347	787	3355	0	0	0	0	0	168	267	209	102	14.4	5	90	29	61.99	508	1	2	0.00	0.00
2014	143	174	272	212	103	14.9	21677	803	3525	106	12955	760	882	50	76	51	55	15.7	5	20	5	61.95	508	1	2	3,241.66	2,339.92	
2019	223	51	112	53	54	6.5	9011	73	1082	18	9011	38	539	3	11	10	20	1.6	10	16	0	59.59	506	1	4	2,191.10	1,345.14	
2029	236	20	52	61	53	3.9	0	226	226	0	0	0	0	0	20	52	61	53	3.9	10	58	0	55.58	508	2	4	0.00	0.00
2039	231	45	100	105	72	5.9	127	871	890	0	0	0	0	0	45	100	105	72	5.9	10	98	1	55.73	511	2	4	0.00	0.00
2049	226	75	152	141	85	7.8	2041	1410	1703	0	0	0	0	0	75	152	141	85	7.8	10	146	2	58.91	511	2	3	0.00	0.00
2059	222	116	214	179	94	9.8	6905	1667	2606	0	0	0	0	0	116	214	179	94	9.8	10	158	13	65.01	511	2	2	0.00	0.00
2069	209	152	264	205	101	11.6	12977	1639	3358	0	0	0	0	0	152	264	205	101	11.6	10	150	38	70.41	511	1	2	0.00	0.00
2079	185	176	290	216	105	13.2	18364	1513	3880	0	0	0	0	0	176	290	216	105	13.2	10	141	38	73.03	511	1	2	0.00	0.00
2089	169	199	313	227	108	14.7	23455	1411	4369	0	0	0	0	0	199	313	227	108	14.7	10	132	35	74.83	508	1	2	0.00	0.00
2099	158	220	335	239	110	16.0	28188	1350	4845	0	0	0	0	0	220	335	239	110	16.0	10	114	102	76.04	508	1	2	0.00	0.00
2109	132	218	321	225	111	17.4	30198	1127	4781	0	0	0	0	0	218	321	225	111	17.4	0	0	0	72.63	508	1	2	0.00	0.00
																						Revenue (\$/ac)	5,432.75					
																						PV	3,885.07					

### Mixed Hardwood and Pine Condition Class

Classification under previous system: H3

Old Stands: 9, 22, 32, 34, 36, 38, 101, 105, 106, 126, 128, 130, 144, 149, 150, 216, 412, 416, 418, 421, 423

New Stands: 3, 101, 103, 105, 115, 206, 402, 403

Acres = 404.2

Hardwood and Pine TPA= 153

Shrub TPA = 22

Hardwood and Pine BA/acre = 113 ft<sup>2</sup>

Shrub BA/acre = 4 ft<sup>2</sup>

QMD = 12.2 inches

% BA Pine/HW = 17/83

Hardwood and Pine % AGS/UGS = 57/43

Sawtimber (MBF/Acre) = 8.61 (2.55 pine, 6.05 hardwood)

Pulpwood (ft<sup>3</sup>/acre) = 1021 (112 pine, 873 hardwood, 36 shrub)

Average Age of Dominants = 67 years

Loblolly Pine Site Index<sub>50</sub> = 89

White Oak Site Index<sub>50</sub> = 75

Yellow Poplar Site Index<sub>50</sub> = 85

Average Height = 86 ft.

Gingrich Stocking= 105% (overstocked)

Average Live Crown Ratio = 42%

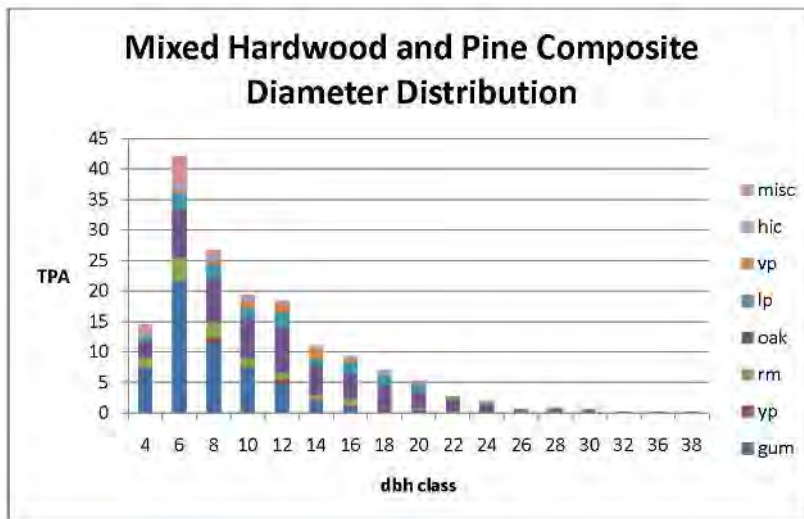


Figure 20- Composite diameter distribution for Mixed Hardwood and Pine.

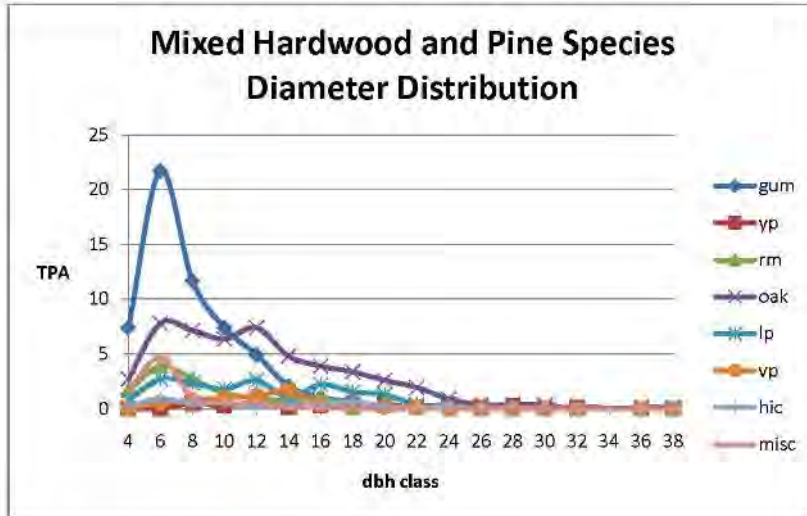


Figure 21 - Species diameter distribution for Mixed Hardwood and Pine.

**Description of Current Conditions:**

These areas are similar in diameter distribution to the mixed gum condition class, but differ in that the sawtimber class is not dominated by gum. Table 2 shows the relative dominance of the major species in this condition class. The sawtimber of this cover type is diverse but highly represented in loblolly pine and oak species. This stand also has a smaller range in diameter class.

The composite stand diameter distribution is shown in Figure 20 and plots an inverse j-shape. The diameter distributions of the major species groups are shown in Figure 21. As with the mixed gum cover type gum is dominating the younger age classes and is strongly influencing the composite diameter distribution. The other species show much flatter curves representing a relatively even distribution across diameter classes. Fortunately there is a negative slope to the oak distribution representing more trees in the smaller diameter classes which will be managed for recruitment into the overstory.

**Uneven-age management:** Under uneven-age management this stand will be managed under the same recommendations for guide curve as the Mixed Gum condition class. A marking guide may be developed for regulating the stand towards the guide distribution. As with Mixed Gum condition class, group selection should be used in predominately in combination with some single tree removals.

**Even-age management:** Even-age options for this stand include clearcutting at various rotation ages, shelterwood at various rotation ages.



Table 16 - Regeneration by species for the Mixed Hardwood and Pine condition class.

Regeneration by Species for Forest Condition Class 7 (stems/ac)										
Ht. Class	ah	bc	gum	oak	hick	lp	pers	rm	vp	Total
1	391	234	953	641	172	438	16	1281	94	4219
2	94	0	78	141	0	156	0	0	47	516
3	31	0	78	16	0	0	0	0	0	125
4	250	0	141	16	0	0	0	47	31	484
Total	766	234	1250	813	172	594	16	1328	172	5344

The regeneration in this condition class is mixed with an over abundance of red maple and gum seedlings.

**Stand Recommendations:**

Stand 3 is a consolidation of old stands 9, 22, 32, 34, and 36 located in compartment A on the western side of the installation. Stand 3 consists of three non-contiguous areas, the largest of which borders the perimeter road to the west and is composed in large part of old stand 9 which contained the forested wetland swale. This area is wet for most of the year, except for extremely dry periods; however the old delineation of stand 9 was not a delineation of the wetland only but also included more dry and operable areas. For this reason combining this area with surrounding stands of the same condition class membership was justified. There will simply be a large area within stand 3, depending on the conditions which are of limited operability. It is recommended that any sale of timber from this stand be scheduled in dry periods when damage to the soil will be minimal, or the inoperable areas may simply be "mapped out" of the sale area during the sale layout and inventory. Old stand 36 was included in this stand because of the relative ease of getting over to the main portion of the stand via the old airfield. This is conditional to the current use of the airfield, therefore if stand access via the runway area is limited this area may need to be split off into its own stand. All 5 previous stands combined to form a 173.2 acre stand 3 with an average age of 65 years and a white oak site index of 74 feet. On average this stand has 181 TPA, 131 ft<sup>2</sup> of basal area/acre, and a QMD of 12 inches. Plotted on the upland hardwood guide this stand is 110% stocking and the SDI is calculated at 47% of maximum for loblolly and mixed hardwood stand types. The quality of growing stock was observed as 58% AGS and 42% UGS. This stand is a high priority for thinning to reduce the stand density. Complicating this is the high portion of wetland that will need to be excluded from harvesting. It is recommended that a guide curve be followed to remove excess trees by age class, via group selection, in order to regulate this stand towards an uneven-age structure with a cutting cycle of 20 years.

Stand 101 is located adjacent to the perimeter road and alongside where Gambo Creek enters the installation. An SMZ will be located on the border of this stand facing the creek and a visual buffer is also recommended on the side facing the perimeter road and Rt. 301 to screen any harvesting activities.

Stand 101 retained its old stand number and configuration. This 23.3 acre stand has approximately 185 TPA, 140 ft<sup>2</sup> of basal area per acre, and a QMD of 14.5 inches. This stand has a significant amount of merchantable sawtimber, roughly 15MBF/acre. It is dominated by 77% hardwood, 15% pine, and 8% shrub by basal area. The quality of this stand is reasonably good with 82% AGS and 18% UGS. Plotted on

the upland hardwood stocking guide this stand is 118% stocking, and the SDI is calculated as 47% of maximum for mixed loblolly and hardwood types. This stand is also a high priority for a reduction in density.

Stand 103 is a combination of old stands 128 and 130 to make 15.7 acres located on the tip of the peninsula jutting out into Gambo Creek from its connection with the perimeter road via stand 101. This stand has an approximate age of dominants and co-dominants of 97 years and a sampled white oak site index of 61. On average this stand has 150 TPA, 115 ft<sup>2</sup> basal area/acre, and a QMD of 13.9 inches. Plotted on the upland hardwood guide, stocking is 95%. SDI is calculated as 39% for mixed loblolly and hardwood stands. Relative to the previously mentioned stands in this condition class this stand is of lower priority for management within the 10 year planning period. Quality was observed as 44% AGS and 56% UGS.

Stand 105 consolidated old stands 144, 149, and 150 in Compartment B. This stand makes up 47.5 acres with an average age of 63 years of dominants and co-dominants and a white oak site index of 87. This stand on average has 194 TPA, 118 ft<sup>2</sup> of basal area/acre and a QMD of 11.2 inches. This stand is 88% hardwood, 8% pine and the remaining 4% is made up of woody shrubs and understory species. Quality of growing stock was observed as 71% AGS and 29% UGS. On the hardwood stocking guide this stand is at 102% stocking, and it has an SDI of 43.5% of maximum for loblolly and mixed hardwood stands. If managed as an uneven-aged stand, some removals should be scheduled in the next 5 years. Portions of stand 105 adjacent to Gambo creek and wetland tributaries will utilize and SMZ for water quality protection.

Stand 115 consolidated stands 105, 106, and 126 to form a 30.6 acre stand part of which fronts on the perimeter road connected to the rest of the stand by cleared right of way. This stand has a sampled average age of 57 years and site index for white oak of 70 feet. Stand 115 has an average of 240 TPA yielding 96 ft<sup>2</sup> of basal area and a QMD of 9.2 inches. The majority (77%) of the stand is hardwood with a small pine (17%) and shrub (6%) component. Quality was observed as 70% AGS and 30% UGS. On the hardwood stocking guide this stand shows 88% stocking and an SDI of 38.4% of maximum for loblolly and mixed hardwood stands was calculated. This stand is of low priority for management within the next 10 years.

Stand 206, previously 216, is a 10.2 acre stand with a sampled average age of 107 years and a white oak site index of 90. This stand is composed of many large, overmature trees, averaging 120 TPA, 159 ft<sup>2</sup> basal area/acre, and a QMD of 20.9 inches. The quality of growing stock was observed to be 35% AGS and 65% UGS due to the large *wolf trees* present in the stand. This stand is located on the southwestern corner of compartment C and borders wetland leading into Machodoc Creek. The topography of this stand was rather steep compared with much of the rest of the forest, consisting of sideslopes and drainages. Stocking on the upland hardwood guide is at 120% and SDI is calculated as 46% of maximum for loblolly and hardwood mixed stands. This stand is highly constrained by proximity to water, poor quality, and steep slopes. For these reasons, harvesting is not recommended unless operable areas are to be included in sales on adjacent stands.

Stand 402 is a consolidation of old stands 416, 421, and 423 in compartment E of Pumpkin Neck. These hardwood dominated stands have an average age of 74 years, and average white oak site index of 69 feet. This stand makes up 90.2 acres with an average of 143 TPA, 110 ft<sup>2</sup> of basal area/ acre, and a QMD of 12.4 inches. Quality of growing stock was observed as 68% AGS and 32% UGS. On the hardwood stocking guide this stand is 88% stocking and its calculated SDI is 39% of maximum for loblolly and mixed hardwood stands. This stand is a low priority for management for the 10 year planning horizon.

Stand 403 combined stands 412 and 418 to form a 13.4 acre stand to the south of Churchill Rd. This stand is the youngest stand of the mixed hardwood and pine condition class at approximately 27 years of age. It has a white oak site index of 88 feet and averages 295 TPA, 104ft<sup>2</sup> of basal area per acre, and a QMD of 8 inches. This stand is approximately 61% hardwood and 39% pine. The hardwood stocking guide plots Stand 403 at 95% stocking and the calculated SDI is 43.6% of maximum for loblolly and mixed hardwood stands. Quality was observed as 58% AGS and 42% UGS. This stand is a high priority for management in the next ten years. Management at this early developmental stage to reduce stand density will take advantage of young and vigorous growing stock and maintain rapid rates of growth.

Table 17 - Growth and yield tables for stands of the Mixed Hardwood and Pine condition class stands.

Stand Rx Acreage	3 Let grow 170.93	Pulp												RPulp												Revenue			
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	Bdft	CuFt	TCuFt	Rtpa	RbDft	CuFt	RbDft	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls
2009	181	131	227	212	83	11.5	9653	1241	2750	0	0	0	0	0	131	227	212	83	11.5	10	105	8	46.42	520	1	2	0.00	0.00	
2019	174	155	258	244	87	12.8	13170	1353	3374	0	0	0	0	0	155	258	244	87	12.8	10	100	30	52.29	520	1	1	0.00	0.00	
2029	156	169	271	260	89	14.1	16247	1296	3745	0	0	0	0	0	169	271	260	89	14.1	10	96	25	54.11	520	1	1	0.00	0.00	
2039	145	185	287	278	91	15.3	19267	1301	4159	0	0	0	0	0	185	287	278	91	15.3	10	94	26	55.74	520	1	1	0.00	0.00	
2049	136	200	302	294	93	16.4	22435	1237	4516	0	0	0	0	0	200	302	294	93	16.4	10	84	24	56.81	520	1	1	0.00	0.00	
2059	129	214	315	307	94	17.4	25247	1186	4833	0	0	0	0	0	214	315	307	94	17.4	10	72	62	57.08	520	1	1	0.00	0.00	
2069	113	213	306	300	95	18.6	26404	1052	4816	0	0	0	0	0	213	306	300	95	18.6	10	68	59	53.64	520	1	1	0.00	0.00	
2079	101	213	298	293	95	19.7	27505	922	4791	0	0	0	0	0	213	298	293	95	19.7	10	63	57	50.56	520	1	1	0.00	0.00	
2089	90	212	291	285	96	20.7	28448	811	4764	0	0	0	0	0	212	291	285	96	20.7	10	54	52	47.73	520	1	1	0.00	0.00	
2099	82	211	285	277	96	21.7	29123	730	4734	0	0	0	0	0	211	285	277	96	21.7	10	51	47	45.04	520	1	1	0.00	0.00	
2109	76	210	280	270	97	22.6	29814	658	4718	0	0	0	0	0	210	280	270	97	22.6	10	48	45	42.72	520	1	1	0.00	0.00	
2119	70	210	275	263	97	23.4	30448	590	4699	0	0	0	0	0	210	275	263	97	23.4	0	0	0	40.62	520	1	1	0.00	0.00	
Stand Rx Acreage	3 170.93																												
2009	181	131	227	212	83	11.5	9653	1241	2750	0	0	0	0	0	131	227	212	83	11.5	6	100	3	46.42	520	1	2	0.00	0.00	
2015	179	146	247	233	85	12.2	11644	1337	3140	96	8650	745	835	50	90	84	73	10.5	4	58	2	50.08	520	1	2	2,016.21	1,504.52		
2019	232	56	121	93	75	6.7	3725	634	1229	0	0	0	0	56	121	93	75	6.7	10	71	1	50.37	520	1	3	0.00	0.00		
2029	228	81	161	137	81	8.1	6225	719	1680	0	0	0	0	81	161	137	81	8.1	6	70	2	52.38	520	1	3	0.00	0.00		
2035	225	94	182	160	83	8.8	7710	775	1947	72	5007	133	203	50	101	80	76	7.8	4	49	1	53.32	520	1	2	1,131.44	318.21		
2039	285	57	127	90	78	6.0	3415	647	1192	0	0	0	0	57	127	90	78	6.0	10	60	1	53.13	520	1	3	0.00	0.00		
2049	279	81	167	142	83	7.3	5359	777	1604	0	0	0	0	81	167	142	83	7.3	6	67	2	53.62	520	1	3	0.00	0.00		
2055	275	94	189	166	85	7.9	6642	876	1885	123	4051	186	219	50	101	76	80	7.8	4	50	1	54.20	520	1	2	924.69	98.01		
2059	300	56	135	85	82	5.2	3210	737	1246	0	0	0	0	56	135	85	82	5.2	10	65	1	54.04	520	1	3	0.00	0.00		
2069	382	87	190	163	84	6.5	5007	988	1752	0	0	0	0	87	190	163	84	6.5	6	71	2	54.73	520	1	2	0.00	0.00		
2075	377	103	217	193	85	7.1	6098	1187	2102	226	3638	411	427	50	101	71	80	7.8	4	52	1	55.34	520	1	2	859.48	34.34		
2079	599	57	147	81	82	4.2	3040	845	1318	0	0	0	0	57	147	81	82	4.2	10	62	2	55.21	520	1	3	0.00	0.00		
2089	578	96	222	205	85	5.5	4969	983	1744	0	0	0	0	96	222	205	85	5.5	6	72	1	55.55	520	1	2	0.00	0.00		
2095	576	116	258	250	86	6.1	6186	1143	2081	431	3673	425	433	50	100	71	81	8.0	4	55	1	56.15	520	1	2	869.02	13.08		
2099	1004	57	164	81	83	3.2	3160	773	1282	0	0	0	0	57	164	81	83	3.2	10	64	10	56.08	520	1	3	0.00	0.00		
2109	839	105	257	264	86	4.8	5009	850	1631	0	0	0	0	105	257	264	86	4.8	0	0	0	55.93	520	1	2	0.00	0.00		
																												5,800.84	1,968.17

Stand	Rx	Acresage	Year	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp	TCuFt	RTpa	RBdFt	RPulp	RTCuFt	ATBA	ATSDI	ATCCF	ATTophT	ATQMD	PrdLen	Acc	Mort	MAL	ForTyp	StredCs	StkCls	Revenue (\$/ac)	PV	
101	Uneven-age management beginning in 2016, RBA 50 sq. ft., 20 year cutting cycle, q= 1.4, maximum cbh 20 inches	23.13	2009	185	140	241	230	52	11.8	14655	588	2685	0	0	0	140	241	230	92	11.8	7	76	17	0.00	520	1	2	0.00	0.00	
			2016	178	151	254	241	93	12.5	16443	626	2951	85	13288	245	402	50	92	86	72	9.9	3	52	2	0.00	520	1	2	2,837.64	2,016.65
			2019	245	54	119	91	73	6.4	3584	425	978	0	0	0	54	119	91	73	6.4	10	61	2	0.00	520	1	3	0.00	0.00	
			2029	239	76	156	136	79	7.7	5630	556	1383	0	0	0	76	156	136	79	7.7	7	63	2	0.00	520	1	3	0.00	0.00	
			2036	235	91	179	162	81	8.4	7265	608	1659	86	4665	146	200	50	101	90	72	7.8	3	41	1	0.00	520	1	2	1,006.83	269.68
			2039	316	54	125	97	73	5.6	3091	465	935	0	0	0	54	125	97	73	5.6	10	58	1	0.00	520	1	3	0.00	0.00	
			2049	308	78	166	155	78	6.8	5065	572	1317	0	0	0	78	166	155	78	6.8	7	64	2	0.00	520	1	3	0.00	0.00	
			2056	303	94	192	185	81	7.5	6410	689	1619	153	3846	204	229	50	101	82	76	7.8	3	45	1	0.00	520	1	2	844.75	85.28
			2059	452	55	135	86	77	4.7	2908	530	976	0	0	0	55	135	89	77	4.7	10	58	1	0.00	520	1	3	0.00	0.00	
			2069	440	86	193	189	81	6.0	4594	706	1380	0	0	0	86	193	189	81	6.0	7	65	2	0.00	520	1	3	0.00	0.00	
			2076	432	103	223	231	83	6.6	5885	847	1693	267	3536	317	330	50	103	86	77	7.5	3	45	1	0.00	520	1	2	799.47	30.42
			2079	603	55	147	94	78	3.8	2745	562	972	0	0	0	55	147	94	78	3.8	10	63	3	0.00	520	1	3	0.00	0.00	
			2089	657	97	229	252	83	5.2	5056	639	1366	0	0	0	97	229	252	83	5.2	7	66	0	0.00	520	1	2	0.00	0.00	
			2096	654	118	270	318	85	5.8	6441	762	1685	471	4104	306	315	50	105	90	79	7.1	3	41	1	0.00	520	1	2	917.04	13.15
			2099	1120	55	161	98	80	3.0	2629	502	913	0	0	0	55	161	98	80	3.0	10	56	7	0.00	520	1	3	0.00	0.00	
			2109	941	105	263	333	82	4.5	4346	592	1237	712	2109	98	101	50	110	93	79	6.3	10	49	1	0.00	520	1	2	460.83	3.50
6,866.56																														2,418.68
101	Let grow	23.13	2009	185	140	241	230	52	11.8	14655	588	2685	0	0	0	140	241	230	92	11.8	10	80	17	0.00	520	1	2	0.00	0.00	
			2019	175	157	260	246	93	12.8	17220	680	3098	0	0	0	157	260	246	93	12.8	10	77	25	0.00	520	1	2	0.00	0.00	
			2029	164	169	273	255	93	13.8	19235	804	3457	0	0	0	169	273	255	93	13.8	10	72	29	0.00	520	1	1	0.00	0.00	
			2039	153	179	282	260	93	14.6	21067	863	3735	0	0	0	179	282	260	93	14.6	10	68	24	0.00	520	1	1	0.00	0.00	
			2049	146	189	292	267	94	15.4	23065	897	4019	0	0	0	189	292	267	94	15.4	10	69	23	0.00	520	1	1	0.00	0.00	
			2059	139	200	303	273	94	16.2	25104	938	4308	0	0	0	200	303	273	94	16.2	10	64	22	0.00	520	1	1	0.00	0.00	
			2069	134	209	312	277	95	16.9	27069	965	4572	0	0	0	209	312	277	95	16.9	10	64	43	0.00	520	1	1	0.00	0.00	
			2079	125	212	311	272	95	17.6	28273	955	4693	0	0	0	212	311	272	95	17.6	10	58	51	0.00	520	1	1	0.00	0.00	
			2089	115	211	305	263	96	18.3	28922	937	4730	0	0	0	211	305	263	96	18.3	10	53	47	0.00	520	1	1	0.00	0.00	
			2099	107	211	300	253	96	19.0	29477	929	4764	0	0	0	211	300	253	96	19.0	10	47	42	0.00	520	1	1	0.00	0.00	
			2109	101	210	295	245	97	19.5	29874	932	4795	0	0	0	210	295	245	97	19.5	10	45	39	0.00	520	1	1	0.00	0.00	
			2119	95	209	291	238	97	20.1	30510	894	4820	0	0	0	209	291	238	97	20.1	0	0	0	0.00	520	1	1	0.00	0.00	

Stand	Rx	Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	Pulp	CuFt	TcuFt	Rtpa	RbDft	RPulp	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	ATProlen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls	Revenue	PV		
103	Uneven-age management beginning in 2016, RBA 50 sq. ft., 20-year cutting cycle, q=1.4, maximum dbh 20 inches	16.56	2009	150	115	198	163	82	11.9	8224	860	2097	0	0	0	0	0	115	198	163	82	11.9	10	66	5	29.89	503	1	2	0.00	0.00		
			2016	148	128	214	177	84	12.6	9597	864	2292	62	7269	284	401	0	50	91	77	69	10.3	3	42	2	31.63	503	1	2	2,012.67	1,430.37		
			2019	179	54	111	81	70	7.4	2625	625	1032	0	0	0	0	0	54	111	81	70	7.4	10	47	1	31.84	503	1	3	0.00	0.00		
			2029	175	70	136	103	73	8.5	3893	753	1333	0	0	0	0	0	70	136	103	73	8.5	7	50	2	32.91	503	1	3	0.00	0.00		
			2086	173	82	154	120	75	9.3	4885	834	1545	56	2721	120	168	0	54	116	82	72	8.9	3	37	1	33.70	503	1	3	754.92	202.21		
			2089	226	54	116	82	72	6.6	2488	726	1106	0	0	0	0	0	54	116	82	72	6.6	10	42	1	33.75	503	1	3	0.00	0.00		
			2049	221	69	141	102	75	7.6	3654	804	1349	0	0	0	0	0	69	141	102	75	7.6	7	50	1	34.20	503	1	3	0.00	0.00		
			2056	218	82	161	121	76	8.3	4652	863	1549	78	2695	89	124	0	50	100	78	74	8.1	3	40	1	34.85	503	1	3	744.47	75.15		
			2059	292	54	123	83	75	5.8	2219	822	1164	0	0	0	0	0	54	123	83	75	5.8	10	46	1	34.92	503	1	3	0.00	0.00		
			2069	286	72	154	111	78	6.8	3256	1020	1509	0	0	0	0	0	72	154	111	78	6.8	7	53	1	35.53	503	1	3	0.00	0.00		
			2076	282	87	179	134	78	7.5	3983	1242	1830	144	2246	361	376	0	50	99	78	76	8.1	3	42	1	36.18	503	1	2	651.26	24.78		
			2079	424	54	133	84	76	4.9	2039	932	1246	0	0	0	0	0	54	133	84	76	4.9	10	51	1	36.26	503	1	3	0.00	0.00		
			2089	416	77	174	121	79	5.8	3370	1082	1584	0	0	0	0	0	77	174	121	79	5.8	7	56	1	37.02	503	1	3	0.00	0.00		
			2096	410	95	206	154	80	6.5	4436	1176	1827	285	2385	426	434	0	50	97	78	77	8.6	3	44	1	37.65	503	1	2	696.21	9.98		
			2099	692	55	147	84	77	3.8	2403	779	1144	0	0	0	0	0	55	147	84	77	3.8	10	54	1	37.72	503	1	3	0.00	0.00		
			2109	678	82	202	131	80	4.7	3919	913	1485	425	1732	255	259	0	50	112	80	77	6.0	10	49	1	38.47	503	1	3	489.95	3.80		
			2119	1088	71	199	116	79	3.4	3504	773	1296	0	0	0	0	0	71	199	116	79	3.4	0	0	0	35.78	503	1	3	0.00	0.00		
103	Let grow	16.56																														5,359.48	1,746.29

Stand	Rx	Year	Tpa	BA	SDI	CCF	TopHt	QMD	Bdft	Pulp	CuFt	TcuFt	Rtpa	Rbdft	CuFt	RPulp	RtcuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCds	StkCds	Revenue	PV		
105	Uneven-age management beginning in 2016, RBA 50 sq. ft., 20 year cutting cycle, q= 1.4, maximum cbh 20 inches	50.57																															
2009		194	118	211	176	79	10.6	6819	1447	2504	0	0	0	0	0	0	0	118	211	176	79	10.6	7	123	4	70.66	520	1	2	0.00	0.00		
2016		191	137	237	197	85	11.5	9536	1634	3107	110	6419	1042	1100	50	89	79	77	10.7	3	64	2	77.73	520	1	2	1,483.72	1,054.45					
2019		290	55	124	85	79	5.9	3667	655	1236	0	0	0	0	55	124	85	79	5.9	10	75	1	76.82	520	1	3	0.00	0.00					
2029		285	84	174	136	88	7.4	6333	749	1733	0	0	0	0	84	174	136	88	7.4	7	85	1	76.34	520	1	3	0.00	0.00					
2036		281	103	204	166	93	8.2	8559	797	2114	145	5527	170	208	50	99	86	86	8.2	3	64	1	77.12	520	1	2	1,186.98	317.93					
2039		421	55	134	94	88	4.9	3614	675	1258	0	0	0	0	55	134	94	88	4.9	10	75	1	76.51	520	1	3	0.00	0.00					
2049		415	92	202	160	95	6.4	6106	831	1789	0	0	0	0	92	202	160	95	6.4	7	87	1	76.22	520	1	2	0.00	0.00					
2056		410	113	238	192	99	7.1	7960	1031	2257	283	5079	330	348	50	98	79	87	8.5	3	60	1	76.99	520	1	2	1,112.35	112.29					
2059		689	55	148	86	88	3.8	3409	757	1308	0	0	0	0	55	148	86	88	3.8	10	76	3	76.40	520	1	3	0.00	0.00					
2069		632	103	240	182	93	5.5	5377	1088	1920	0	0	0	0	103	240	182	93	5.5	7	91	0	76.02	520	1	2	0.00	0.00					
2076		628	130	289	226	97	6.2	7042	1388	2459	480	4243	629	638	50	101	82	90	7.9	3	61	1	76.95	520	1	2	973.26	37.03					
2079		1107	55	163	90	91	3.0	3366	807	1343	0	0	0	0	55	163	90	91	3.0	10	76	9	76.50	520	1	3	0.00	0.00					
2089		860	118	283	227	96	5.0	5572	976	1836	0	0	0	0	118	283	227	96	5.0	7	99	1	75.71	520	1	2	0.00	0.00					
2096		850	148	340	283	99	5.7	7288	1326	2434	706	4417	610	617	50	100	82	90	8.0	3	64	1	76.95	520	1	2	1,007.57	14.45					
2099		1555	56	175	92	91	2.6	3426	776	1327	0	0	0	0	56	175	92	91	2.6	10	74	18	76.63	520	1	3	0.00	0.00					
2109		910	119	289	255	95	4.9	5548	846	1707	749	2669	179	182	50	102	81	89	7.5	10	68	1	75.20	520	1	2	585.12	4.45					
6,349.00																																	
1,540.60																																	
Stand	105																																
Rx	Let grow																																
Acreage	50.57																																

Stand Rx Acreage	Year	Pulp										RPulp										Revenue									
		Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TcuFt	RtPa	RbFt	CuFt	RbFt	CuFt	RtCuFt	ATBA	ATSDI	ATCCF	ATTophHt	ATQMD	PrdLen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls	(\$/ac)	PV	
115 Let grow 30.52	2009	240	96	187	164	76	8.6	4588	919	1554	0	0	0	0	0	96	187	164	76	8.6	10	101	2	41.48	508	2	2	0.00	0.00		
	2019	235	128	235	202	80	10.0	6568	1365	2266	0	0	0	0	0	128	235	202	80	10.0	10	104	11	50.45	508	1	2	0.00	0.00		
	2029	218	154	268	229	84	11.4	8926	1574	2803	0	0	0	0	0	154	268	229	84	11.4	10	104	25	56.18	508	1	2	0.00	0.00		
	2039	193	173	287	245	86	12.8	11506	1549	3132	0	0	0	0	0	173	287	245	86	12.8	10	96	20	58.88	508	1	1	0.00	0.00		
	2049	179	191	307	262	89	14.0	14090	1479	3419	0	0	0	0	0	191	307	262	89	14.0	10	91	21	60.66	508	1	1	0.00	0.00		
	2059	168	208	324	277	90	15.1	16654	1374	3661	0	0	0	0	0	208	324	277	90	15.1	10	81	41	61.61	508	1	1	0.00	0.00		
	2069	151	215	326	278	91	16.2	18650	1160	3711	0	0	0	0	0	215	326	278	91	16.2	10	72	59	59.78	508	1	1	0.00	0.00		
	2079	131	214	315	270	92	17.3	19757	1004	3664	0	0	0	0	0	214	315	270	92	17.3	10	65	55	56.01	508	1	1	0.00	0.00		
	2089	115	213	307	262	92	18.4	20729	875	3630	0	0	0	0	0	213	307	262	92	18.4	10	57	50	52.63	508	1	1	0.00	0.00		
	2099	104	212	299	256	92	19.3	21407	800	3613	0	0	0	0	0	212	299	256	92	19.3	10	52	46	49.44	508	1	1	0.00	0.00		
	2109	95	211	293	250	92	20.2	22047	724	3592	0	0	0	0	0	211	293	250	92	20.2	10	45	41	46.63	508	1	1	0.00	0.00		
2119	87	210	287	245	93	21.0	22473	695	3591	0	0	0	0	0	210	287	245	93	21.0	0	0	0	0	44.03	508	1	1	0.00	0.00		
Stand Rx Acreage:	206	Uneven-age management beginning in 2015, RBA 50 sq. ft., 20 year cutting cycle, q=1.4, maximum dbh 20 inches 10.13																													
206	2009	120	159	244	172	92	15.6	9752	1764	2992	0	0	0	0	0	159	244	172	92	15.6	6	96	16	39.13	503	1	2	0.00	0.00		
	2015	117	165	251	176	97	16.1	10744	1798	3154	24	9217	242	626	50	92	92	87	70	9.9	4	59	3	40.96	503	1	2	4,377.84	3,266.81		
	2019	133	55	107	93	75	8.7	1884	1696	1967	0	0	0	0	0	55	107	93	75	8.7	10	76	1	41.41	520	1	3	0.00	0.00		
	2029	130	76	138	122	86	10.4	2911	2595	3003	8	1862	136	369	50	97	92	92	77	8.7	10	71	1	43.66	520	1	3	888.18	334.75		
	2039	136	68	127	111	90	9.6	2036	3154	3451	0	0	0	0	0	68	127	111	90	9.6	10	81	2	45.32	520	1	3	0.00	0.00		
	2049	133	88	155	134	100	11.0	3292	3721	4189	37	2020	1073	1127	50	92	85	91	98	10	9.8	10	61	2	47.30	520	1	3	1,001.67	142.28	
	2059	167	64	126	100	99	8.4	2289	2822	3165	0	0	0	0	0	64	126	100	99	8.4	10	84	2	47.96	520	1	3	0.00	0.00		
	2069	164	88	162	131	106	9.9	3663	3347	3874	33	2152	997	1063	50	98	79	94	84	10	6.2	10	62	1	49.77	503	1	3	1,060.83	56.79	
	2079	193	66	133	100	101	7.9	2509	2743	3107	0	0	0	0	0	66	133	100	101	7.9	10	92	2	50.32	503	1	3	0.00	0.00		
	2089	189	92	173	137	107	9.5	4032	3245	3817	53	2673	1156	1206	50	99	87	93	93	8.2	10	72	2	52.23	503	1	3	1,314.19	26.52		
	2099	235	68	142	110	102	7.3	2446	2678	3053	0	0	0	0	0	68	142	110	102	7.3	10	98	2	53.03	503	1	3	0.00	0.00		
2109	230	99	191	157	108	8.9	3930	3426	4008	0	0	0	0	0	99	191	157	108	8.9	0	0	0	0	54.93	503	1	2	0.00	0.00		
		8,642.71 3,827.15																													



Stand Rx Acreage	206 Let grow 10.13	Pulp															RPulp					Revenue												
		Year	Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TcuFt	Rtpa	RbdFt	CuFt	RbDfT	CuFt	RbDfT	CuFt	RbDfT	ATCCF	ATSDI	ATCCF	ATTopHt	ATQMD	PrDlen	Acc	Mort	MAI	ForTyp	SizeCls	StkCls	Revenue (\$/ac)	PV	
		2009	120	159	244	172	92	15.6	9752	1764	2992	0	0	0	0	0	159	244	172	92	15.6	10	101	15	39.13	503	1	2	0.00	0.00				
		2019	115	170	256	180	101	16.4	11493	1856	3317	0	0	0	0	170	256	180	101	16.4	10	91	22	42.46	503	1	2	0.00	0.00					
		2029	110	179	264	186	107	17.2	12859	2131	3748	0	0	0	0	179	264	186	107	17.2	10	80	27	44.22	503	1	2	0.00	0.00					
		2039	105	185	269	188	112	18.0	13983	2270	4019	0	0	0	0	185	269	188	112	18.0	10	74	23	44.72	503	1	1	0.00	0.00					
		2049	101	192	275	193	115	18.6	15103	2406	4283	0	0	0	0	192	275	193	115	18.6	10	70	23	45.11	503	1	1	0.00	0.00					
		2059	98	199	281	197	119	19.3	16153	2501	4497	0	0	0	0	199	281	197	119	19.3	10	56	47	45.19	503	1	1	0.00	0.00					
		2069	92	198	276	192	120	19.9	16403	2584	4599	0	0	0	0	198	276	192	120	19.9	10	48	40	43.28	503	1	1	0.00	0.00					
		2079	87	197	273	189	120	20.3	16546	2671	4702	0	0	0	0	197	273	189	120	20.3	10	49	39	41.51	503	1	1	0.00	0.00					
		2089	83	197	271	186	121	20.8	16967	2675	4734	0	0	0	0	197	271	186	121	20.8	10	41	37	40.01	503	1	1	0.00	0.00					
		2099	80	196	267	182	121	21.2	17137	2675	4745	0	0	0	0	196	267	182	121	21.2	10	38	29	38.36	503	1	1	0.00	0.00					
		2109	77	197	266	181	122	21.6	17407	2648	4746	0	0	0	0	197	266	181	122	21.6	10	35	35	37.10	503	1	1	0.00	0.00					
		2119	74	196	263	178	122	22.0	17452	2614	4713	0	0	0	0	196	263	178	122	22.0	0	0	0	35.51	503	1	1	0.00	0.00					
Stand Rx Acreage:	402 Let grow 87.17																																	

Stand R# Acreage	Year	Pulp										RPulp										Revenue													
		Tpa	BA	SDI	CCF	TopHt	QMD	BdFt	CuFt	TCuFt	Rtpa	RbDft	CuFt	RbDft	CuFt	RTCuFt	ATBA	ATSDI	ATCCF	ATTopHt	ATQMD	PrDlen	Acc	Mort	MAI	ForTyp	SizeCds	StkCds	Revenue (\$/ac)	PV					
403 Let grow 14.67	2009	295	104	207	206	71	8.0	3119	1284	1814	0	0	0	0	0	104	207	206	206	71	8.0	10	183	2	89.29	406	2	2	0.00	0.00					
	2019	291	150	278	275	84	9.7	7554	1878	3129	0	0	0	0	0	150	278	275	275	84	9.7	10	193	30	116.44	406	1	1	0.00	0.00					
	2029	254	180	314	316	95	11.4	12948	2066	4157	0	0	0	0	0	180	314	316	316	95	11.4	10	190	42	127.07	406	1	1	0.00	0.00					
	2039	223	206	340	347	102	13.0	18569	2092	5024	0	0	0	0	0	206	340	347	347	102	13.0	10	184	36	131.00	406	1	1	0.00	0.00					
	2049	205	232	368	380	107	14.4	25004	1946	5814	0	0	0	0	0	232	368	380	380	107	14.4	10	151	53	133.66	406	1	1	0.00	0.00					
	2059	171	235	359	379	111	15.9	28865	1638	6012	0	0	0	0	0	235	359	379	379	111	15.9	10	130	104	123.47	406	1	1	0.00	0.00					
	2069	141	233	344	370	114	17.4	31803	1248	5989	0	0	0	0	0	233	344	370	370	114	17.4	10	111	95	111.90	406	1	1	0.00	0.00					
	2079	120	232	331	360	115	18.8	34179	975	5963	0	0	0	0	0	232	331	360	360	115	18.8	10	100	86	101.79	406	1	1	0.00	0.00					
	2089	104	231	321	351	116	20.1	36107	768	5948	0	0	0	0	0	231	321	351	351	116	20.1	10	84	78	93.29	406	1	1	0.00	0.00					
	2099	93	229	311	340	117	21.3	37473	628	5919	0	0	0	0	0	229	311	340	340	117	21.3	10	81	72	85.62	406	1	1	0.00	0.00					
	2109	83	229	305	331	118	22.5	38878	532	5929	0	0	0	0	0	229	305	331	331	118	22.5	10	72	69	79.46	406	1	1	0.00	0.00					
Stand R# Acreage	403 14.67																															Revenue (\$/ac)	7,028.59	PV	1,231.62
403 Uneven-age management beginning in 2019, RBA 50 sq. ft., 20 year cutting cycle, q=1.4, maximum cbh 20 inches 14.67	2009	295	104	207	206	71	8.0	3119	1284	1814	0	0	0	0	0	104	207	206	206	71	8.0	4	160	2	89.29	406	2	2	0.00	0.00					
	2013	293	120	233	232	76	8.7	4645	1482	2267	0	0	0	0	0	120	233	232	232	76	8.7	6	180	4	99.04	406	2	2	0.00	0.00					
	2019	288	146	272	269	84	9.6	7133	1859	3047	211	3763	1379	1397	50	89	98	98	98	79	10.9	10	103	1	112.68	406	1	1	1,040.12	638.54					
	2029	400	75	170	139	80	5.9	6891	588	1663	0	0	0	0	0	75	170	139	139	89	5.9	10	117	5	110.02	406	1	3	0.00	0.00					
	2039	380	121	246	231	98	7.6	10968	683	2355	234	7707	184	217	50	101	99	99	99	87	7.9	10	84	1	110.46	406	1	2	1,737.46	402.01					
	2049	584	73	180	139	95	4.8	6080	608	1551	0	0	0	0	0	73	180	139	139	95	4.8	10	108	10	106.19	520	1	3	0.00	0.00					
	2059	508	122	263	225	101	6.6	9730	703	2164	344	6387	281	259	50	103	93	93	93	83	7.5	10	85	1	105.16	520	1	2	1,459.11	127.24					
	2069	834	76	198	132	91	4.1	5975	634	1533	0	0	0	0	0	76	198	132	132	91	4.1	10	107	17	102.67	520	1	3	0.00	0.00					
	2079	633	130	289	224	96	6.1	9046	826	2136	492	6259	263	276	50	100	91	91	91	82	8.1	10	89	1	101.28	520	1	2	1,427.88	46.93					
	2089	1120	76	210	127	90	3.5	5587	779	1588	0	0	0	0	0	76	210	127	127	90	3.5	10	103	27	100.04	520	1	3	0.00	0.00					
	2099	739	134	306	226	96	5.8	8878	762	2023	583	5981	247	258	50	102	92	92	92	85	7.7	10	85	1	97.98	520	1	2	1,364.03	16.90					
2109	1318	75	215	130	93	3.2	5519	720	1542	0	0	0	0	0	75	215	130	130	93	3.2	0	0	0	83.64	520	1	3	0.00	0.00						
Stand R# Acreage	403 14.67																															Revenue (\$/ac)	7,028.59	PV	1,231.62

### Non-Merchantable Condition Class

**Classification under previous system:** Class 1

**Old Stands:** 2, 4, 11, 12, 16, 18, 21, 23, 38, 48, 110, 147, 155, 157, 210, 212

**New Stands:** 2, 10, 11, 13, 15, 17, 20, 107, 110, 119, 205

**Acres =** 202.5

This condition class is similar to the Class 1 designation in the 1997 forest classification system. These stands were not sampled, however many of the existing non-merchantable stands were surveyed qualitatively. Additional acreage has been added to the NSFDL forest in the non-merchantable forest condition class and these stands have been digitized and added to the forest stands layer in the GIS database.

Stands 2, 11, 17 are loblolly pine dominated stands with estimated densities to be 1000-2000 TPA, making them a high priority for precommercial thinning.

Stand 10 is best characterized as old field succession. This stand is highly variable in age and structure. TSI treatments which seek to maximize the wildlife benefit, species composition, and stand increment are recommended.

Stand 14 was previously stand 24 and is a two-aged stand resulting from a partial harvest. The overstory consists of oak and loblolly pine residuals and the understory is dominated by loblolly pine with an average dbh of 6 inches. This stand could be managed as a two age stand.

Stand 15 was previously labeled stand 23 and is composed of young hardwoods and loblolly pine. The hardwood component consists of sweet gum, red maple, willow oak, southern red oak, locust, and bigtooth aspen. Some mature loblolly pine exists along the border of stand 15 and stand 14. The average dbh of trees in stand 15 is 5 inches. In pine dominated patches there are approximately 700-1000 TPA. Common to recently disturbed areas, *ailanthus altissima* (tree of heaven), is present in this stand. This stand should undergo a precommercial timber stand improvement thinning to improve stand density and species composition.

Stands 20-26 are new stands that were delineated from the 2008 aerial photographs. There was no on-the-ground measurement of these stands. It is recommended that in the next inventory that these stands be sampled. Currently these stands are likely candidates for pre-commercial thinning or TSI work.

Stand 107 is dominated by pre-commercial sized loblolly pine. This stand would benefit as well from a pre-commercial thinning.

Stand 110 is a seed tree harvest which still has the residual seed crop intact. Herbicide treatment to control the hardwood competition and release the pine regeneration is a common practice in young regenerating pine stands such as this.

Stand 119 is a stand that suffered a good amount of wind damage and has a very open canopy due to the blow down. Much regeneration is coming up in the gaps. TSI would benefit this stand in areas where the new age class is overstocked. Other areas of this stand can continue to grow until stocking levels increase. Located beside a small pond, this stand is providing a diverse habitat for wildlife.

Stand 205 is a hardwood dominated stand in compartment C. TSI is recommended to improve growth rates and species composition.

Precommercial thinning in loblolly dominated stands should reduce the stocking to 400-500 trees per acre, giving preference to trees with good form, size, and vigor for crop trees. Treatments in the mixed hardwood and pine stands should focus more on improving species composition and overall stand quality. Hardwood dominated stands should undergo lighter intensity release focusing more on releasing the crowns of preferred crop trees. This entails cutting trees around crop trees to release the crown of the crop tree on all sides from neighboring competition. This is recommended for stand 205.

Suggested Schedule of Activities

Table 16- 10 year schedule of management activities.

Stand/Rx	10 Year Schedule of Activities (R = remove residuals, P = plant)						
	Rx 2 Shelterwood	Rx 3 Selection Cut	Rx 4 Seed Tree	Rx 5 Clearcut/plant	Rx 6 Thin Above	Rx 7 Thin Below	
2011	5, 106	1, 404	202	8, 20, 117		109, 114, 203, 14	
2012	120		113	8P, 20P, 117P, 118			
2013				118P			
2014	19		116, 201, 113R, 202R				
2015	106R, 5R, 405	3, 6, 16, 206	401		4, 108	18, 204	
2016		101, 102, 103, 104, 105					
2017	120R						
2018		111				122, 112	
2019	19R, 405R	403	401R, 201R, 116R				
2020							
2021							

## Appendix

### Key to Acronyms

**AGS** – Acceptable growing stock

**ACOE** – Army Corps of Engineers

**BA** – Basal area

**BMPs** – Best Management Practices

**ESQD** - explosive safety quantity distance

**FREC** – Forest Resources and Environmental Conservation

**GIS** – Geographic Information System. ArcGIS 9.3.1 (ESRI, 2009) software was used for GIS applications

**LCR** – Live Crown Ratio

**NAD83** – North American Datum 83

**NSFDL** – Naval Support Facility Dahlgren

**QMD** – Quadratic Mean Diameter

**RH** – Relative humidity

**RBA** – Residual basal area

**SPSS** – Statistical Package for the Social Sciences

**SMZ** – Streamside Management Zone

**TSI** – Timber Stand Improvement

**UGS** – Unacceptable growing stock

**UXO** – Unexploded Ordnance

### Glossary of Terms

**Acceptable Growing Stock** – trees that can make a salable log or bolt and are valuable in the stand for their potential growth.

**Advance Regeneration** – younger trees belonging to a new age class that have established under an existing canopy.

**Basal Area (BA)** - the sum of the cross-sectional areas of all stems in a stand measured at breast height and is a good estimate of stand density.

**Bolt** – 8 foot section of a tree which qualifies as pulpwood.

**Bole** - main stem, or trunk, of the tree.

**Bucking** – from a forest operations standpoint, bucking means cutting logs to meet product length specifications, usually occurs at the landing.

**Clinometer** – tool used to measure heights and angles, used to measure the height of a tree.

**Coarse Woody Debris (CWD)** – dead woody material lying on the forest floor.

**Cohort** – class of trees that originated from the same disturbance event.

**Condition Class** – a classification of stands based on a k-means cluster analysis which used the variables of relative basal area and product classification.

**Cord** – unit of wood volume equal to 128 ft<sup>3</sup> or a 4'x4'x 8' stack of wood, bark, and air.

**Crown Competition Factor** – The southern variant of FVS uses crown competition factor (*CCF*) as a predictor variable in some growth relationships. Crown competition factor is a relative measurement of stand density that is based on tree diameters. Individual tree *CCF<sub>i</sub>* values estimate the percentage of an acre that would be covered by the tree's crown if the tree were open-grown. Stand *CCF* is the summation of individual tree (*CCF<sub>i</sub>*) values. A stand *CCF* value of 100 theoretically indicates that tree crowns will just touch in an unthinned, evenly spaced stand (FVS Southern Variant Overview, 2009).

**Crown Position - Dominant** - Dominant stems receive full sunlight, the tops of which are located above the main canopy. **Co-dominant** - Co-dominant stems receive sunlight on upper branches and some lower branches, but are located in the main canopy. **Intermediate** - Intermediate trees receive some sunlight on the upper branches; they are just below the canopy line. **Suppressed** – Suppressed means a stem receives no sunlight; it is below intermediate trees.

**Cut-to-length harvesting** – harvesting system that where a significant portion of the delimiting and bucking occurs out in the woods at the site where the tree was felled.

**Dbh** – diameter at breast height (4.5 feet from the ground).

**Dendrochronology** – the science of using growth rings from a tree to determine tree ages and historical events

**Density management diagram** – diagram developed to chart the stocking of a stand based on SDI, trees per acre, and quadratic mean diameter.

**Diameter distribution** – a histogram showing the frequency of observations, typically in trees per acre, by diameter class (1 or 2 inch classes, or ranges of diameters are common).

**Diameter limit harvest** – harvest where a specific dbh is set as the limit, above or below which trees are harvested. Can be a legitimate guide for thinning from above or below, but is more often a poor harvest practice that seeks to most economically harvest the value from the stand while leaving some trees behind for aesthetics.

**High-grade** – a poor management practice which removes the best trees and leaves the small intermediate and suppressed crown classes.

**Increment** – growth of a tree or stand, as in the increase in diameter, volume, or height.

**Ingrowth**- trees which have gained membership into inventory by growing into the measurable size class (4.5 inches) since the last measurement period.

**K-means cluster analysis** – a statistical method of clustering observations around a common mean. In this plan stands were clustered using this technique to create common condition classes.

**Landing** – AKA log deck, site where the logs are loaded onto the truck to be hauled away.

**Line Intersect Method** – method for measuring CWD.

**Live Crown Ratio** – the length of live foliage divided by the total length of the tree.

**Log** – wood product classification which meets the size specifications for sawing boards.

**Mean annual increment (MAI)** – a measurement of total growth (volume, diameter, value) divided by the total number of years of growth.

**Mortality** – the death of a tree and associated removal of its volume from the inventory.

**Pre-commercial Thinning** – a silvicultural treatment which applies to overly dense stands with trees too small to generate revenue from the harvest, employed to improve the growth of the residual trees.

**Pulpwood** – timber product class for trees that are either too small or have defect keeping them from making sawtimber and instead chipped and used in paper making, energy feedstock, or oriented strand board (OSB).

**QMD** – quadratic mean diameter, (aka quadratic stand diameter) the diameter of the tree of average basal area.

**Residual Basal Area** – the amount of BA left after a harvest.

**Rotation** – time span from regeneration harvest to regeneration harvest.

**Sawtimber** – timber product class for trees that are large enough to be sawn into boards.

**Silviculture** – the art and science of managing forests to meet the objectives of the landowner.

**Site Index (SI)** – a numerical index of the productivity of a site based on the height in feet of the dominant and co-dominant trees at the base age, typically 25 or 50 years.

**Stand density index (SDI)** – index of stocking, or stand density, which can account for variations in BA due to different species and tree sizes in mixed-species or hardwood stands and construct density estimates across a wide range of conditions in softwood stands.

**Stocking** – term used somewhat interchangeably with density, however stocking takes into account the goals of the stand and the size of the trees.



**Streamside Management Zone** – buffer zone a minimum of 50 feet wide on either side of a stream employed for benefits of stream bank stabilization, water temperature regulation, pollutant buffering, and wildlife habitat.

**Stumpage**- the value of a tree on the stump. This is the price that the timber owner is paid and is typically the delivered price minus the logging costs.

**Thinning from above** – aka **high thinning** - removing large dominant and co-dominant trees in order to release a suppressed cohort underneath.

**Thinning from below** – aka **low thinning** - removing suppressed, intermediate, and some co-dominant trees (depending on the intensity) to allocate more resources to the healthiest and most vigorous trees in the overstory.

**Timber Stand Improvement (TSI)** – describes any treatment which is performed to benefit the stand spacing or composition but typically refers to young, precommercial stands dominated by hardwoods.

**Topwood** – pulpwood located above sawtimber, often made up of the limbs and branches in the crown of the tree.

**Unexploded Ordnance** – undetonated hazardous materials often left behind in the forest which may endanger those who work around it.

**Whole-tree harvesting** – harvesting system which skids the entire tree to the landing where it is then delimbed and bucked.

**Wolf Tree** – a large tree with a wide crown extending low on the bole of the tree indicating that it was grown in an open canopy with full sunlight before the surrounding trees were established.

Table 19 - Key to tree and shrub species codes for VI inventory and FVS data.

<b>Woody Tree and Shrub Species Abbreviation Key</b>		
<i>VT Code</i>	<i>FVS Code</i>	<i>Common Name</i>
AA	OT	tree of heaven
AB	AB	american beech
AH	AH	american hornbeam
BC	BC	black cherry
BG	BG	black gum
BK	BK	black locust
BNHI	HI	bitternut hickory
BO	BO	black oak
BT	BT	bigtooth aspen
CO	CO	chestnut oak
DW	DW	dogwood
EL	EL	elm
HI	HI	hickory
HY	HY	american holly
JU	JU	eastern red cedar
LP	LP	loblolly pine
MHI	HI	mockernut hickory
PHI	HI	pignut hickory
PO	PO	post oak
PS	PS	persimmon
RBIR	BB	river birch
RD	RD	redbud
RM	RM	red maple
RO	RO	red oak
SC	SC	sweet cherry
SK	SK	southern red oak
SO	SO	scarlet oak
SP	SP	shortleaf pine
SS	SS	sassafras
SU	SU	sweet gum
SY	SY	sycamore
VP	VP	virginia pine
WLO	WK	willow oak
WN	WN	black walnut
WO	WO	white oak
WP	WP	white pine
YP	YP	yellow poplar

Table 20 – Key to forest type codes for FVS summary output.

Type Code	Forest Type
103	Eastern White pine
161	Loblolly pine
163	Virginia pine
405	Virginia pine-southern red oak
406	Loblolly pine-hardwood
502	Chestnut oak
503	White oak-red oak-hickory
504	White oak
506	Yellow Poplar-white oak-red oak
508	Sweetgum-yellow poplar
511	Yellow poplar
519	Red maple-oak
520	Mixed upland hardwoods
997	FVS other hardwoods
999	Nonstocked

Table 21 – CWD estimates by forest condition class in Cubic Feet/Acre.

<i>All Values in Cuft/Ac</i>		Species			Size			Decay			
Cond. Class	Total CWD	H	P	Null	1-3 inches	<1 inch	>3 inches	Class 1	Class 2	Class 3	Class 4
1	248.4	19.7	155.7	73.0	52.5	8.5	187.5	4.0	70.2	66.2	108.1
2	140.7	37.7	55.2	47.8	13.7	6.5	120.5	48.9	10.8	22.7	58.4
4	171.5	24.1	44.4	103.0	61.0	12.2	98.3	11.3	29.8	30.9	99.5
5	231.9	62.2	125.0	44.7	26.9	7.6	197.4	10.3	58.9	70.6	92.2
6	281.0	18.1	24.6	238.3	43.9	7.1	230.1	26.8	26.3	98.7	129.3
7	375.8	99.7	164.0	112.1	34.9	6.5	334.4	14.6	118.9	105.9	136.4

Table 22- Field key for FVS growth and yield summary output.

Column	Description
Tpa	Trees/acre
BA	Basal area per acre
SDI	Stand density index
CCF	Crown competition factor
TopHt	Top height
QMD	Quadratic mean DBH
BdFt	Sawtimber board foot volume per acre
Pulp CuFt	Pulpwood cubic foot volume per acre
TCuFt	Total (sawtimber and pulpwood) cubic foot volume per acre
RTpa	Removed trees per acre
RBdFt	Removed board volume per acre
RPulp CuFt	Removed pulpwood cubic foot volume per acre
RTCuFt	Removed total (sawtimber and pulpwood) cubic foot volume per acre
ATBA	After thin basal area per acre
ATSDI	After thin stand density index
ATCCF	After thin crown competition factor
ATTopHt	After thin top height
ATQMD	After thin quadratic mean DBH
PrdLen	Period length (years)
Acc	Accretion (cubic feet/acre/year)
Mort	Mortality (cubic feet/acre/year)
MAI	Mean annual increment
ForTyp	Forest type (See table 20)
SizeCls	Stand size class code determined from stand conditions throughout the projection (see table 23)
StkCls	Stand stocking class code determined from stand conditions throughout the projection (see table 24)
Revenue (\$/ac)	Revenue generated from RBdFT and Rpulp CuFT fields
PV	Present value of revenue

Table 23- Explanation of the SizeCls (Size Class) field from the FVS summary output

Condition	Stand Size Class	Code
Poletimber stocking < Sawtimber stocking	Sawtimber	1
Poletimber stocking > Sawtimber stocking	Poletimber	2
Seedling-sapling stocking > 50% of total stocking	Seedling-sapling	3
Chaparral/Woodland	Chaparral	4
Total stocking < 10	Nonstocked	5

Table 24- Explanation of the StkCls field of the FVS summary output.

Stocking Class	Class Boundaries	Code
Overstocked	Total Stocking > 100	1
Fully Stocked	60 < Total Stocking < 100	2
Moderately Stocked	35 < Total Stocking < 60	3
Poorly Stocked	10 < Total Stocking < 35	4
Nonstocked	0 < Total Stocking < 10	5

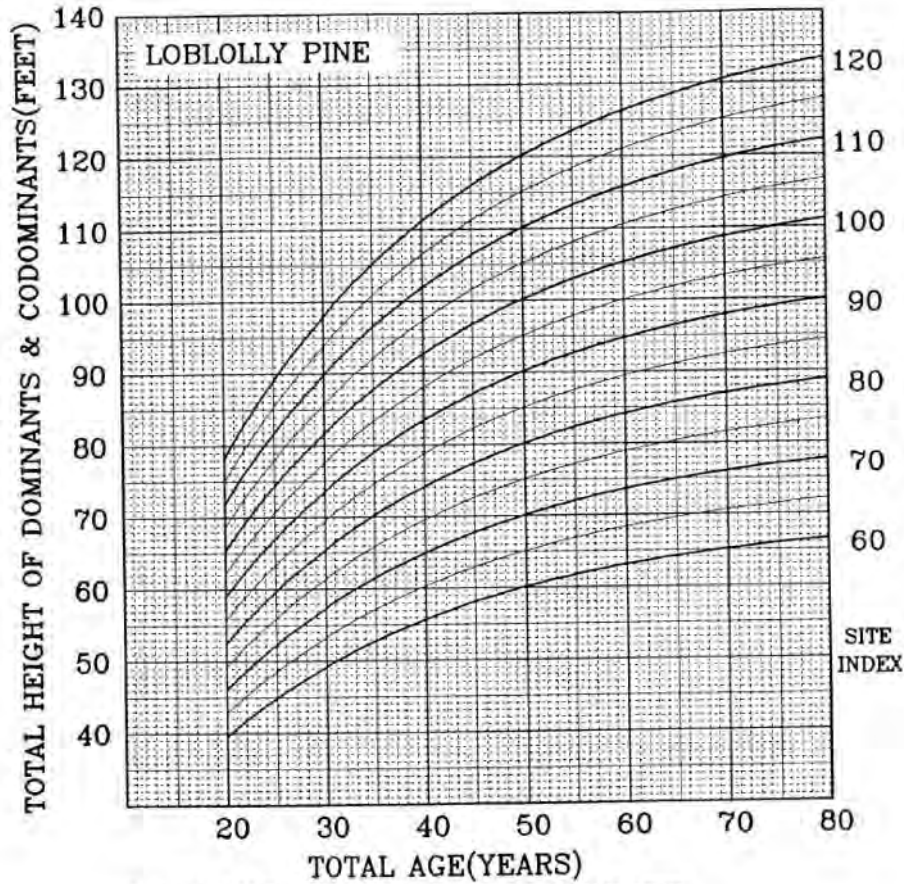


Figure 110.—Loblolly pine (Schumacher and Coile 1960, Coile and Schumacher 1964)

Coastal Plain from Chesapeake Bay, Maryland to Mobile Bay, Alabama

420 plots having 8 dominant and codominant trees on each plot

Total height and total age, anamorphic, logarithm equation

Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):

SI: 60-75 76+  
 Years: 4 3

	$b_1$	$b_2$	$b_3$	$b_4$	$b_5$	$R^2$	SE	Maximum difference
H	1.1421	1.0042	-0.0374	0.7632	0.0358	0.99	0.73	2.2
SI	0.8485	1.0038	-0.0389	-1.0031	-0.0145	0.99	0.82	3.0

Figure 22 - Loblolly Pine site index curves.

125

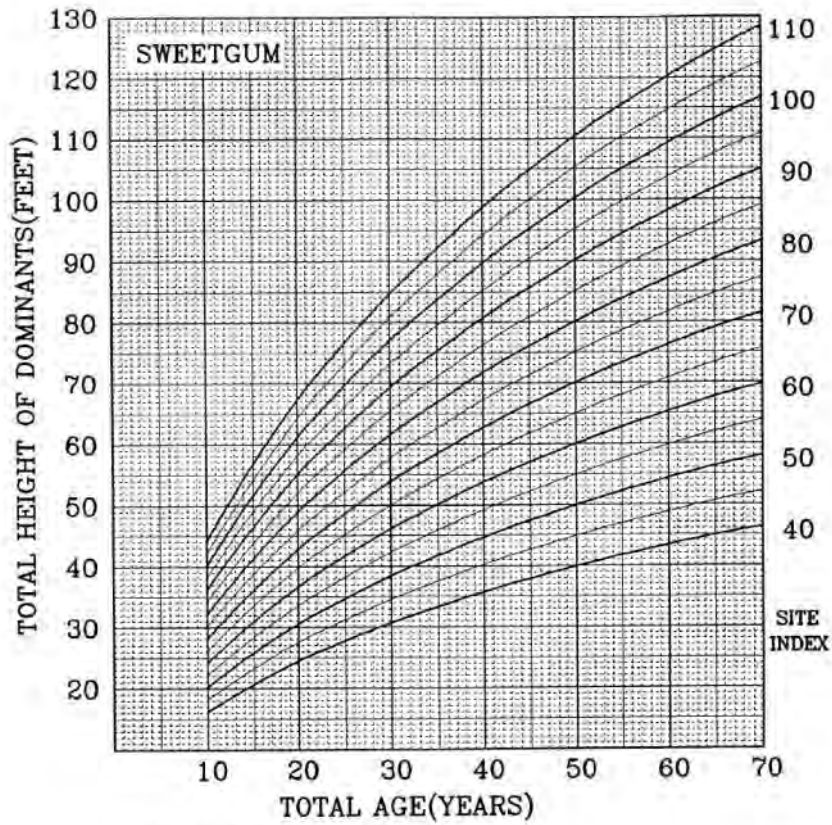


Figure 19.—Sweetgum (Trenk 1929)  
 Maryland  
 Number of plots and number of dominant trees not given  
 Total height and total age, anamorphic, equation not given  
 Convert d.b.h. age to total age by adding years according to  
 site index (BH = 0.0):

SI:	40-55	56-75	76+
Years:	5	4	3 (seedlings)
	2	1	1 (sprouts)

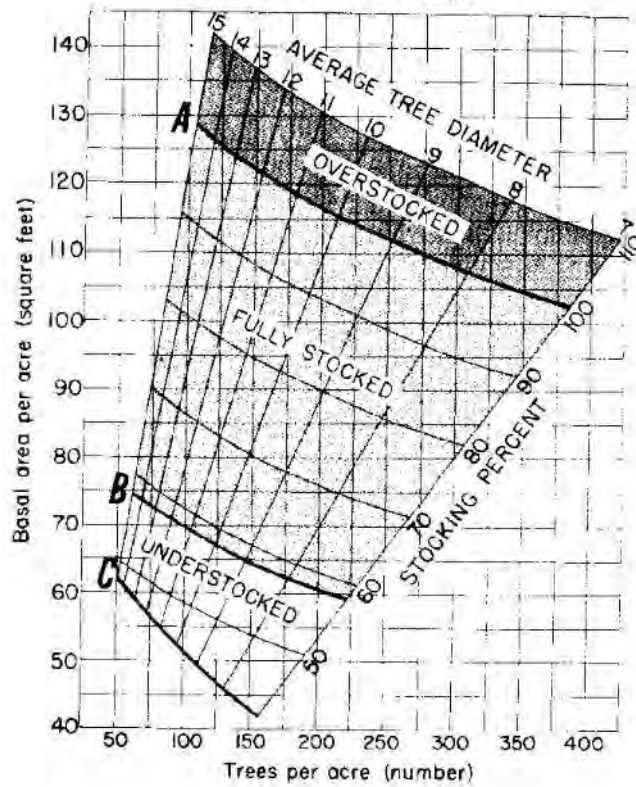
	$b_1$	$b_2$	$b_3$	$b_4$	$b_5$	$R^2$	SE	Maximum difference
H	1.5932	1.0124	-0.0122	0.6245	0.0130	0.99	0.75	3.3
SI	0.6092	0.9895	-0.0113	-0.6219	0.0078	0.99	1.12	5.5

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Figure 23 - Sweetgum site index curves.

### Stocking Diagrams

Relation of basal area, number of trees, and average tree diameter to stocking percent for upland central hardwoods. Tree-diameter range 7-15 (left), 3-7 (right). The area between curves A and B indicates the range of stocking where  
 (continued on next page)



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Figure 24 - Upland Central Hardwoods stocking guide

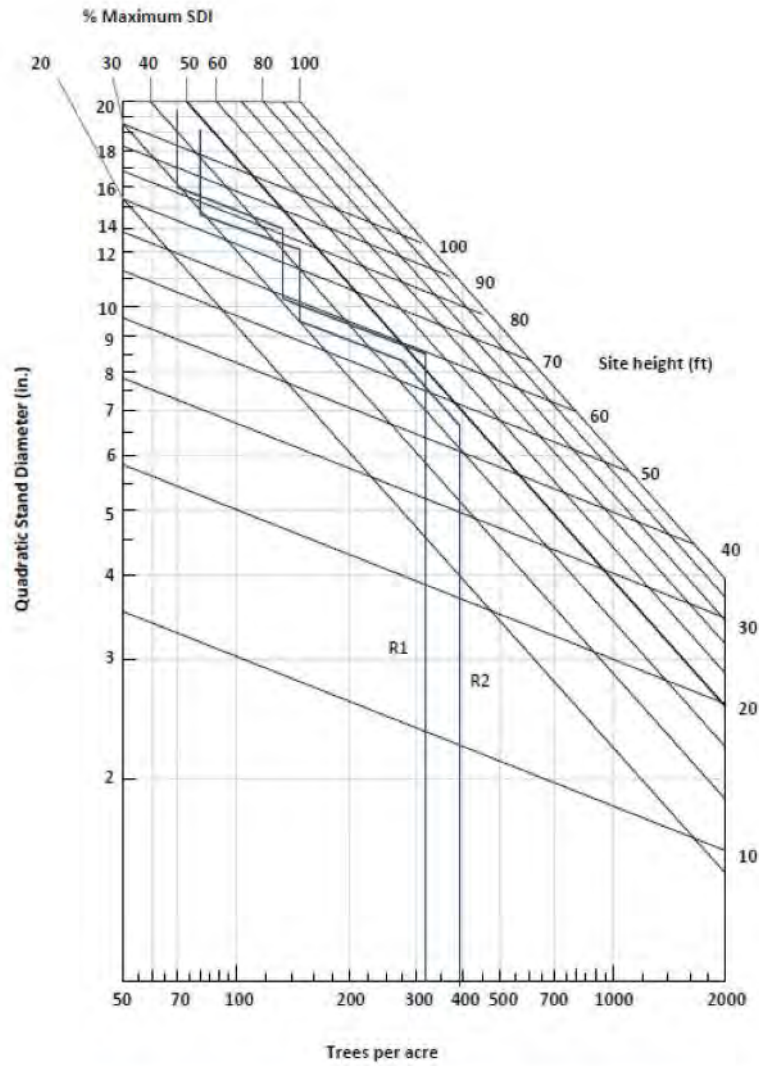


Figure 25 - Density management diagram showing two different thinning regimes (R1 and R2).

**List of Equations**

Site Index Equations

1. Oaks:  $\log_{10} SI = \log_{10} H + 9.5639 \left( \frac{1}{A} - 1/50 \right)$

2. Yellow poplar:  $\log_{10} SI = \log_{10} H + 6.5788 \left( \frac{1}{A} - 1/50 \right)$



3. Loblolly pine:  $\log_{10} SI = \log_{10} H + 5.8654 \left( \frac{1}{A} - 1/50 \right)$
4. Virginia pine:  $\log_{10} SI = \log_{10} H + 8.6970 \left( \frac{1}{A} - 1/50 \right)$
5.  $SI_{50} = (1.31) * SI_{25}$
6. Site Index Conversion:  $Y = b_0 + b_1 X$

Table 25 - Species site index conversion matrix

Y Species Site Index	X Species Site Index									
	Black Oak		Loblolly Pine		White & So. Red		Virginia Pine		Yellow Poplar	
	b0	b1	b0	b1	b0	b1	b0	b1	b0	b1
Black Oak	1	1	2.8	0.85	3	1	-5.4	1.08	39.7	0.45
Loblolly Pine	-3.3	1.18	1	1	0.2	1.18	-9.7	1.27	43.4	0.53
White & So. Red Oak	-3	1	-0.2	0.85	1	1	-8.4	1.08	36.7	0.45
Virginia Pine	5.1	0.93	7	0.79	7.8	0.93	1	1	42.1	0.42
Yellow Poplar	-88.2	2.22	-81.9	1.89	-81.6	2.22	-100.2	2.38	1	1

Volume Equations:

1. Sawtimber Volume (bd. ft.)

$$= (1.52963L^2 + 9.58615L - 13.35212) + (1.7962 - 0.27465L^2 - 2.5999L)D + (0.04482 - 0.00961L^2 + 4.5997L)D^2$$

2. Pulpwood Volume (ft<sup>3</sup>) = 0.01878 × (dbh<sup>2</sup> × S)

Stand Metrics:

1. Quadratic stand diameter:  $(\bar{D}_q) = \sqrt{\frac{BA}{.005454}}$

2. Basal area:  $(BA \text{ ft}^2) = \frac{\pi dbh^2}{4(144)} = .005454 dbh^2$

3. Coarse Woody Debris (CWD) (volume in cubic feet per acre:

$$V = \frac{\pi \sum d^2}{8L} * \frac{43560}{144}$$

where V is the volume in cubic feet/acre of CWD, d is the diameter of CWD at the point of transect intersection, and L is the length of the transect.

4. Stand Density Index (SDI) =  $10^{(\log_{10} TPA + 1.605 \log_{10} Dq - 1.605)}$

5. Guide curves can be calculated from the following equation:

$$N_{max} = \frac{RBA}{\sum \left( BA_i \times q^{\frac{D_{max}-D_i}{w}} \right)}$$

Where the  $N_{max}$  is the number of TPA in the largest diameter class; residual basal area ( $RBA$ ) is the selected residual basal area in  $\text{ft}^2/\text{acre}$ ,  $BA_i$  is the basal area of the tree of dbh  $D_i$ ,  $q$  is the q-factor representing the guiding curve structure,  $D_{max}$  is the maximum tree dbh represented by the guiding curve, and  $w$  is diameter class width in inches.

*Conversion Factors:*

*Volume conversions:*

Pine and hardwood : 5 bd. ft.  $\approx$  1 cu. ft.

1 MBF Pine  $\approx$  3 cords

1 Std. Cord Pine = 75  $\text{ft}^3$  of solid wood and bark

1 Std. Cord Mixed Hardwood = 80  $\text{ft}^3$  of solid wood and bark

*Volume to weight conversions:*

Pine : 1 cu. ft.  $\approx$  60 lbs

Hardwood : 1 cu. ft.  $\approx$  70 lbs

1 MBF (International) Hardwood = 5.425 Tons

1 MBF (International) Pine Sawtimber = 6.225 Tons

1 Std. Cord Pine  $\approx$  2.68 Tons

1 Std. Cord Hardwood = 2.90 Tons

*Economic Formulas:*

$$\text{Present Value (PV)} = \sum_{y=0}^n \left[ \frac{R_y}{(1+r)^y} \right]$$

Where  $r$  = rate of return or interest rate;  $y$  = year;  $n$  = number of years;  $V$  = value;  $R$  = revenues

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**Appendix 6  
Naval Support Facility Dahlgren Bald Eagle Management  
Plan**

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# BALD EAGLE MANAGEMENT PLAN

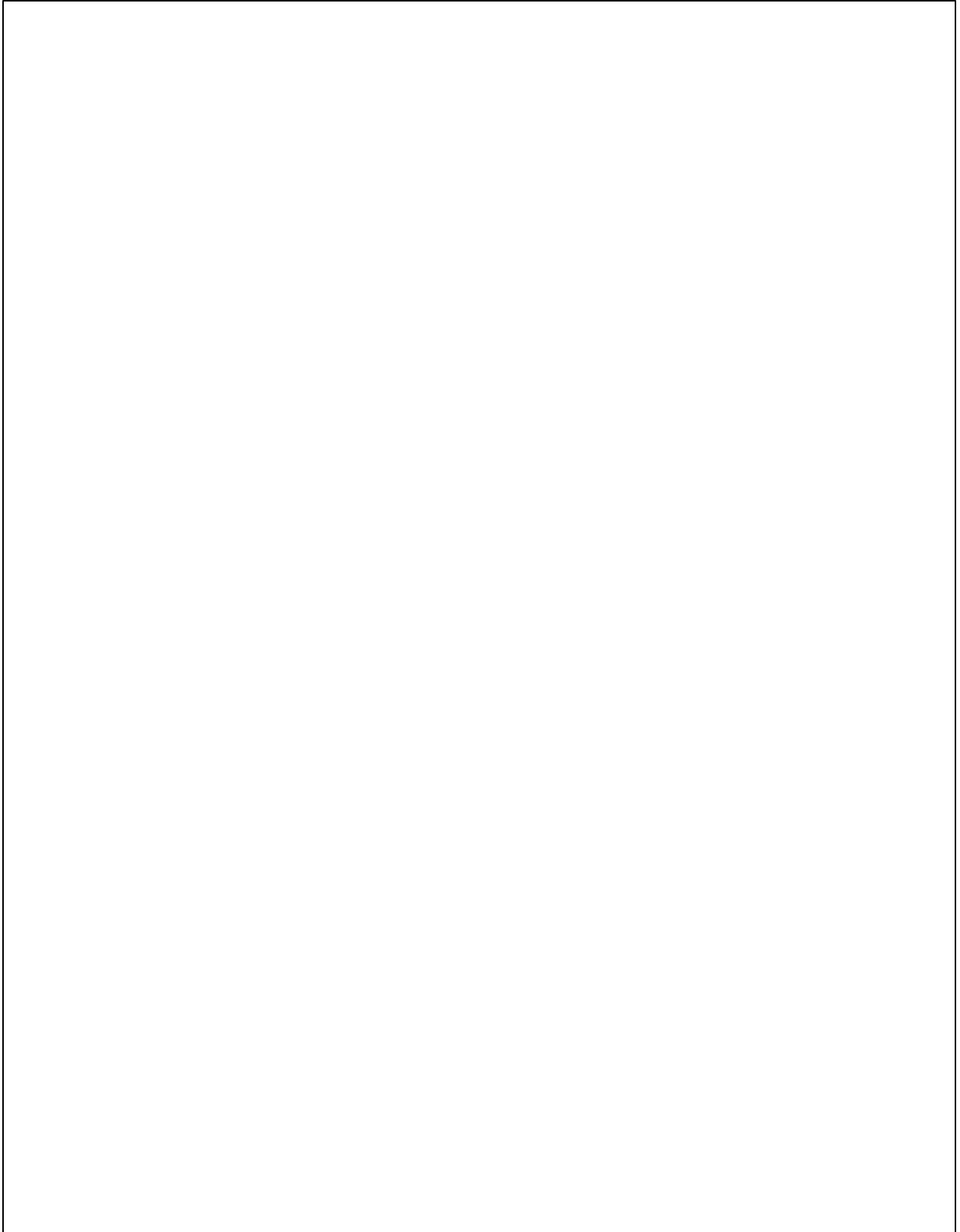
## Naval Support Facility Dahlgren



FINAL

APRIL 2007

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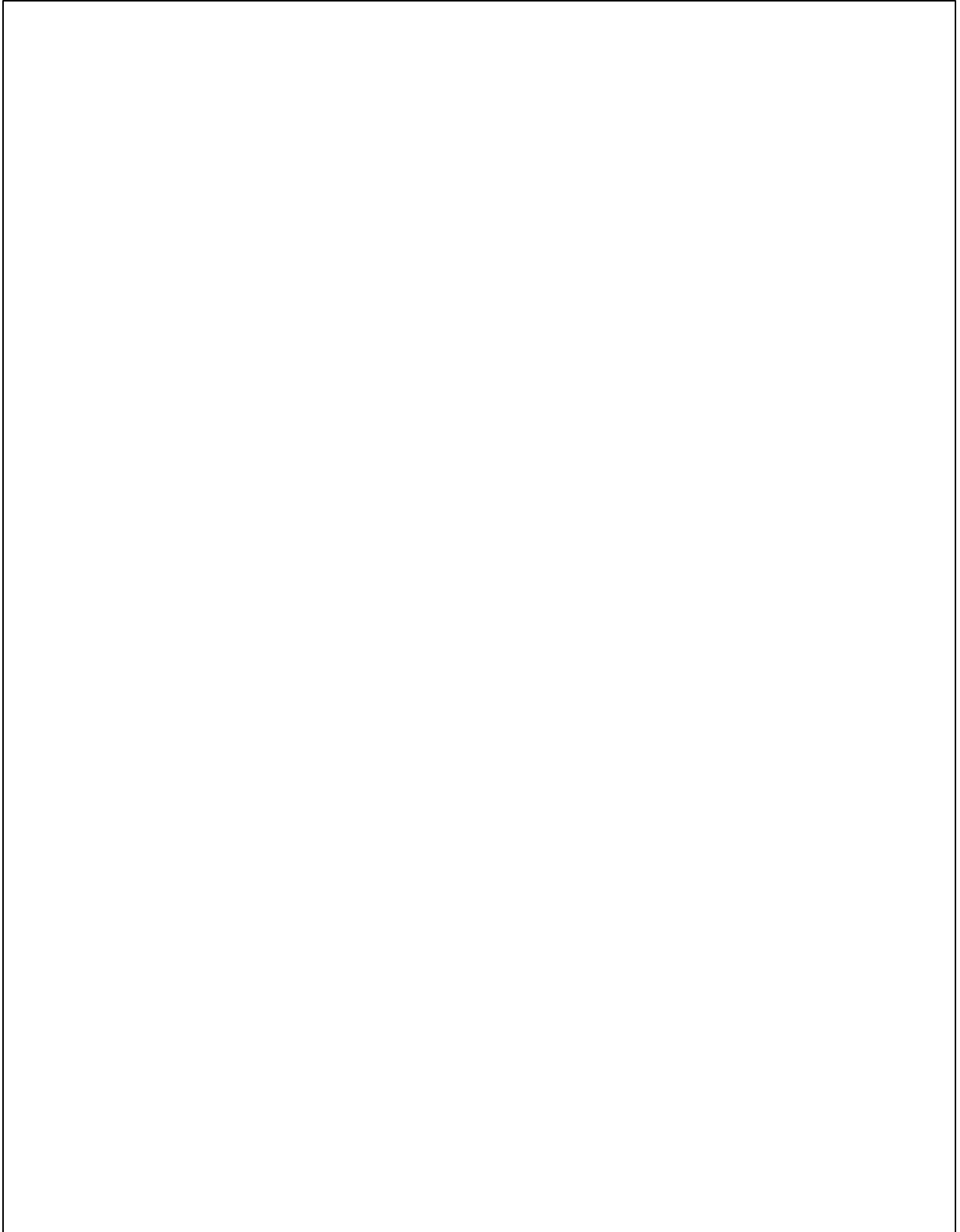


**Prepared For:  
Naval Support Facility Dahlgren  
and  
Naval Facilities Engineering Command Washington**



**Prepared by:  
Geo-Marine Inc.,  
Hampton, Virginia**







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Acronyms and Abbreviations

**ACRONYMS AND ABBREVIATIONS**

APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
DDE	Dichlorophenyl-dichloroethylene
DDT	Dichloro-diphenyl-trichloroethane
EA	Environmental Assessment
ED	Environmental Defense
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
TNRMP	Integrated Natural Resources Management Plan
MBTA	Migratory Bird Treaty Act
MDNR	Maryland Department of Natural Resources
NRO	Natural Resources Office
NSF	Naval Support Facility Dahlgren
NWR	National Wildlife Refuge
ODNR	Ohio Department of Natural Resources
PZ	Protection Zone
RDT&E	Research, Development, Testing, and Evaluation
SIA	Special Interest Area
USFWS	United States Fish and Wildlife Service
VDCR	Virginia Department of Conservation and Recreation
VDGIF	Virginia Department of Game and Inland Fisheries

## 1.0 INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is the only federally listed (threatened or endangered) species occurring at Naval Support Facility Dahlgren (NSFD). Migratory and residential breeding populations inhabit the installation year-round. NSFD's proximity to open water and relatively forested habitats, combined with an increase in the bald eagle population throughout the region and loss of suitable habitat in the areas surrounding NSFD has resulted in a dramatic increase in the number of bald eagle nests and population at NSFD. In 2000 there were only four known bald eagle nests at NSFD, two of which were active. By 2006 the number of known nests increased to ten, although only four were active. Ten additional nests occur within a two-mile radius of NSFD (VDGIF 2006). As encroachment pressures reduce available habitat in the Chesapeake Bay region, areas of available habitat such as NSFD are likely to see increasing concentrations of bald eagles.

This management plan seeks to describe the current condition and productivity of the bald eagle population on-site at NSFD and to provide management guidelines to reduce potential negative impacts while allowing the facility to fulfill its military mission. Although this plan does not specifically address off-site encroachment (i.e., landscape changes) it should be realized that these activities will affect bald eagle activity on NSFD. The specific purpose of this Bald Eagle Management Plan is to:

- Present information on the federally threatened bald eagle;
- Identify the threats facing the species on the installation;
- Define conservation goals and management objectives;
- Set parameters for protection and management of the bald eagle; and
- Enable the implementation of the best combination of options to eliminate take of the bald eagle while minimizing adverse impacts to installation activities.

This plan may be used for analysis of potential impacts of actions for Biological Assessments, Environmental Assessments (EA), and Environmental Impact Statements (EIS). However, this management plan is not meant to serve as an EA or EIS.

## Introduction

### **1.1 Installation Description**

NSFD hosts the Navy's principal research, development, test and evaluation (RDT&E) activity for surface combat systems, ordnance, mines, and strategic systems support. NSFD is located in King George County, Virginia, approximately 23 miles east of Fredericksburg, VA; 53 miles south of Washington, D.C.; and 65 miles northeast of Richmond, VA (Figure 1; NSFD 2001). NSFD encompasses roughly 4,320 acres, divided into two sections by the Upper Machodoc Creek. The main base (Mainside) is 2,678 acres and contains the majority of the developed land uses, including operational and support activities, and military housing. An airfield exceeding six acres of pavement exists within the southern portion of Mainside. Pumpkin Neck, located south of Upper Machodoc Creek, is 1,641 acres and largely undeveloped, but does support two large open test ranges and scattered test facilities.

NSFD is located in the Outer Coastal Plain physiographic province, which extends from Cape Cod south to Florida along the Atlantic Ocean and into the Gulf Coast. The Chesapeake Bay and Potomac River are prominent features of the Outer Coastal Plain in the vicinity of NSFD. The Potomac River and Upper Machodoc and Garbo Creeks are in the Chesapeake Bay watershed. The Potomac River forms the eastern boundary of Mainside and Pumpkin Neck. Upper Machodoc Creek forms the southern boundary of Mainside and the northern boundary of Pumpkin Neck. Garbo Creek flows from the northwest to the southeast, dividing Mainside into two approximately equal sections.

NSFD is generally surrounded by commercial and residential land (NSFD 2001). The town of Dahlgren is located to the southwest of the installation's main gate and the majority of residences in the vicinity of the installation are located in this area.

The installation has 2,214 acres of pine, hardwood, and mixed pine-hardwood forests (NSFD 2001). NSFD contains four miles of Potomac River shoreline, six miles of Upper Machodoc Creek shoreline, two man-made impoundments, and over 675 acres of wetlands (NSFD 2001).

### **1.2 Regulations Protecting Bald Eagles**

Bald eagles are protected under a number of federal and state laws. The federal government provides legal protection to bald eagles through the Endangered Species Act (ESA; 87 Stat. 884; 16 U.S.C. 1531 et seq.; 50 CFR Part 17), Bald and Golden Eagle Protection Act (BGEPA; 54 Stat. 250, as amended; 16 U.S.C. 668; 50 CFR Part 22), Migratory Bird Treaty Act (MBTA; 40 Stat. 755, as amended; 16 U.S.C. 701 et seq.; 50 CFR Parts 10, 20, 21), and the Lacey Act (16 U.S.C. § 701).



Figure 1. NSFD Location Map

## Introduction

At the state level, bald eagles are protected under Virginia's Endangered Species Act (Code of Virginia, §29.1-563-570), the Federal Endangered Species Act Cooperative Agreement, and the State Protection of Wildlife Species (Code of Virginia § 29.1-521; and Virginia Department of Game and Inland Fisheries regulations, 4 VAC 15-30-10).

The Virginia Department of Game and Inland Fisheries (VDGIF) and the United States Fish and Wildlife Service (USFWS) are responsible for the conservation and management of the bald eagle throughout Virginia. Bald eagle management practices are implemented at NSFD in cooperation with VDGIF and USFWS to ensure protection of the species and compliance with the ESA and other regulations.

### **1.3 Limiting Factors**

The primary limiting factor for bald eagles in the Chesapeake Bay region is habitat loss. The destruction and disturbance of shoreline and riparian forests have reduced available habitat for bald eagle nesting, foraging, and roosting (VDGIF 2006, Buehler et al. 1991). Potential limiting factors for bald eagles at NSFD include habitat availability and disturbance from installation activities such as construction, forestry, hunting, fishing, aircraft operations, and RDT&E activities.

### **1.4 Management Objectives**

The objective of bald eagle management at NSFD is to maintain the current level of eagle activity on the installation through management of current and future nesting, foraging, and roosting habitat. To accomplish this, NSFD will protect its nesting eagle pairs by establishing and/or maintaining protection zones, as well as maintaining existing foraging and roosting habitat through sound natural resource management integrated into installation operations.



## **2.0 SPECIES INFORMATION**

### **2.1 Reasons for Listing**

Late in the 18th century, estimates of bald eagle populations ranged from 25,000 to 75,000 individuals in the Continental United States, and a half a million throughout North America (Guilfoyle et al. 2000). In the Chesapeake Bay region there may have been an eagle nest for every mile of shoreline. However, by the early 1960s there were fewer than 500 nesting pairs in the Continental United States (USFWS 1999). Several factors contributed to this decline. Prior to the passing of the Bald Eagle Protection Act in 1940, indiscriminate killing by uninformed fishermen, ranchers, farmers, and hunters; habitat loss; declines in waterfowl, shorebirds, and other prey species; and encroachment reduced bald eagle numbers (Guilfoyle et al. 2000, USFWS 2006a). Between 1917 and 1953 an estimated 100,000 individuals were destroyed by sportsmen and landowners (Guilfoyle et al. 2000).

After the mid-1940s, widespread use of the organochlorine pesticide dichloro-diphenyl-trichloroethane (DDT) led to a decline in the reproductive success of bald eagles (Guilfoyle et al. 2000). Initially, DDT was sprayed extensively along coastal and other wetland areas to control mosquitoes. Later it was used as a general insecticide on farms (USFWS 2006a). Runoff from farms and direct spraying on wetland areas left the eagles' principle food source, fish, contaminated (ODNR 2005). Bioaccumulation of the principle breakdown product of DDT, dichlorophenyl-dichloroethylene (DDE), left many eagles sterile or caused females to lay eggs with unusually thin shells, which were often crushed during incubation. Eggs not crushed during incubation often did not hatch (USFWS 2006a). This led to a critical decline in the number of healthy adult nesting pairs because too few young were being produced to replace or expand the population (ODNR 2005).

These declining numbers resulted in the bald eagle being listed as endangered south of the 40th parallel on March 11, 1967, under the Endangered Species Preservation Act of 1966, a precursor to the ESA (USFWS 2006a). This included all or portions of 29 states in the southern half of the United States. Recognizing DDT as the chief culprit leading to the bald eagle's decline, it was banned from use in the United States on December 31, 1972. In 1978, the bald eagle was listed as endangered under the ESA of 1973 throughout the lower 48 states, except in Michigan, Minnesota, Wisconsin, Washington, and

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Oregon, where it was designated as threatened (USFWS 2006a). Endangered refers to species that are considered in danger of extinction throughout all or a significant portion of their range, while threatened species are considered likely to become endangered within the foreseeable future, but are not currently in danger of extinction.

#### **2.2 Conservation and Recovery**

Due to the banning of DDT and efforts by agencies to recover the bald eagle, there have been significant increases in eagle numbers throughout the United States (USFWS 2006a, USFWS 1999). In 1963 there were only 417 active nests with an average of 0.59 young produced per nest in the lower 48 states. By 1995, the number of active nests had increased to 4,450 with an average of 1.17 young produced per nest (USFWS 1999). Although still recognized as state endangered in some regions, the bald eagle was down-listed from federally endangered to threatened, in 1995. Presently, the status of the bald eagle is under review throughout the United States as to whether it should remain on the threatened and endangered species list (USFWS 2006a).

The bald eagle population in the Chesapeake Bay region has experienced similar declines and subsequent recovery. In 1972, only 72 nesting pairs could be found in the Maryland, Virginia, and Pennsylvania portions of the Chesapeake Bay basin. By 2003 the number of nesting pairs had increased to 760. Today, it is estimated that more than 2,000 eagles live in the Chesapeake Bay region (MDNR 2000). From 1976 to 1992 the breeding population of the Chesapeake Bay region increased by 350 percent (Therres et al. 1993). The bald eagle is currently listed as state threatened in Virginia.

Bald eagle recovery in the Chesapeake Bay region was due in large part to goals set forth in a Recovery Plan for the area (USFWS 2006a). Using guidelines from the ESA, the Recovery Plan was created in 1982, with updates in 1990 and 2000. The Recovery Plan defines the Chesapeake Bay region as the portion of Virginia east of the Blue Ridge Mountains, the states of Delaware and Maryland, including the Delaware Bay, the eastern half of Pennsylvania, the panhandle of West Virginia, and the southern two-thirds of New Jersey. The 1982 plan established a threshold of 175 to 250 nesting pairs and an average of 1.1 eaglets per nest before initiating further downlisting. Additionally, the 1982 plan set full recovery goals at 300 to 400 pairs with an average of 1.1 eaglets produced per nest for five years,

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and increased protection of nesting and roosting habitat to support the pairs (USFWS 2006a).

The Chesapeake Bay bald eagle population has exceeded the recovery goals every year since 1984. In 1992, the population reached a level warranting de-listing, by reaching the 5-year sustainability requirement. However, habitat protection requirements have yet to be attained. This is becoming an increasing issue due to encroachment from urban areas, destruction and degradation of eagle habitat, and an increase in environmental contaminants (USFWS 2006a). The species' dependence upon large trees in the vicinity of water makes it vulnerable to water-associated development pressures. Direct cutting of trees for shoreline development often degrade or destroy nesting, foraging, and roosting sites. In addition, shoreline development increases disturbance from construction, vehicle traffic, and recreational use of the shoreline and waterways (VDGIF 2006, USFWS 2006a). Shoreline development can also contaminate waterways, indirectly affecting eagles by limiting their reproductive capabilities, altering their behavior and foraging abilities, and increasing their susceptibility to diseases or other environmental stresses (USFWS 2006a). Other direct threats to bald eagles include: shootings; collisions with cars, powerlines, and other obstructions; power pole electrocutions; and lead poisoning (VDGIF 2006, USFWS 1999).

### 2.3 Description

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 eight feet and weigh 8 to 14 pounds. Females are usually larger than males and eagles in northern ranges are typically larger than those in the south (USFWS 2006a). Juvenile and subadult 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). The head and tail of a juvenile becomes increasingly white with age until full adult plumage is reached in four to five years. Over the same time period, the eyes, feet, and bill gradually change from black to yellow. Bald eagles have lived up to 48 years in captivity but generally will not live longer than 30 years in the wild (Guilfoyle et al. 2000).

### 2.4 Distribution

Bald eagles are found throughout North America, except northern Alaska, northern Canada, and central and southern Mexico. In the

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northern portion of their range bald eagles typically breed in Alaska, Canada, the Pacific Northwest, and the Great Lakes. In the southern portion of their range, they breed in the Chesapeake Bay region and Florida. Wintering eagles concentrate in Alaska, Oregon, the upper Mississippi River, and the Chesapeake Bay region (Guilfoyle et al. 2000).

In the Chesapeake Bay region the bald eagle population is divided primarily into two distinct groups. One group consists of individuals that breed in geographically-isolated areas in the northeast, southeast, and mid-Atlantic regions but migrate to the Chesapeake Bay region outside the breeding season. The second group consists of individuals that are year-round residents of the Chesapeake Bay region. Outside of the breeding season, the non-resident population will find an area to roost and forage until the next migration, while the resident population will roam the entire area (Buehler et al. 1991).

The current and historical breeding range of bald eagles in the Chesapeake Bay region is largely confined to the Chesapeake Bay and its tidal tributaries including the Chester, Choptank, James, Patuxent, and Potomac Rivers. Pairs of nesting eagles have also been found near large reservoirs and non-tidal areas connected to these tributaries (MDNR 2000). In Virginia, nesting pairs of bald eagles are known to occur near reservoirs in Bath and Halifax Counties (VDGIF 2006).

Transient bald eagles may be seen anywhere in Virginia, with migrants occasionally reported along the Appalachian Mountains (VDGIF 2006). Bald eagles use communal roost sites and congregate at foraging areas in the winter and summer. Substantial winter roosts are found along the Rappahannock, James, and Potomac Rivers; and substantial summer roosts are located along the James and Potomac Rivers in Virginia (VDGIF 2006). Caledon Natural Area, approximately five miles up river from NSFD, is known for its high summer concentration of eagles. As many as 60 birds have been observed roosting along the Potomac River shoreline (VDCR 2006a). Choptank Creek Natural Area Preserve, adjoining Caledon Natural Area, currently has three active bald eagle nests and is frequented by large concentrations of eagles (Rebecca Wilson pers. comm., VDCR 2006b). Mason Neck National Wildlife Refuge (NWR) in northern Virginia contains three nests within its borders and another four nearby. Its winter population averages from 50 to 60 bald eagles (USFWS 2006h).

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**2.5 Habitat/Ecosystem**

**2.5.1 Nesting Habitat**

Bald eagles prefer coasts, lakes, and rivers for foraging, nesting, and roosting. Nearly 100 percent of successful nests in the United States are located within two miles of open water (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). Most nests are located approximately 100 yards from breaks in the forest, such as field edges, timber cuts, or roads (Cline 1990, Guilfoyle et al. 2000). Nests are rarely located immediately adjacent to the shoreline (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, VDGIF 2006). Nests are usually on stout limbs just below the crown (VDGIF 2006). The average height of nest trees in the Chesapeake Bay region is 88 feet. Loblolly pine (*Pinus taeda*) is most frequently used by eagles for nesting, but nests may also be constructed in Virginia pine (*Pinus virginiana*), oak (*Quercus* spp.), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and hickory (*Carya* spp.; VDGIF 2006). The structure of a tree typically seems more important to nesting bald eagles than the species (USFWS 1999).

Bald eagle nests are constructed with large sticks; are typically four to six feet in diameter and three feet deep; are usually shaped like an inverted cone or bowl; and weigh up to 1,000 pounds (USFWS 2006a, VDGIF 2006). Nests may be lined with soft materials such as dead weeds, plant stalks, moss, grass, lichens, seaweed, or sod (USFWS 2006a, VDGIF 2006). A slight depression, approximately four inches deep by 14 inches in diameter, is formed in the lining (VDGIF 2006).

Throughout the breeding season, bald eagles occupy a territory, which they defend against intrusion from other eagles (USFWS 2006a). The size and shape of a territory varies greatly depending on terrain, vegetation, food availability, and eagle density in the area (USFWS 1999). In large undisturbed forested tracts, territories can be as close as three-quarters of a mile from each other. In areas along rivers where territories are distributed linearly, they can be five miles apart (VDGIF 2006). A nesting territory typically contains the active nest and perch and roost sites, but usually does not include foraging areas (USFWS 1999). In addition to the active nest, a

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territory may include one or more alternate nests - nests built or maintained by the eagles but not used for nesting in a given year (USFWS 2006a). Some bald eagles will use the same nest every year, while others will alternate from year to year between two to five nests in their breeding territory (Cline 1990). Some territories have been used continuously for over half a century (USFWS 2006a).

#### **2.5.2 Foraging Habitat**

Bald eagles most often feed on fish, particularly menhaden (*Brevoortia tyrannus*), large gizzard shad (*Dorosoma cepedianum*), white perch (*Morone americana*), and catfish (*Ameiurus* spp.) in the Chesapeake Bay region, but are opportunistic feeders and will feed on waterfowl, shorebirds, mammals, turtles, and carrion (USEWS 1990, Guilfoyle et al. 2000, Cline 1990). Dead trees are used more often than live trees for foraging perches (Guilfoyle et al. 2000). Perch selection is primarily based on availability and abundance of a food source, and shoreline trees or snags provide the visibility and accessibility needed to locate aquatic prey (USFWS 2006a). Perch sites, important in both nesting territories and foraging areas, may be used to hunt, consume food, display, or act as sentry posts to advertise and defend the nesting territory. Perches may also be used for loafing, warming, drying, and refuge from the wind or rain (USEWS 1999). Aggression is common at communal foraging areas as eagles will compete for the best roost sites and food items (VDGIF 2006). Most foraging occurs early in the morning with less intense feeding occurring in the afternoon (USFWS 1999).

#### **2.5.3 Roosting Habitat**

Unlike perches, roost sites are used at night for resting, and do not need to be near water and foraging sites. Roost sites are generally located away from houses and roads. They are frequently on public lands such as military reserves and state parks which have protected mature coastal forests and limited human development (USFWS 1990). 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 2006a). 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).

In winter, bald eagles often congregate at specific wintering sites in close proximity to sufficient food sources, good perch trees, and

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night roosts (USFWS 2006a, VDGIF 2006). Diurnal (daytime) roosts are also important winter habitat components. Trees, logs, driftwood, gravel and mud bars, riprap, powerline poles, fence posts, and pilings are used for diurnal roosting (Guilfoyle et al. 2000).

**2.6 Life History/Ecology**

Bald eagles become sexually mature at four to six years of age, but generally do not breed until the fifth or sixth year (Guilfoyle et al. 2000). They are monogamous and typically mate for life, but may form a new pair bond if one member of the pair dies (VDGIF 2006). Breeding seasons vary with latitude. In the Chesapeake Bay region nest building and repair occurs from November to January (VDGIF 2006). Eagles produce a single clutch of one to three buff-colored, speckled eggs, but will produce a second clutch if the first is destroyed (Guilfoyle et al. 2000, VDGIF 2006). Clutches may appear as early as January, but are usually produced from February 13 to March 19. Eggs hatch after 34 to 38 days (April in the Chesapeake Bay region). At hatching, young are altricial (unable to feed and care for themselves) and immediately accept food from the parents. Young are brooded by both adults for six weeks and fledge nine to 14 weeks after hatching (mid-June in the Chesapeake Bay region) but may return to the nest to feed or rest for four to six weeks after fledging (Guilfoyle et al. 2000, VDGIF 2006). Mortality is high for fledglings, with 50 to 70 percent dying within one year (Guilfoyle et al. 2000).

**2.7 Sensitivity to Disturbance**

Bald eagle pairs exhibit considerable variation in response to human activities (USFWS 1987). The variability in eagles' responses to disturbance may be related to a number of factors, including: visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and the tolerance of the nesting pair (USFWS 2006a). Human disturbance has been shown to reduce productivity, nest success, and territory use (USFWS 1989).

**2.7.1 Nesting Activity and Disturbance**

Eagles are most vulnerable to disturbance during the first 12 weeks of the nesting period (USFWS 1987). If disturbed during this time period, eagles may fail to adequately construct or repair their nest, expend energy defending the nest rather than tending to eggs or young, or abandon the nest altogether (USFWS 1987, USFWS 2006a). Human disturbances that cause prolonged absences of eagles from their nest may affect the survival of eggs or nestlings. Eggs may overheat or

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cool too much and fail to hatch or young may die as a result of hypo- or hyperthermia. If feeding is interrupted, young may not develop properly or older nestlings may fledge prematurely (USFWS 2006a, USFWS 1999). In the Chesapeake Bay region, eagles are building nests further inland to avoid human activity. This is likely to have a negative impact as eagles will need to travel further to feed thus expending more energy and spending more time away from the nest (USFWS 1999). Table 1 presents the relative sensitivity of bald eagles to human disturbance during different phases of the nesting cycle.

**Table 1. Relative Sensitivity of Bald Eagles to Human Disturbance**

Phase of Nesting Cycle <sup>2</sup>	Activity	Sensitivity <sup>1</sup>	Comments
<b>I</b> (November - January)	Courtship/nest building	Most sensitive	Most critical time period. Disturbance is manifested in nest abandonment. Eagles in newly established territories are more prone to abandon nest sites.
<b>II</b> (mid-February-Mid-March)	Egg laying	Very sensitive	Human activity of even limited duration may cause nest desertion and abandonment of territory for the nesting season.
<b>III</b> (April)	Incubation and hatching	Very sensitive	Adults are less likely to abandon the nest near and after hatching. However, young may be left susceptible to elements and predation.
<b>IV</b> (April-mid-June)	Nestling period	Moderately sensitive	Likelihood of nest abandonment and vulnerability of nestlings to elements gradually decreases. However, missed feedings and premature fledging may affect nestling survival.

<sup>1</sup>From USFWS 2006a.

<sup>2</sup>Presented are approximate dates of occurrence in the Chesapeake Bay Region.



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**2.7.2 Roosting Activity and Disturbance**

Bald eagles use communal roost sites and congregate at foraging areas in the winter and summer (VDGIF 2006). Eagles typically congregate at winter roosts from November to January, but can be present from September to April. Use of summer roosts is heaviest from June to August, but can occur from April to October (Wallin and Byrd 1984). Human disturbances at roost sites may prevent eagles from feeding and taking shelter, or may cause an eagle to perch farther from foraging areas (USFWS 2006a). In addition, human disturbances in the flight path between roosting and foraging areas can interfere with feeding. These human disturbances can force eagles to expend more energy and reduce hunting success, ultimately affecting survival. Repeated disturbances can force eagles to abandon the roost site entirely (USFWS 2006a).

**2.8 Laws and Regulations Protecting Bald Eagles**

Bald eagles in the Chesapeake Bay region are state and federally listed threatened species and are protected by a number of federal and state laws. At the federal level the ESA, BGEPA, MBTA, and the Lacey Act protect the bald eagle (USFWS and VDGIF 2000, USFWS 2004, USFWS 2006a).

• **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 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.

• **Bald and Golden Eagle Protection Act**

Prohibits 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 if, upon their return, the alterations interfere with or interrupt normal breeding, feeding, or sheltering habits, and causes, injury, death, or nest abandonment (USFWS 2006a).

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- **Migratory Bird Treaty Act**

Prohibits the taking, killing, possession, transportation, and importation of migratory birds, including bald eagles, their eggs, parts, and nests.

- **Lacey Act**

Makes it unlawful to import, export, transport, buy or sell wildlife taken or possessed in violation of federal, state or tribal law.

Within the state of Virginia, the bald eagle is protected under Virginia's Endangered Species Act, the Federal Endangered Species Act Cooperative Agreement, and the State Protection of Wildlife Species (USFWS and VDGLF 2000).

- **Virginia's Endangered Species Act**

Prohibits the take, transportation, processing, sale, or offer for sale of any federally listed species within the Commonwealth of Virginia. Further allows species not federally listed to be listed as endangered or threatened in the state of Virginia with prohibitions similar to that of federally listed species.

- **Federal Endangered Species Act Cooperative Agreement**

Under Section 5 of the ESA this Cooperative Agreement between the USFWS and VDGLF recognizes VDGLF as the lead state agency with regulatory and management authority over federally listed animals in Virginia. The Agreement also provides for federal/state cooperation regarding the protection and management of listed species.

- **State Protection of Wildlife Species**

The Code of Virginia (§ 29.1-521) and VDGLF regulations (4 VAC 15-30-10) provide legal protection to all native birds and their nests, eggs, and young.

## 2.9 Conservation Measures

A number of conservation measures have been implemented in the Chesapeake Bay region to promote recovery of the bald eagle (USFWS 1990). Mason Neck NWR, situated along the Potomac River, was established in 1969 as the first federal refuge specifically for the protection of bald eagles. The refuge and adjacent parks protect more than 6,000 acres of nesting, feeding, and roosting habitat for the bald eagle. The area currently supports seven nests and a roosting and wintering population of 50 to 60 birds (USFWS 1990, USFWS 2006b). The Nature Conservancy has been instrumental in the protection of an important bald eagle roost site along the James River. Caledon State Park has been designated as an "eagle park", which will limit human

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access. Also, a Virginia state law (Code of Virginia 10.1-2100-1988) prohibits new development within 30.5 meters of the shoreline in designated resource protection areas (USFWS 1990).

In 2005 there were 453 nesting pairs of bald eagles with 657 chicks produced in Virginia (ED 2006). Maintaining or increasing this level of productivity will likely require the protection and restoration of suitable nesting, foraging, and roosting habitat. Land-use practices, particularly logging, construction, and recreational use, associated with development often degrade or destroy feeding and nesting sites (Guilfoyle et al. 2000). Therefore, bald eagle distribution and abundance are best managed through maintenance of large mature riparian forest stands for nesting, foraging, and roosting, particularly within a half-mile of water (Guilfoyle et al. 2000, USFWS 2006a). Areas to be protected should include areas where eagles are known to have previously bred and areas with suitable habitat for future population expansion (Guilfoyle et al. 2000). In addition, wintering areas known to be historically important to bald eagles should be protected and management practices implemented to maintain and improve the suitability of these areas (Guilfoyle et al. 2000).

Bald eagles are disturbed by human activities, including: recreational boating, shoreline activities, off-road vehicles, farming, and hunting. Continued disturbances at eagle use areas, or even a single disturbance during the breeding season, can cause the eagles 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, providing a visual barrier from human disturbance; avoiding disruptive activities and development in the eagles' direct flight path between nesting, roosting, and foraging areas; and avoiding recreational and commercial boating and fishing near eagle foraging areas during peak feeding times (Guilfoyle et al. 2000, USFWS 2006a).

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### 3.0 BALD EAGLE OCCURRENCE AT NSFD

#### 3.1 Breeding Activity

Bald eagles have been known to nest at NSFD since 1983. From 1983 to 2006 the number of nests documented at NSFD increased from one to ten, four of which were active (Figures 2 and 3, Table 2). This indicates a growing population of nesting bald eagles at NSFD. Presently, there are four nests on Mainside and six on Pumpkin Neck.

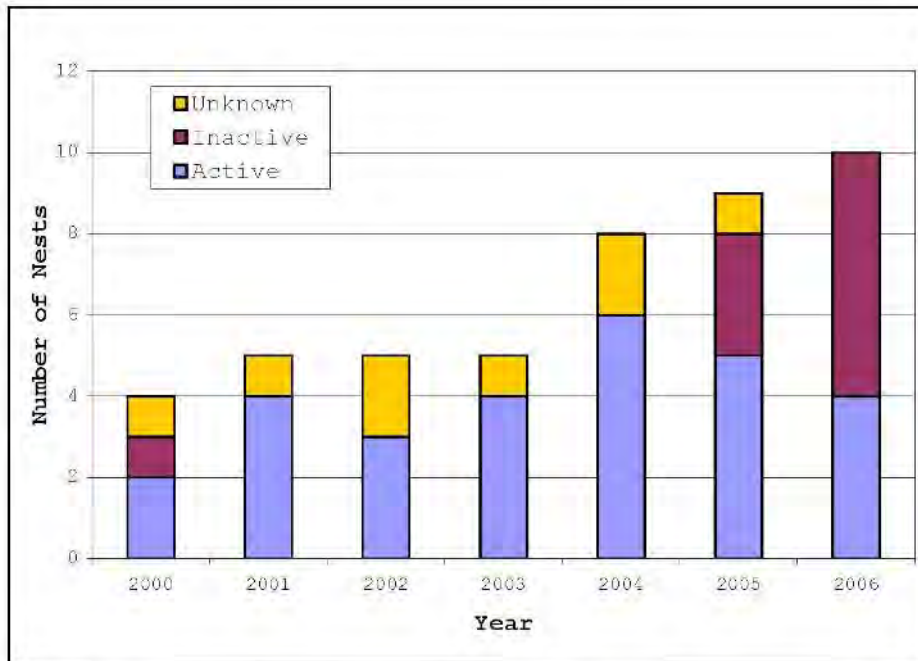


Figure 2. Number of Bald Eagle Nests Located at NSFD Since 2000

Only one nest was present at NSFD from 1983 through 1990, when one additional nest was discovered (Table 2). Following the nest discovery in 1990, no new nests were reported until 1996. Subsequently, one nest was discovered in both 1997 and 2001. A significant increase in the number of bald eagle nests at NSFD occurred in 2004, when three additional nests were discovered. One

Bald Eagle Occurrence at NSFD

additional nest was discovered in 2005 and two were discovered in 2006.

Information on the status of bald eagle nests at NSFD is available from 2000 through 2006 (Figure 2, Table 2). The highest bald eagle activity occurred in 2004, when six nests were active. One nest (KG0408) was lost following the 2005 nesting season when the tree containing the nest fell.

**Table 2. Nest Location and Activity from 2000 to 2006 at NSFD**

Nest	Location	Year Established	2000	2001	2002	2003	2004	2005	2006
KG8302	Pumpkin Neck	1983	UN <sup>1</sup>	UN	UN	UN	UN	A	A
KG9604	Pumpkin Neck	1990	A <sup>2</sup>	A	UN	A	UN	UN	IA
KG9605	Mainside	1996	IA <sup>3</sup>	A	A	A	A	IA	IA
KG9705	Pumpkin Neck	1997	A	A	A	A	A	A	A
KG0104	Pumpkin Neck	2001		A	A	A	A	A	IA
KG0406	Mainside	2004					A	IA	IA
KG0407	Pumpkin Neck	2004					A	A	A
KG0408	Pumpkin Neck	2004					A	IA	-
KG0511	Mainside	2005						A	IA
KG0606	Pumpkin Neck	2006							A
KG06DL	Mainside	2006							IA

UN<sup>1</sup> - Information unavailable  
 A<sup>2</sup> - Active Nest  
 IA<sup>3</sup> - Inactive Nest

Bald Eagle Occurrence at NSFD



Figure 3. 2006 NSFD Bald Eagle Nesting Activity

Bald Eagle Occurrence at NSFD

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#### **4.0 CURRENT MANAGEMENT PRACTICES**

Bald eagle management practices at NSFD are implemented by the Natural Resources Office (NRO) to ensure protection of the species and compliance with the ESA and other regulations. Coordination with the appropriate regulatory agencies (VDGIF and USFWS) is ongoing with regards to bald eagle management and mission/natural resources management program requirements. Management includes protection of documented nesting habitat, monitoring nesting activity and success, and enforcement of the Bald Eagle Protection Guidelines for Virginia (USFWS and VDGIF 2000). As recommended in the protection guidelines, NSFD establishes and maintains two bald eagle protection zones (PZs) around all new and existing nests, respectively. NSFD obtains bald eagle nesting activity and productivity data each year from aerial surveys conducted by the College of William and Mary and VDGIF (NSFD 2001). Using this information NSFD NRO will update the PZ1 and PZ2 boundaries as needed to assist base planning.

- 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.

Historical nesting sites are assumed to be active unless the aerial surveys indicate otherwise. PZs will remain in place while the nest is active and for three consecutive nesting seasons after the last season in which the nest was occupied (USFWS and VDGIF 2000).

Established PZs for a given year are communicated to NSFD personnel by the NRO through a project review process and hunting guidelines (NSFD 2001). Activities that were routinely conducted at the time the nest was established are permitted within PZ1 and PZ2. Any deviations from the Bald Eagle Protection Guidelines for Virginia (USFWS and VDGIF 2000) will be approved by USFWS and VDGIF in advance (NSFD 2001). In particular, NSFD will 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 (December 15 through July 15) involving activities that were not routinely conducted at the time the nest was established; or
- Permanent changes to the landscape within 750 feet of a nest.

Current Management Practices

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**5.0 CURRENT CONDITIONS/ACTIVITIES AT NSFD**

Housing, administrative, and operational support at NSFD is conducted within 820 buildings encompassing more than 47 acres (NSFD 2001). The majority of these buildings are located on Mainside. An airfield covering more than six acres of pavement also exists on Mainside. Approximately 43 miles of roads covering 105 acres exist on the installation. NSFD is the major testing area for naval gun ballistics and has six land ranges and one water range to accomplish this role. Most activities at NSFD occur within the interior of facilities; the near vicinity of facilities; within the test ranges; and along the supporting infrastructure of roads and parking lots. Current conditions and current, planned, and conceptual activities occurring on-site at NSFD with the potential to affect bald eagles include forestry, hunting, RDT&E activities, construction of new facilities, building demolition, building renovation/maintenance, and aircraft operations.

**5.1 Forestry**

Previously, NSFD managed its forest resources for timber production under written plans (NSFD 2001). Presently, the forests are managed under a multiple use approach with the goals of protecting and enhancing fish and wildlife habitat, including rare species habitat, and providing opportunities for outdoor recreational activities. The forests at NSFD are grouped into seven compartments based on geographic location and 123 stands based on the dominant tree type within each stand (hardwood, pine, or mixed pine-hardwood; Table 3).

**Table 3. Acres of Forested Land at NSFD by Stand Type**

Stand Type	Acres	Percent of Installation
Hardwood	1,229	26
Pine	649	15
Pine-Hardwood	336	8
<b>Total Forests</b>	<b>2,214</b>	<b>51</b>

Forest stands at NSFD are classified as either multiple use or off-limits (NSFD 2001). Multiple use stands may be harvested, but are also used for outdoor recreation. Some multiple use stands fall

#### Current Conditions/Activities at NSFD

within Special Interest Areas (SIAs; see section 5.1.1) and designated recreational areas. Although timber management is not precluded in these areas, special considerations are made to ensure that no conflicts exist. Three timber compartments (D, F, and G), totaling approximately 556 acres, on Pumpkin Neck are classified as off-limits due to safety concerns associated with unexploded ordnance. No forest management activities are permitted in these compartments.

Hardwood stands at NSFD have received minimal active management in the past due to a limited market for hardwood and constraints associated with wetlands, bald eagle habitat, and ordnance contamination (NSFD 2001). Management activities in hardwood stands include thinning, shelterwood cuts, clearcuts, salvage cuts, and removal of Virginia pine, large pines, and seed trees. Pine and mixed pine-hardwood stands are managed as even-aged stands with area-wide regeneration cuts conducted on a 60-year and a 75-year rotation, respectively. Selected pine-hardwood stands are managed on a 95-year rotation to provide large trees for bald eagle nesting.

The overall goal of the forestry program is to promote healthy and diverse forests at NSFD. Management criteria for the program include the following:

- Sustain non-fragmented forest habitat for existing wildlife;
- Sustain ecological values and function of the forested landscape;
- Protect real property investments of the installation;
- Comply with best management practices established by the Virginia Department of Forestry; and
- Integrate the forest management activities with the management of all natural resources at NSFD (NSFD 2001).

#### **5.1.1 Special Interest Areas**

Five SIAs have been established at NSFD (Figure 4). These SIAs represent areas with unique ecological characteristics and/or high quality habitat for rare species (NSFD 2001). Four of the five SIAs were primarily established to protect bald eagle habitat. Two SIAs totaling 810.6 acres and three totaling 222.3 acres are located on Mainside and Pumpkin Neck, respectively. SIAs containing bald eagle habitat include Gambo Creek, Tetotum Flats North, Tetotum Flats South, and Tetotum Flats East.

The Gambo Creek SIA encompasses approximately 643 acres on Mainside, and contains extensive brackish-intertidal marsh and mixed pine-hardwood forests. It provides important nesting, roosting, and

Current Conditions/Activities at NSFD



Figure 4. NSFD Special Interest Areas

Current Conditions/Activities at NSFD

foraging habitat for bald eagles and other bird species (NSFD 2001). All three bald eagle nests on Mainside are located within this SIA. The three Tetotum Flats SIAs are located on Pumpkin Neck. Tetotum Flats North encompasses approximately 124 acres of undeveloped forest adjacent to Upper Machodoc Creek (NSFD 2001). Bald eagle nest KG9004 is located within this SIA. Tetotum Flats South encompasses approximately 44 acres of undeveloped forest adjacent to Upper Machodoc Creek (NSFD 2001). Bald eagle nest KG0104 is located within this SIA. Tetotum Flats East encompasses approximately 55 acres of undeveloped forest in the interior of Pumpkin Neck (NSFD 2001). Bald eagle nest KG9705 is located within this SIA.

**5.2 Hunting**

NSFD provides ample opportunities for hunting, fishing, and trapping, although demand for trapping is low (NSFD 2001). Primary species hunted include white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), small game, and waterfowl. Hunting areas at NSFD are divided into game compartments, with nine and four on Mainside and Pumpkin Neck, respectively. Designated bow and gun hunting areas within these compartments are delineated in the NSFD Hunting Regulations. Areas open to hunting are subject to change based on natural resource issues (i.e., bald eagle nesting) and military use requirements. The nine hunting compartments on Mainside are located throughout the northern and eastern portions of the installation, while the four hunting compartments on Pumpkin Neck are located along its southern and western borders (NSFD 2001).

Hunting compartment maps from the 2001 Hunting Regulations were compared with maps of bald eagle nest locations to determine potential impacts. Mainside has three bald eagle nest sites: KG0511, KG0406, and KG9605. KG0511 is located in deer hunt compartment 4 and KG9605 is located in turkey and small game hunt compartments 4-1 and 4-2. Nest site KG0406 is located along the border of deer, turkey, and small game hunt compartment 7, the bow-only deer hunt compartment 8, and the waterfowl compartment of Gambo Creek. Pumpkin Neck has six bald eagle nests, KG0407, KG0606, KG9705, KG0104, KG8302, and KG9004. Nests KG0104 and KG8302 are located within hunt compartment 1 and KG8302 is located within hunt compartment 2. Only one nest site, KG0407, is clearly in the off limits area, while KG9705 and KG0606 are close to the borders of hunt compartments 3 and 4, respectively.

Current Conditions/Activities at NSFD

**5.2.1 White-tailed Deer**

Regulated deer hunting at NSFD began during the 1980/81 hunting season (NSFD 2001). No hunting occurred on Pumpkin Neck from 1987/88 to the 1990/91 season due to safety concerns. These concerns were addressed and mitigated, and deer hunting was once again initiated, although restricted. Regulated hunting has continued to be the primary method of managing deer herds (NSFD 2001). Deer are hunted from established hunt stands using either a bow or gun (shotgun or muzzleloader). There are 57 hunt stands on Mainside and 20 on Pumpkin Neck (NSFD 2001). Deer season occurs from early October through the first week of January. Gun hunting is permitted on Saturdays, site-observed holidays, and during the shutdown period between Christmas and New Years. Bow hunting is permitted Monday through Friday, with restrictions.

**5.2.2 Wild Turkey**

Wild turkeys are abundant on both Mainside and Pumpkin Neck, although no accurate population estimate is available (NSFD 2001). Turkey hunting on Mainside is permitted for approximately six weeks in the fall (late October through early November and mid-December through the first week of January) and during the six-week spring gobbler season (mid-April through mid-May). On Pumpkin Neck hunting is generally restricted to the spring gobbler season. Turkey hunting is permitted on Saturdays, site-observed holidays, and during the shutdown period between Christmas and New Years.

**5.2.3 Small Game**

All legal small game species may be hunted in accordance with state seasons, but may be taken by shotgun or bow only. Primary small game species include: Bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaidura macroura*), Eastern cottontail (*Sylvilagus floridanus*), Eastern gray squirrel (*Sciurus carolinensis*), and to a lesser extent, American woodcock (*Philohela minor*; NSFD 2001). Small game seasons typically range from early October through late January. Small game hunting is permitted on Saturdays, site-observed holidays, and during the shutdown over the Christmas holidays (NSFD 2001).

**5.2.4 Waterfowl**

Waterfowl management primarily focuses on wetland habitat and water quality protection (NSFD 2001). Waterfowl hunting is permitted on Mainside and Pumpkin Neck (NSFD 2001). On Mainside, waterfowl hunting is permitted in eight areas located along the Potomac River, Upper

Current Conditions/Activities at NSFD

Machodoc Creek, and within the Gambo Creek Marsh complex. On Pumpkin Neck waterfowl hunting is permitted in Black Marsh and along designated portions of Upper Machodoc Creek. NSFD also licenses the use of six stake blinds on the Potomac River, with four located off the Mainside shoreline and two off the Pumpkin Neck shoreline. Hunting seasons for duck typically occur in early October and from mid-November to mid-January; for resident geese in September; and for swan from early December through January. Waterfowl hunting is permitted on Saturdays, site-observed holidays, and during the shutdown over the Christmas holidays (NSFD 2001).

**5.3 RDT&E Activities**

NSFD maintains a complex of land and water ranges for the test and evaluation of live and inert ordnance, weapon system integration, and weapon system components. As such the installation has six land ranges and one water range to accomplish this mission. The five land ranges on Mainside are located on the eastern side of the installation adjacent to the Potomac River and include: Main Range, Terminal Range, Missile Test Range, AA Fuze Range, and Machine Gun Range (Table 4). The Potomac River Test Range, which is adjacent to and south of the installation, encompasses 169 square nautical miles. Pumpkin Neck Range consists of approximately 1,631 acres and includes three major operational areas: Churchill, Harris, and Open Burn/Open Detonation.

**Table 4. Test Ranges at NSFD**

Range	Purpose
<b>Mainside</b>	
Main Range	Trajectory testing of naval gun ballistics.
Terminal Range	Proof testing and testing of faulted rounds.
Missile Test Range	EOD training, rocket testing, and open detonation; 2,000-meter overland range used for gun and fuze testing.
AA Fuze Range	Explosive fuze and gun testing.
Machine Gun/Small Arms Range	Indoor and outdoor ranges for small arms training and testing.
<b>Pumpkin Neck</b>	
Pumpkin Neck Range	Experimental research, development, testing, and evaluation (RDT&E) and thermal treatment of explosives.

From NSFD 2001.



Current Conditions/Activities at NSFD

All but one (KG0406) of the bald eagle nests occurring at NSFD fall within a test range buffer area. Nests KG0511 and KG9605 occur within the Missile Test Range buffer area on Mainside. All bald eagle nests on Pumpkin Neck fall within a range safety buffer. An upcoming bald eagle assessment at NSFD will identify potential mitigative measures to minimize RDT&E activities impacts on bald eagles.

Current Conditions/Activities at NSFD

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## **6.0 CONSERVATION GOALS**

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The primary goal of the NSFD bald eagle management plan is to maintain the existing nesting pairs of bald eagles through management of current and future foraging, roosting, and nesting habit. Specifically, this goal will be achieved through implementation of the following management practices:

- Maintaining the habitat features which attracted the eagles;
- Providing multiple nest and perch tree sites;
- Providing adequate nest trees for future nesting;
- Preventing human disturbance at nesting, foraging, and roosting sites; and
- Maintaining a visual barrier of vegetation between the eagles and adjacent human use areas.

Conservation Goals

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## **7.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS**

### **7.1 Management of Nesting Areas**

The following sections provide specific management practices for current and proposed future activities at NSFD, including: forestry, hunting, RDT&E activities, construction, renovation/maintenance, demolition, and aircraft operations. All planned activities, excluding routine RDT&E activities, will be coordinated with NSFD NRO to determine potential impacts to bald eagles. NSFD will contact the USFWS if any current or proposed action is likely to affect bald eagles, or falls under any of the three circumstances listed in Section 4.0. NSFD routinely coordinates with the appropriate regulatory agencies (VDGIF and USFWS) with regards to bald eagle management and mission/natural resources management program requirements and certain activities may be allowable on a case by case basis (e.g., allowing activities to occur prior to July 15 in the event of early nesting).

#### **7.1.1 Forestry**

Forestry activities may pose many threats to nesting bald eagles, including: loss of the nest or nest tree, nest disturbance, and loss of forest age classes that are suitable nesting habitat (USFWS 1990). According to federal law, a bald eagle nest and the tree in which it is located cannot be removed as long as any portion of the nest remains in the tree (USFWS and VDGIF 2000). However, if a nest is inactive for three consecutive nesting seasons a determination of nest abandonment can be requested from the VDGIF/USFWS. In addition, the method of timber harvest (clearcut, seed-tree cut, shelterwood cut, or selective thinning) will have an effect on existing eagle habitat and will create or eliminate eagle habitat for the future (Cline 1980). Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a nest is active or inactive and forestry operations will be planned on an annual basis with cognizance of current active and inactive nest locations.

Forestry practices at NSFD will adhere to the following guidelines around nest sites to avoid take of the bald eagle. If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season.

- Forestry operations within P21, creating a permanent change to the landscape, will not be conducted at any time;

Management Prescriptions and Actions

- Forestry operations within PZ2, including road construction, chain saw, and yarding operations, will not be conducted during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Only selective thinning will be performed within PZ2 but not during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- A maximum number of large trees (living or dead) will be retained within PZ2 as roost and perch sites (trees with open crowns and stout lateral limbs are preferable) during thinning operations;
- Forestry operations within suitable bald eagle habitat will be conducted using seed-tree cuts to provide future nest trees;
- Management practices designed to conserve or enhance habitat within PZ1 and PZ2, including prescribed burning, will not be conducted during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year. When such practices are conducted, care will be taken to prevent damage or destruction of the nest tree; and
- The use of herbicide or pesticides toxic to wildlife will be restricted within both PZ1 and PZ2 at all times (USFWS and VDGIF 2000, USFWS 2006a).

**7.1.2 Hunting**

Hunting seasons for all species hunted at NSFD occur in the early part of the bald eagle nesting season when the pair is most sensitive to disturbance. Hunting may disturb nesting bald eagles through increased foot traffic and loud noises generated by shooting. In addition, illegal shooting of bald eagles is one of the most frequent causes of death, especially during the hunting season (VDGIF 2006). As it is often difficult to determine bald eagle nesting status early in the breeding season, all historical nest sites will be assumed to be active, unless aerial surveys or incidental observations indicate otherwise. Hunting activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

Hunting practices at NSFD will adhere to the following guidelines around nest sites to avoid take of the bald eagle. If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. NSFD will communicate these restrictions to hunters and restrictions will be enforced to prevent disturbance of nesting pairs.

- Any portion of a hunting area that falls within PZ1 during gun season will be closed;

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Management Prescriptions and Actions

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- Any waterfowl blind with the potential to disturb bald eagles will be closed;
- During bow season, areas within sight of an active nest will be closed; and
- Hunting will be permitted outside of the bald eagle nesting season, December 15 to July 15, in both PZ1 and PZ2.

#### 7.1.3 RDT&E Activities

All but one bald eagle nest at NSFD occurs within the buffer of a test range. RDT&E activities have the potential to disturb bald eagles through loud noises generated by explosives and increases in human activity. Testing at these ranges is intermittent, has a historic presence, and is consistent with past practices. Therefore these activities are allowed to proceed during the bald eagle nesting season.

RDT&E activities at NSFD will adhere to the following guidelines around nest sites when prudent to avoid take of bald eagles.

- USFWS will be consulted if a bald eagle builds a nest within a quarter-mile of existing test ranges, if testing was not routinely conducted at the time of nest establishment;
- USFWS will be consulted if a given test on an existing range is significantly different from those conducted historically; and
- USFWS will be consulted if a new testing area is proposed.

#### 7.1.4 Construction

##### 7.1.4.1 New Construction (Existing Footprint)

New construction occurring within an existing footprint does not result in the removal of trees and will not decrease available bald eagle habitat. However, new construction in an existing footprint does have the potential to disturb bald eagles through increases in vehicle and foot traffic and increases in noise before, during, and after construction. Site preparation preceding construction will require the use of bulldozers, backhoes, rollers, and vibratory compactors. Building construction will require the use of cranes, concrete trucks, and tractor-trailers and increases in personal vehicles for workers and delivery trucks with construction materials would be expected on a daily basis. Disturbances following construction will vary based on the building's purpose. Impacts from new buildings will vary based on the visibility of the activity from the nest and the degree to which similar activities are occurring in proximity to the nest (USFWS 2006a). Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a

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nest is active or inactive and construction activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

The USFWS will be consulted for all construction projects proposed within PZ1 or PZ2 (see Section 4.0). If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. The following guidelines are general recommendations for new construction; however, the USFWS reviews proposed activities near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the bald eagle, while allowing projects to proceed.

- No construction of any kind will occur within PZ1 at any time without concurrence of the USFWS;
- If approved by the USFWS, construction within PZ1 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Within PZ2, construction of multi-story buildings; high density housing; large commercial, industrial, or agricultural facilities, or facilities generating loud noises will not occur without concurrence of the USFWS; and
- Construction within PZ2 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year.

**7.1.4.2 New Construction (New Footprint)**

New construction in a new footprint will create a new footprint by clearing land followed by building construction. This activity may require the removal of trees and available habitat for bald eagles may be decreased. In addition, new construction in a new footprint has the potential to disturb bald eagles through increases in vehicle and foot traffic and increases in noise before, during, and after construction. Site preparation preceding construction will require the use of bulldozers, backhoes, rollers, and vibratory compactors. Building construction will require the use of cranes, concrete trucks, and tractor-trailers and increases in personal vehicles for workers and delivery trucks with construction materials would be expected on a daily basis. Disturbances following construction will vary based on the building's purpose. 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 2006a). Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a nest is active or inactive



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and construction activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

The USFWS should be consulted for all construction projects proposed within PZ1 or PZ2 (see Section 4.0). If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. The following guidelines are general recommendations for new construction; however, the USFWS reviews proposed activities near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the bald eagle, while allowing projects to proceed.

- Land clearing will not take place within PZ1 at any time without concurrence of the USFWS;
- No construction of any kind will occur within PZ1 at any time without concurrence of the USFWS;
- If approved by USFWS, construction within PZ1 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- Within PZ2, construction of multi-story buildings; high density housing; large commercial, industrial, or agricultural facilities, or facilities generating loud noises will not occur without concurrence of the USFWS;
- Construction within PZ2 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year; and
- Within PZ2, vegetation clearing will be minimized and line-of-sight vegetation buffers between the nest and building will be maintained. Bald eagles are more prone to disturbance when an activity occurs in full view. The buffer will help minimize the visual and auditory impacts associated with human activity. Structures may need to be placed further from the nest in open areas compared to areas with denser vegetation or other natural screening. The USFWS will be consulted to determine the appropriate buffer size in a given area (USEWS and VDGIF 2000).

**7.1.5 Renovation**

**7.1.5.1 Indoor Renovation**

Although the potential to disturb nesting bald eagles through increases in vehicle and/or foot traffic and noises generated during indoor renovation exists, they are unlikely to cause disturbance to nesting bald eagles as long as there is no significant increase compared to the normal routine activities at the particular building. Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a nest is active or inactive and indoor

Management Prescriptions and Actions

renovation activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

The USFWS will be consulted for indoor renovation projects proposed within PZ1 that may affect bald eagles (i.e., increases in vehicle or foot traffic, or activities that were not routinely conducted at the time the nest was established). If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. The following guidelines are general recommendations for indoor renovations; however, the USFWS reviews proposed activities near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the bald eagle, while allowing projects to proceed.

- Indoor renovations will not be performed within PZ1 or PZ2 during the bald eagle nesting season, December 15 through July 15, if there is a significant increase in loud noises and/or vehicle and/or foot traffic.

**7.1.5.2 Outdoor Renovation**

Outdoor renovations, including roofing, outdoor carpentry, or similar activities, have the potential to disturb bald eagles through increases in vehicle and foot traffic and increases in noise from the use of power tools and hammering. Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a nest is active or inactive and outdoor renovation activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

Currently, the NRO determines which outdoor renovations can proceed during the bald eagle nesting season, December 15 through July 15, based on the activity's potential impact. If the NRO is unable to determine the impact of the activity the USFWS will be consulted. If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. The following guidelines are general recommendations for outdoor renovations; however, the USFWS reviews proposed activities near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the bald eagle, while allowing projects to proceed.

- Outdoor renovations not leading to significant increases in noise or human activity within PZ1 or PZ2 (e.g., painting), as determined by the NRO, may be conducted at any time; and

Management Prescriptions and Actions

- Outdoor renovations within PZ1 or PZ2 with the potential to have a significant impact on bald eagles will not occur during the bald eagle nesting season, December 15 through July 15, without concurrence of the USFWS unless the nest is determined to be unoccupied in a particular year.

**7.1.6 Demolition**

Building demolition typically involves the use of pneumatic jackhammers, backhoes, flatbed trucks, skid steer loaders, bulldozers, and dump trucks. Demolition has the potential to disturb nesting bald eagles through increased vehicle and foot traffic, and loud noises associated with the demolition. Therefore, NSFD will conduct surveys of bald eagle nest locations annually to determine whether a nest is active or inactive and demolition activities will be planned on an annual basis with cognizance of current active and inactive nest locations.

The USFWS will be consulted for all demolition projects proposed within PZ1 or PZ2 (see Section 4.0). Typically, demolitions are addressed by the NSFD NRO through the work approval process. If a particular nest shows no activity by March 15 of each year, NSFD may make a request to the USFWS that the time-of-year restrictions be lifted for that nest for the remainder of the season. The following guidelines are general recommendations for demolition projects; however, the USFWS reviews proposed activities near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the bald eagle, while allowing projects to proceed.

- No demolition will occur within PZ1 at any time without concurrence of the USFWS;
- If approved by the USFWS, demolition within PZ1 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- If approved by the USFWS, care will be taken when demolishing buildings within PZ1 to avoid causing permanent changes to the natural landscape;
- Demolition within PZ2 will not occur during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year;
- As demolition of buildings proceeds, all abandoned distribution wires will be removed to reduce line-strike hazards; and
- Abandoned electrical poles in areas that promote roosting around energized electrical poles and powerlines will be removed.

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**7.1.7 Aircraft Operations**

Helicopters or fixed-wing aircraft will not be operated within 500 feet vertical distance or 1,000 feet horizontal distance from a bald eagle nest during the nesting season, December 15 through July 15, unless the nest is determined to be unoccupied in a particular year (USFWS 1987).

**7.2 Management of Concentration Areas**

The potential for bald eagle concentration areas at NSFD exists anywhere there is suitable habitat along the Potomac River and Upper Machodoc and Gambo Creeks. However, to date no communal roosting and foraging areas have been identified. To protect potential bald eagle foraging and roosting areas, disruptive activities (powerline installation, construction, and significant logging or land clearing) should not be conducted within 100-feet of the shoreline, without considering all possible alternatives.

In the event that communal roosting and foraging areas are identified, NSFD will protect these areas by establishing a 1,500-foot buffer zone (USFWS 1987). Additional guidelines for documented roosting and/or foraging areas include:

- Prohibiting the use of toxic chemicals in watersheds and rivers where bald eagles feed;
- Preventing the alteration of natural shorelines where bald eagles feed;
- Locating long-term and permanent water-dependent facilities away from foraging areas; and
- Constructing, or burying where possible, powerlines away from concentration areas.

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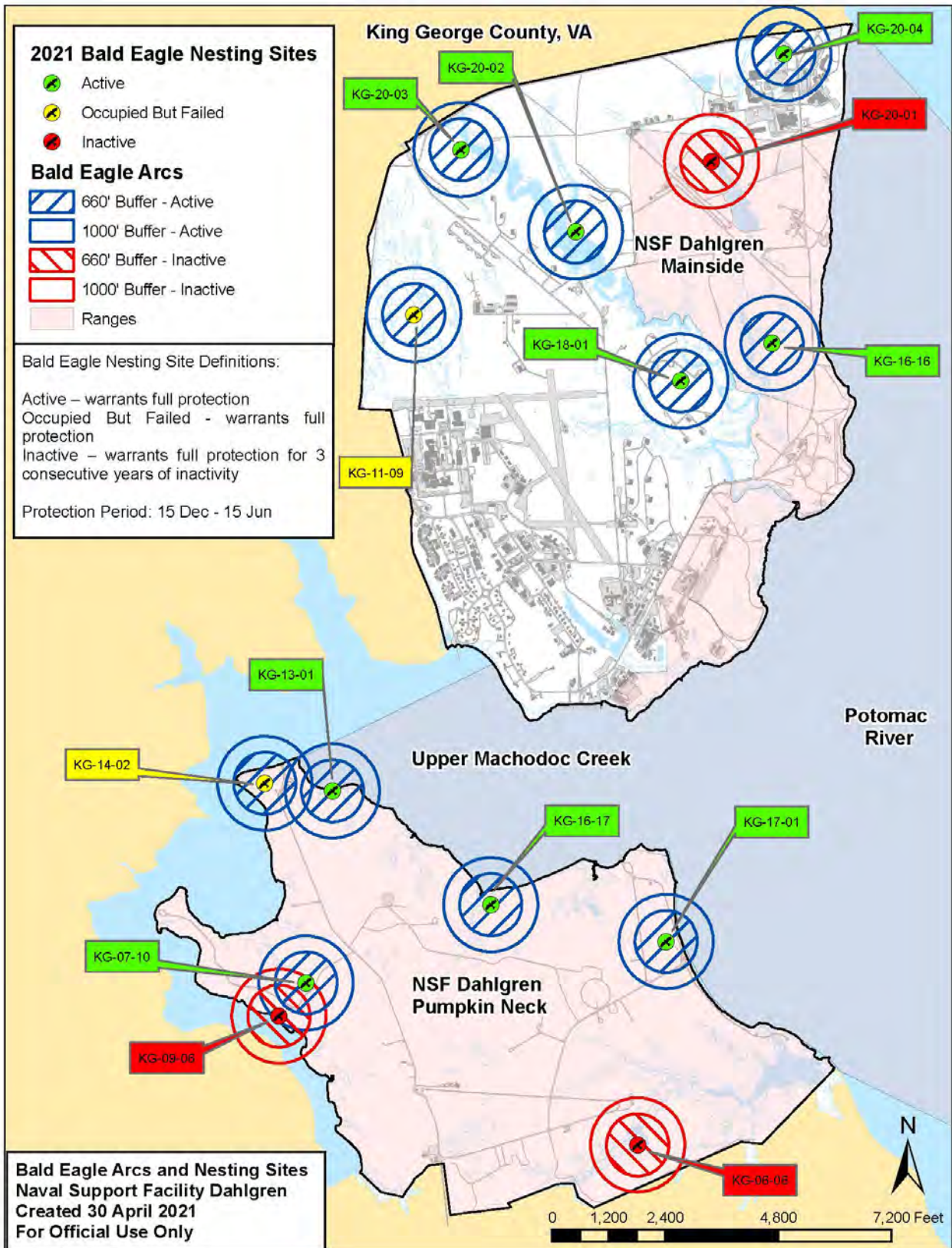
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**2021 Bald Eagle Nesting Sites Map**

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**Northeast Bald Eagle Project Screening Form**

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## NORTHEAST BALD EAGLE PROJECT SCREENING FORM



### Welcome!

**What is the purpose of this form?** The U.S. Fish and Wildlife Service (Service) designed this form as a voluntary tool to help people comply with the Bald and Golden Eagle Protection Act (BGEPA) by planning activities in a manner that avoids disturbing nesting bald eagles. To disturb a bald eagle nest means to agitate or bother a bald eagle to a degree that causes, or is likely to cause, that eagle to abandon its nest, suffer injury, or be unable to perform activities necessary to its survival. While all guidance included in this form is voluntary, individuals and organizations that disturb eagles may be subject to fine and prosecution under BGEPA.

**How is this form different from the National Bald Eagle Management Guidelines?** The National Bald Eagle Management Guidelines ([Guidelines](#)) is a document published by the Service in 2007 that provides background information on the biology of bald eagles, explains the Federal laws and regulations protecting them, and lays out guidance for several categories of human activities that can affect their nesting. This form takes the Guideline's recommendations, fits them to the regional conditions of the Northeast, and offers them to you in an interactive and intuitive format. Because the form fits its assessments and recommendations to the needs and behaviors of nesting bald eagles in the Northeast, you may find that it differs from the Guidelines on certain details. Nonetheless, the ultimate goal remains the same: to keep project proponents in compliance with BGEPA, while also protecting nesting bald eagles from disturbance.

**How this form works.** To complete this form, first, find the category of activities that includes your proposed activity. Then, go to the page listed for that category to assess whether your project may risk disturbing nesting bald eagles. If the form identifies that your activities may disturb nesting bald eagles, follow the recommended avoidance measures. These measures will identify factors that could influence nesting eagles' sensitivity to your activities: distance, visibility, timing, and exposure to other human activities. Sign the self-certification that you have committed to implementing the appropriate measures. If your proposed activities fall into multiple categories, repeat this process for each category. Additionally, if your project has the potential to affect multiple nests, complete a separate form for each nest site.

**What to do with your completed form.** Once you have signed your self-certification, keep the form for your personal records. You do not need to submit your completed form to the Service. Keep the form and additional pages that may be helpful to your future planning and compliance. If a local, state, or federal authority asks for documentation that you are complying with the Service's regional guidance, you can present them with your completed and signed form.

## INTRODUCTION

**What to know before you start.** You will need a few pieces of information to help you complete this form.

### Breeding Season

For temporary activities that might be loud or very visible, one of the simplest and most effective ways to avoid disturbing a bald eagle nest is to time the activity when eagles are not nesting, that is, outside the bald eagle breeding season. Wildlife agencies often refer to this type of measure as a time-of-year restriction. The bald eagle breeding season lasts approximately seven to eight months and has many stages. Start and end dates to this season can vary by location, year, and breeding pair. For simplicity, general dates are often set at a statewide level. Consult Appendix A to find the breeding season in your area.

### Visibility

For some categories of activities, this form will ask whether your project activities will be visible to the nest. There are two general approaches to answering this question, a desktop assessment and a site visit. A desktop assessment involves consulting online mapping resources, such as Google Maps or state nest maps (see Appendix B), which can display your project location and the nest location on satellite or aerial imagery. When viewing this imagery, look to see whether there are landscape features or structures that might screen the nest's view of your activities. Your assessment is only as good as your imagery. Make sure the imagery is current and accurately reflects visibility conditions on the ground.

The second option is to visit your project location. Assess from various points in your project footprint whether you can see the nest. Use binoculars (4X power or greater) or spotting scope to assist your viewing. If you plan to visit the project site during the breeding season, be aware that your presence could also disturb the nest. Maintain 330' feet between you and the nest, or at least as much distance as the nearest ongoing foot traffic at the nest site. You should only perform your site visit from property legally accessible to you.

Using both the field and desktop approach will give you your best answer. If there is need to select between the two options, a site visit will generally provide a better sense of visibility. In either approach, consider that your activities may become more visible during portions of the year when leaves are off trees and other vegetation.

### Nest Location

To figure out how close or how visible your activities will be, you will need precise knowledge of the nest's location. If you do not already have this information, check Appendix B to see if any online or state resources are available. If you are unable to get this information from any of these sources, survey the site. As when assessing visibility, you should only perform your visit on property legally accessible to you. You should also avoid coming within 330 feet of a nest during the breeding season, unless you know that the eagles have previously tolerated people at whatever shorter distance you are planning to use. For descriptions and examples of bald eagle nests, and explanation of how they differ from other large bird nests, see "Appendix C – Guide to Nest Identification."

## INTRODUCTION

If you feel unable to perform this search, consider employing the services of a wildlife biologist experienced in this type of surveying. Alternatively, consider contacting your state or local wildlife agency to see if they would be able to perform a site visit (please be aware that many state and local wildlife agencies are constrained in their resources and time and may not be able to offer this service). Be sensitive to sharing information about nest locations. Attracting public interest to a nest site can threaten the safety of that nest. Some states also continue to prohibit the release of nest locations.

It is possible that you will be unable to find a reported nest. While bald eagles commonly use nests across breeding seasons, nests do not always survive from one season to the next. Nests may fall apart of their own accord or be blown down by high winds. Bald eagles may also stop using a nest for one season or more, even if the nest as a structure still exists. In these scenarios, bald eagles may still reuse a former nest site in the following breeding seasons. The temporary absence of a nest or nesting eagles does not absolve you of your responsibilities to avoid disturbing future nesting at that site. The Service recommends implementing the measures included in this form for five years after the last breeding season eagles used a nest or, where the nest no longer exists, three years after the last breeding season in which the nest existed.

### Similar Activities

One of the best indicators of what a nesting bald eagle pair will tolerate is what they have already tolerated. In certain places, this form will ask whether the nesting pair has experienced and tolerated similar activities at the nest location. To answer this question, you will need to know about previous human activity at that location. Was that activity similar in nature to what you propose? As close as or closer than what you propose to do? Did it occur at the same time of day? Time of year? Did it last as long? Was it as frequent? Was it as loud? Was it as visible? You will also need to know basic history about the nest. Did the nest exist before that previous activity? Was it ever used after that activity? If your answer to any of these questions is 'no,' you cannot answer 'yes' to the broader question of whether there is similar activity at that site. See "Appendix D – Similar Activity Example Exercise" for a demonstration of how to apply this principle.

### Limitations

Know when and how you should be using this form. See "Appendix E – Limitations of this form."

**Where to go for help.** The Service understands that project proponents may occasionally need clarification on which assessments are relevant to them and how to implement certain avoidance and minimization measures. If you find you are unable to complete this form, you can contact your regional eagle coordinator (Tom Wittig) for assistance at

[thomas\\_wittig@fws.gov](mailto:thomas_wittig@fws.gov) – or - 413-253-8577

When emailing, please include in your subject line "BALD EAGLE SCREENING FORM QUESTION." If you are unable to connect with your regional eagle coordinator when calling, please leave a voice message that you are calling about this form and how best to reach you.

For explanation of technical terms used in this form, see "Appendix F – Glossary of Terms."

PROJECT INFORMATION

PROJECT INFORMATION

Project Name: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ State: \_\_\_\_\_

Lat/Long (decimal degrees; ex. 38.418310, -76.001096): \_\_\_\_\_

[Find Lat/Long via map](#)

Size: \_\_\_\_\_ acres\miles

PROJECT CONTACT INFORMATION

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Email: \_\_\_\_\_

If your project has a Federal (ex. U.S. Army Corps), state (ex. PNDI), or other ID number, please list here: \_\_\_\_\_

PROJECT ACTIVITY CATEGORY(S)

Place a check next to all activities you plan to perform.

- Construction and Development Activities → go to pages 5 - 7
- Maintenance and Restoration Activities → go to pages 8 - 9
- Timber Operation and Forestry Practices → go to page 10
- Use of Helicopters and Fixed-wing Aircraft → go to page 11
- Blasting and Other Loud, Intermittent Noises (including Fireworks) → go to page 12
- Recreational Activities → go to pages 13 - 14

**Feedback?** The Service is continuously looking to improve this form. If you have suggested changes, please feel free to email them to us at [thomas\\_wittig@fws.gov](mailto:thomas_wittig@fws.gov). Include "Bald Eagle Project Screening Form - Feedback" in your subject line.



CONSTRUCTION & DEVELOPMENT

**Construction and Development Activities**

Which specific construction activities do you plan to perform? (check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Building construction   | <input type="checkbox"/> Water impoundment or withdrawal   |
| <input type="checkbox"/> Tree and land clearing  | <input type="checkbox"/> Mining  |
| <input type="checkbox"/> Construction of roads, trails, canals, power lines, pipelines and other linear utilities    | <input type="checkbox"/> Oil and natural gas drilling and refining                               |
| <input type="checkbox"/> Agriculture or aquaculture – new or expanded operations                                     | <input type="checkbox"/> Wind farm construction  |
| <input type="checkbox"/> Alteration of shorelines or wetlands  | <input type="checkbox"/> Installation or expansion of marinas with a capacity of 6 or more boats |
| <input type="checkbox"/> Installation of docks, piers, or moorings (pile driving may qualify as loud noise, page 12) | <input type="checkbox"/> Communications tower construction (excluding maintenance and repairs)   |

Is your activity similar to an ongoing or previous activity that coincided with the breeding season and that bald eagles tolerated? Consider both construction and use/operation of your project.

Consider all of the following elements/factors in answering:

- |              |                 |                 |
|--------------|-----------------|-----------------|
| -duration    | -time of season | -area/footprint |
| -frequency   | -visibility     | -magnitude      |
| -time of day | -distance       | -nature         |

- Yes → No avoidance measures recommended. Go to self-certification (page 7).
- No → Go to next question.

Will your activities be visible to the bald eagle nest(s)?

- Yes → Stop. Implement Avoidance Measures (AM) 2, 4, and 5 (see page 7)
- No → Go to the next question

CONSTRUCTION & DEVELOPMENT

**Which of these categories most closely matches your proposed project or activity?**  
(check all that apply)

- Building construction, 1 or 2 story, with a project footprint of ½ acre or less
- Construction of roads, trails, canals, power lines, or other linear utilities
- Agriculture or aquaculture – new or expanded operations
- Alteration of shorelines or wetlands
- Installation of docks or moorings
- Water impoundment or withdrawal
- Construction of communication towers

→ Implement AM 3, 4 and 5 (page 7)

- Building construction or expansion, 3 or more stories
- Building construction or expansion, 1 or 2 story, with project footprint more than ½ acre
- Mining
- Oil and natural gas drilling and refining
- Installation or expansion of marinas with a capacity of 6 or more boats

→ Go to the next question

**Is there a similar activity within 1 mile of the nest?**

- Yes → Implement AM 3, 4 and 5 (see page 7)
- No → Implement AM 1 and 5 (see page 7)

CONSTRUCTION & DEVELOPMENT

**AVOIDANCE MEASURES - Place a check mark next to each avoidance measure (AM) that this form instructed you to implement and that you can commit to following. The Service recommends you follow the applicable AMs to prevent your activities from disturbing nesting bald eagles.**

- AM 1 – Maintain a distance buffer of at least 660 feet (200 meters) between all project activities and the nest.
- AM 2 – Maintain a distance buffer of at least 660 feet (200 meters) between all project activities and the nest. If there is an existing human-made feature (e.g., house, road, dock) similar to your project that is closer than 660 feet and tolerated by the nesting eagles, maintain a distance buffer equal to or greater than the distance separating that tolerated feature and the nest.
- AM 3 – Maintain a distance buffer of at least 330 feet (100 meters) year-round between all project activities and the nest. If a similar activity (i.e., similar in kind and size) is closer than 330 feet and has been tolerated by eagles, the distance buffer will be the same or greater than that of the existing tolerated activity.
- AM 4 – Do not perform disruptive project activities within 660 feet (200 meters) of the nest during the breeding season. This time-of-year restriction is in addition to your recommended distance buffer. Disruptive activities include, but are not limited to, external construction, excavation, use of heavy equipment, use of loud equipment or machinery, vegetation clearing, earth disturbance, planting, and landscaping.
- AM 5 – Maintain existing landscape buffers that visually screen the activity from the nest.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.  
**Go to page 15 for further instruction.**

MAINTENANCE & RESTORATION

**Maintenance and Restoration Activities**

This category includes outdoor maintenance of existing structures or infrastructure, where the maintenance activity is temporary and obtrusive (e.g., requires use of heavy equipment or loud machinery), and within the previously disturbed footprint of the structure or infrastructure. If maintenance is proposed outside the previously disturbed footprint, see **Construction and Development Activities** (pages 5-7). This category also applies to the maintenance and restoration of natural habitats (e.g., wetlands, streams, rivers, non-forested uplands). This category does not include routine, ongoing activities to which bald eagles have already exhibited a tolerance (e.g., lawn mowing; plowing, planting or harvesting of agricultural fields; etc.).

**Which maintenance or restoration activities do you plan to perform? (check all that apply)**

- Maintenance of linear utilities (e.g., power lines, pipelines, water and sewer lines)
- Road, bridge, or culvert maintenance
- Trail, campground, or recreational area maintenance
- Maintenance of oil and gas wells, well pads, and storage tanks
- Maintenance of dams, levees, berms, canals and other water-control structures
- Pond, lake, or reservoir maintenance (draw downs, dredging)
- Stream or stream bank maintenance /restoration (e.g., stream bank fencing, stream bank stabilization, livestock crossings, in-stream habitat improvements, channel maintenance, dredging)
- Wetland maintenance / restoration (e.g., invasive plant control, restoration of hydrology)
- Prescribed burning for invasive control
- Upland habitat maintenance / restoration (e.g., planting or cutting of vegetation, invasive plant control, trash cleanup, abandoned mine lands restoration). This does not include activities in forests/woodlands (see **Timber Operation and Forestry Practices**) or in agricultural fields.

**Is your activity similar to an ongoing or previous activity that coincided with the breeding season and that bald eagles tolerated? Consider both construction and use/operation of your project.**

Consider all of the following elements/factors in answering:

- |              |                 |                 |
|--------------|-----------------|-----------------|
| -duration    | -time of season | -area/footprint |
| -frequency   | -visibility     | -magnitude      |
| -time of day | -distance       | -nature         |

- Yes → No avoidance measures recommended. Go to self-certification.
- No → Go to Avoidance Measures.

MAINTENANCE & RESTORATION

**AVOIDANCE MEASURES - Place a check mark next to each AM that you can commit to following. The Service recommends you follow these AMs to prevent your activities from disturbing nesting bald eagles.**

- AM 6 - Within 660 feet (200 meters) of the nest, perform all loud and intrusive maintenance and restoration work outside the breeding season. These activities include, but are not limited to, the following: construction, excavation, use of heavy equipment, use of loud equipment or machinery, vegetation clearing, earth disturbance, planting, landscaping, and habitat restoration activities.
- AM 7 - Maintain existing landscape buffers that visually screen the activity from the nest.
- AM 8 - Do not perform prescribed burning within 660 feet (200 meters) of the nest during the breeding season. If there is no practicable alternative to scheduling prescribed burning during the breeding season, only conduct burns when adult eagles and young are absent from the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is in use or after the young have fledged from that nest).
- AM 9 - When performing prescribed burning within the drip line of the nest tree, rake leaves, vines, and woody debris from around the base of the tree to prevent fire from climbing the tree. When burning within a patch of forest containing the nest tree, take precautions to prevent crown fire.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.

**Go to page 15 for further instruction.**

TIMBER & FORESTRY

Timber Operation and Forestry Practices

**AVOIDANCE MEASURES - Place a check mark next to each AM that you can commit to following. The Service recommends you follow these AMs to prevent your activities from disturbing nesting bald eagles.**

- AM 10 – Do not perform clear-cutting or overstory tree removal within 330 feet (100 meters) of the nest at any time of the year.
- AM 11 - During the breeding season, do not perform timber harvesting, road construction, chain saw use, or yarding operations within 660 feet (200 meters) of the nest. Around alternate nests (including nests that were attended during the current breeding season but not used to raise young), you may reduce this distance to 330 feet (100 meters), provided the eggs laid in another nest within the nesting territory have hatched.
- AM 12 – Do not construct or operate log transfer facilities and in-water log storage areas within 330 feet (100 meters) of nests at any time of the year.
- AM 13 – Do not perform selective thinning, prescribed burning, or other similar silviculture practices for the enhancement or conservation of habitat within 660 feet (200 meters) of the nest during the breeding season. If there is no practicable alternative to scheduling prescribed burning during the breeding season, only conduct burns when adult eagles and young are absent from the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is active or after the young have fledged from that nest).
- AM 14 – When performing prescribed burning within the drip line of the nest tree, rake leaves, vines, and woody debris from around the base of the tree to prevent fire from climbing the tree. When burning within a patch of forest containing the nest tree, take precautions to prevent crown fire.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.

**Go to page 15 for further instruction.**

AIRCRAFT OPERATION

**Use of a Helicopter and Fixed-wing Aircraft**

**Is your activity similar to an ongoing or previous activity that coincided with the breeding season and that bald eagles tolerated?**

Consider all of the following elements/factors in answering:

- |              |                 |                 |
|--------------|-----------------|-----------------|
| -duration    | -time of season | -area/footprint |
| -frequency   | -visibility     | -magnitude      |
| -time of day | -distance       | -nature         |

- Yes → No avoidance measures recommended. Go to self-certification.
- No → Go to Avoidance Measures.

**AVOIDANCE MEASURES - Place a check mark next to each AM that you can commit to following. The Service recommends you follow this AM to prevent your activities from disturbing nesting bald eagles.**

- AM 15 - During the breeding season, do not fly within 1000 feet (305 meters) of bald eagle nests.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.

**Go to page 15 for further instruction.**

LOUD NOISE

**Blasting and Other Loud, Intermittent Noises (including Fireworks)**

**Is your activity similar to an ongoing or previous activity that coincided with the breeding season and that bald eagles tolerated?**

Consider all of the following elements/factors in answering:

- |            |                 |           |
|------------|-----------------|-----------|
| -duration  | -time of day    | -distance |
| -frequency | -time of season | -volume   |

- Yes → No avoidance measures recommended. Go to self-certification.
- No → Go to Avoidance Measures.

**AVOIDANCE MEASURES - Place a check mark next to each AM that you can commit to following. The Service recommends you follow this AM to prevent your activities from disturbing nesting bald eagles.**

- AM 16 - During the breeding season, do not perform blasting and other activities that produce extremely loud noises within 1/2 mile (800 meters) of in-use nests. This measure also applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks intended for licensed public display.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.  
**Go to page 15 for further instruction.**



RECREATION

**Recreational Activities**

**Is your activity similar to an ongoing or previous activity that coincided with the breeding season and that bald eagles tolerated?**

Consider all of the following elements/factors in answering:

- |              |                 |                 |
|--------------|-----------------|-----------------|
| -duration    | -time of season | -area/footprint |
| -frequency   | -visibility     | -magnitude      |
| -time of day | -distance       | -nature         |

- Yes → No avoidance measures recommended. Go to self-certification.
- No → Go to next question

**Will your recreation occur during the breeding season?**

- Yes → Go to Avoidance Measures.
- No → No avoidance measures recommended. Go to self-certification.

**AVOIDANCE MEASURES – For each applicable recreational subcategory, place a check mark next to the AMs you can commit to following. The Service recommends you follow the applicable AMs to prevent your activities from disturbing nesting bald eagles.**

**Non-motorized recreation and human entry (including hiking, camping, fishing, hunting, canoeing)**

- AM 17 - Stay at least 330 feet (100 meters) from the nest if you walk, bike, canoe, camp, fish, or hunt near an eagle nest during the breeding season and your activity will be visible or can be heard from the nest.

**Off-road vehicle use (including snowmobiles)**

- AM 18 - Stay at least 330 feet (100 meters) from the nest. In open areas, where there is increased visibility and exposure to noise, stay at least 660 feet (200 meters) from the nest.

RECREATION

**Motorized watercraft use (including jet skis/personal watercraft)**

- AM 19 - Do not operate jet skis (personal watercraft) or airboats within 330 feet (100 meters) of the nest.
- AM 20 - Avoid concentrations of noisy vessels (e.g. commercial fishing boats and tour boats) within 330 feet (100 meters) of the nest, except where eagles have demonstrated tolerance for such activity.
- AM 21 - For all motorized boat traffic within 330 feet (100 meters) of the nest, minimize trips and avoid stopping in the area, particularly where eagles are unaccustomed to boat traffic.

**Do you commit to following all recommended avoidance measures?**

- YES – I certify that I have completed this form to the best of my ability, answered all questions completely and accurately, and committed to implementing all applicable avoidance measures.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

*U.S. Fish and Wildlife Service Determination: Based on your responses and commitment to implementing all applicable avoidance measures, the Service has determined that your proposed activities are unlikely to disturb nesting bald eagles.*

- NO – I am unable to follow one or more of the avoidance measures recommended by this form.

**Go to page 15 for further instruction.**

FURTHER GUIDANCE

— SEEK FURTHER GUIDANCE —

You have indicated that you are unable to implement all the recommended avoidance measures. Without all avoidance measures, your activities may risk disturbing nesting bald eagles.

Consult with your regional eagle coordinator to determine the appropriate next steps. The Service will work with you to help develop alternate measures to avoid disturbance of nesting bald eagles. If there are no feasible alternate measures, the Service may advise that you obtain an eagle incidental take permit to relieve you of legal liability in the event that your activities unintentionally disturb nesting bald eagles.

Contact your regional eagle coordinator (Tom Wittig) for assistance at [thomas\\_wittig@fws.gov](mailto:thomas_wittig@fws.gov)

When emailing, please include in your subject line “[Your project name] – SCREENING FORM FURTHER GUIDANCE.” In the body of your message, include

- a brief description of your project, including its location and when you plan to start;
- the activity category(s);
- the ID number(s) (e.g., AM 5) of the Avoidance Measure(s) you are unable to implement; and
- the nest location(s), if available.

To see the Service’s eagle incidental take permit application form, go to

<https://www.fws.gov/forms/3-200-71.pdf>

For answers to Frequently Asked Questions on this form, go to

<https://www.fws.gov/migratorybirds/pdf/policies-and-regulations/3-200-71FAQ.pdf>

The Service advises you talk with your regional eagle coordinator before deciding to apply.

APPENDIX A

APPENDIX A

Bald Eagle Breeding Season by State

State	Breeding Season
VA	December 15 – July 15
DC	December 15 – July 15
WV	January 1 – June 30
MD	December 15 – June 30
DE	December 15 – June 30
PA	January 1 – July 31
NY	January 1 – September 30
NJ	January 1 – July 31
RI	January 1 – July 31
CT	January 1 – July 31
MA	January 1 – August 15
VT	February 1 – August 15
NH	February 1 – August 15
ME (coastal)	February 1 – August 15
ME (northern)	March 1 – August 30

APPENDIX B

APPENDIX B

State Mapping Resources

**Connecticut**

Contact state  
Brian Hess, CT DEEP  
[Brian.Hess@ct.gov](mailto:Brian.Hess@ct.gov)

**New Jersey**

Contact state  
<https://www.nj.gov/dep/parksandforests/natural/heritage/datareq.html>

**Delaware**

Contact state  
Katie Kadlubar, Delaware Division of  
Fish & Wildlife  
[Kathryn.Kadlubar@delaware.gov](mailto:Kathryn.Kadlubar@delaware.gov)

**New York**

Contact state  
<https://www.dec.ny.gov/animals/31181.html>

**DC**

Contact National Park Service  
Mikaila Milton, NPS  
[mikaila\\_milton@nps.gov](mailto:mikaila_milton@nps.gov)

**Pennsylvania**

<https://fws.maps.arcgis.com/apps/webappviewer/index.html?id=87ac96536654495b9f4041d81f75d7a0>

**Maine**

<https://www.arcgis.com/apps/webappviewer/index.html?id=796b7baa18de43b49f911fe82dc4a0f1>

**Rhode Island**

Contact state  
[DEM.DFW@dem.ri.gov](mailto:DEM.DFW@dem.ri.gov)

**Maryland**

<https://marylandbirds.org/report-bald-eagle-nest/>

**Vermont**

Contact state  
<https://vtfishandwildlife.com/conservation/development-review>

**Massachusetts**

Contact state  
Andrew Vitz, MassWildlife  
[Andrew.vitz@state.ma.us](mailto:Andrew.vitz@state.ma.us)

**Virginia**

<https://www.ccbirds.org/maps/#eagles>

**New Hampshire**

Contact state  
[https://www2.des.state.nh.us/nhb\\_d/atacheck/signin.aspx](https://www2.des.state.nh.us/nhb_d/atacheck/signin.aspx)

**West Virginia**

Contact state  
Rich Bailey, WVDNR  
[Richard.S.Bailey@wv.gov](mailto:Richard.S.Bailey@wv.gov)

Please note that maps are not exhaustive records of all nests within that state.

APPENDIX C

APPENDIX C

Guide to Nest Identification

**Is it a bald eagle nest?** Because bald eagle populations have grown so rapidly in recent years, not every bald eagle nest is registered to an online map or known to wildlife management agencies. As a result, project screening form users may occasionally have to make their own assessment of whether the nest near their project or activity is a bald eagle nest. Users should be cautious in making these determinations. Bald eagle nests can easily be confused with nests of other large birds such as osprey.

This guide will help landowners and project proponents assess whether a nest belongs to bald eagles or another species. It describes for readers the most commonly encountered large nests in the Northeast, with several reference figures for bald eagle nests, and provides tips for telling nest types apart. Any user who reads this guide and still feels uncertain about what type of nest they have encountered should contact their regional eagle coordinator for further guidance.

**Common types of large nests.**

Bald Eagle

The most notable aspect to a bald eagle nest is generally its size. Bald eagles build some of the largest nests in the world, with most nests around 5 feet in diameter and 3 feet in height (Fig. 1). Nests can grow well beyond these dimensions (Fig. 2), as bald eagles tend to repair and expand their nests each year and can use individual nests for decades. Bald eagle nests are mainly composed of large interwoven sticks. Nests will also have a soft interior bowl made up of materials such as hay, cornhusks, and grass clippings. However, this portion of the nest is rarely visible to human observers. The shape of bald eagle nests varies; they can take the general form of flat discs, inverted cones, cylinders (Fig. 2), or spheres (Fig. 3).

Bald eagles typically place their nests in prominent trees that sit above the surrounding forest canopy. These nest trees will often be on hillsides, lake and ocean shorelines, riverbanks, and forest edges. Nests are generally in the top third of a tree, below the crown, secured in a prominent fork off the main trunk (Fig 4.). Bald eagle nests can be in living deciduous (Fig. 3-4) and coniferous trees (Fig. 1), or dead trees (snags; Fig. 5). Within the Northeastern U.S., bald eagles use a wide range of tree types, including white pines, loblolly pines, tulip poplars, sycamores, oaks, and cottonwoods. Despite their common perception as an emblem of wilderness, bald eagles are also increasingly nesting on human-made structures such as electric transmission towers (Fig. 6) and communication towers.

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### Osprey

Osprey build large stick nests that can look quite similar to bald eagle nests. In general, osprey nests are smaller, flatter, more disorganized, and more often composed of unnatural materials, such as bailing twine and plastic bags. Osprey also show a stronger preference than bald eagles for human made structures, regularly nesting on light polls, channel markers, and cell towers. When osprey do select a natural support for their nest, it tends to be the topmost part of dead trees, in contrast to bald eagles, which seek out slightly lower portions of trees.

The best clue to which species occupies a nest, osprey or bald eagles, is who shows up. Bald eagles arrive back at their nests earlier in the year than osprey, but by late spring, both species are usually attending their nests. At this time of year, watching a nest over a period of hours will generally reveal which species is using it. However, through fall and early winter, both species are usually away from their nests. During these seasons, the only immediate sources of information on nest will be the physical details described above and online mapping resources.

In addition to the state maps for bald eagles listed in Appendix C, Osprey Watch (<http://www.osprey-watch.org/>) provides a mapping database of osprey nest locations. As with the bald eagle mapping resources, this map is thorough, but does not represent all existing nests.

### Red-Tailed Hawk/Red-Shouldered Hawk

Generally around 1.5 feet wide and 2 feet tall, nests of red-tailed hawks and red-shouldered hawks are less than one-half the size of bald eagle nests. The individual sticks in these hawk nests also tend to be smaller, with diameters of about 1-2 inches. Overall appearance of these nests can be slightly more frayed and chaotic than that of bald eagle nests. Like bald eagles, both hawk species show a tendency towards nesting in upper portions of prominent trees. Red-tailed hawks also share bald eagle's occasional preference for human made structures such as cell towers and transmission towers.

### Common Raven

Common ravens construct stick nests that vary substantially in size, from 1.5 to 5 feet across and from little over 0.5 to 2 feet high. The sticks making up the main structure of these nests can be around 3 feet in length and 1 inch in diameter. Ravens place their nests in a variety of natural and developed settings. Raven nests are easily confused with bald eagle nests when located on cell towers, transmission towers, or in trees. When situated in trees, these nests are usually in the upper portion of the tree in a crotch of the main tree stem. The best means of telling raven and bald eagle nests apart are likely size and shape; raven nests are noted for occasionally being asymmetric, and even at their larger sizes, they still tend to be smaller than bald eagle nests.

## APPENDIX C

### Great Horned Owl

In addition to nesting in tree cavities, great horned owls also frequently use the former nests of other animals, including squirrels, ravens, crows, and herons. The size and nature of a great horned owl nest therefore depends on the nest's original creator. Red-tailed hawk may be the most common source of nests for great horned owls in the Northeast. However, great horned owls will also occasionally take over bald eagle nests.

### Heron

Hérons nest in colonies known as "rookeries" where many nests are present; individual heron nests are rare. Multiple nests can be present in one tree and some nests may be located relatively high up or far out on branches. Nest sites are usually near water. Heron nests are mainly composed of sticks, and are flat and broad, often resembling a thin platform. Nests used for several years may grow taller and wider. Heron nests can give off a general impression of messiness or flimsiness.

### Squirrel

Squirrel nests can reach basketball size or larger. They are distinguished from bird nests mainly by their materials, which include leaves and other soft vegetation material (e.g., grasses), and very few sticks. They are usually round shaped, and often look messy.

### **Legal definitions and protections for eagle and migratory bird nests.**

#### Eagle Nests

BGEPA protects eagle nests in same manner it protects eagles; they cannot be destroyed, possessed, or relocated without a permit from the Service, which the Service only provides under a limited set of circumstances. Regulation defines an eagle nest as "any assemblage of materials built, maintained, or used by bald eagles or golden eagles for the purpose of reproduction" (50 CFR 22.3). A nest is an eagle nest if it was built by or ever used by eagles, even if other species of birds played a role in the nest's history. For example, if osprey build a nest and eagles take that nest over, legally, the nest is an eagle nest. Alternatively, if great horned owls begin to use a nest originally built by eagles, that nest remains an eagle nest for as long as it exists. An eagle nest also retains protection regardless of where it was built, whether it was ever finished or successful, or when it was last used. Additionally, BGEPA's protections apply regardless of the nest's size and condition.

#### Migratory Bird Nests

The Migratory Bird Treaty Act (MBTA) protects migratory bird nests in the many of the same ways that BGEPA protects eagle nests. Unless a permit is in place, migratory bird nests cannot be possessed or relocated at any time or intentionally destroyed while active. One notable difference between MBTA and BGEPA is MBTA's standard on inactive nests. If a migratory bird nest is inactive, meaning it does not contain viable eggs or chicks, it can be destroyed without a permit. (Note: the



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terms 'active' and 'inactive' here are different from the 'in-use' and 'alternate' standards used for eagle nests [see Appendix E for definitions].) For more information, please read the Service's [2018 Nest Destruction Memo](#). Bird species protected under MBTA are listed under regulation at 50 CFR 10.13. Additional protections not described here apply to any migratory bird species listed under the Endangered Species Act. Tribal, state, and local laws may also place greater restrictions on the destruction of migratory bird nests.

APPENDIX C



Figure 1.



Figure 2.

APPENDIX C



Credit: Craig Koppie/USFWS

Figure 3.



Credit: Craig Koppie/USFWS

Figure 4.

APPENDIX C



Figure 5.



Figure 6.

APPENDIX D

APPENDIX D

Similar Activity Example Exercise

**What is the purpose of this appendix?** This appendix provides project screening form users with an example of how to assess the similarity between two activities. By reading through this example, landowners and project proponents can develop a better sense of what factors they should consider when answering the question of whether their activity is similar to an ongoing or previous activity tolerated by eagles.

In the example scenario, a proposed residential construction project is compared to previous farming activity. The example starts with an overview of the historic farming activity, nest, and proposed project; then goes through a full assessment, set up in table format; and finally closes with a summary of the determination and explanation of how that determination would influence completion of the form.

**What is the scenario?**

Previous/Existing Activities

The project site is a large agricultural field that was farmed nearly every year for the past two decades. Human activity at the site was limited to occasional operation of heavy farm equipment. The broader area out to one mile includes other agricultural fields and medium density residential and commercial development.

Nest Location & History

Five years ago, a pair of bald eagles constructed a nest in a cottonwood located in the hedgerow bordering the agricultural field. The pair were unsuccessful in their first year, but fledged young from the nest each of the following four years up to present. Workers observed that the pair did not respond to operation of farming equipment, but became vigilant whenever an equipment operator stepped outside their vehicle.

Project Narrative

The proposed project will convert portions of the existing agricultural field to a residential development with 30 single-family homes, which places it under the screening form's Construction and Development category. Construction will require extending water, sewage, and electrical utilities and adding a small network of residential streets. Preparing each lot will involve grading, home and driveway construction, and landscaping. Ten acres of property near the nest will be signed over as a conservation easement.

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Factor	Previous/Existing Activity: Farming	Proposed Activity: Construction	Similar?
NATURE	Heavy equipment preparing field, planting, and harvesting crop. Two-three workers, generally confined to closed cab tractors.	Twenty workers either in heavy equipment or on foot. Ground disturbance. Placement/extension of utilities. Landscaping. Construction of 20 homes.	No
HISTORY	Farming activity predated nesting and continued while eagles successfully fledged young from the nest. This success demonstrates the eagles tolerated the farming.	N/A	Yes
DISTANCE	Distance between farming activity and the nest tree was essentially 0 feet; the hedgerow in which the nest is located bounds the agricultural field.	Nearest lot boundary will be 400 feet from nest. Area between home and nest will be converted conservation easement and left in passive, natural state.	Yes
TIMING	Farming activity began in March and continued through October each year.	Proposed schedule is April through October.	Yes
DURATION	The field was generally worked for one to two days at time, from sunrise to sundown.	On days of construction activity, work will occur during standard business hours.	Yes
FREQUENCY	Intermittent. Farming occurred in stages (e.g., fertilizing, plowing, harvesting) and events were often separated by weeks or months.	Continuous. Work will occur most weekdays and occasionally on weekends.	No
NOISE	Farming equipment (e.g., tractor) generated loud noises within the range of 80 – 100 decibels.	Construction will not require blasting or pile driving. Construction equipment (e.g., backhoes) will generate loud noise within the range of 80 – 95 decibels.	Yes
VISIBILITY	High. Because the field was flat and there was no vegetation other than the hedgerow, practically all farming activity was visible to the nest.	High. There will be no topography or vegetation screening view of construction. Visibility will only begin to lower once exterior walls are put up.	Yes

APPENDIX D

Final Assessment & Conclusion

The proposed construction activity is different from the historic farming activity in general nature and frequency. Construction will require more workers and more equipment, operating at greater intensity and higher frequency. Because of these differences, the construction cannot be considered similar to the historic farming activity, and it cannot be assumed that the breeding pair will tolerate the activity. Avoidance measures will be necessary to reduce the likelihood of disturbing the nest.

Having made these conclusions, the form user would mark 'No' to the question on page 5 of whether the activity was similar to an ongoing or previous activity. Then, at the next question the user would mark 'Yes' because the project would be visible to nest over the open intervening space. At that point, the form would direct them to implement AMs 2, 4, and 5. The project design, as proposed, would not meet AM 2, the 660-foot buffer. The user's options then would be to revise the project to eliminate the portions within 660 feet of the nest and sign the self-certification, or check no on the commitment to follow all recommended AMs and seek further guidance.

APPENDIX E

APPENDIX E

Limitations of This Form

This project screening form is not a permit or authorization to disturb bald eagles. It does not free you from legal liability under BGEPA. Rather, this form provides instruction on how to minimize the legal risk of disturbing nesting bald eagles.

The effectiveness of this form depends on the accuracy and completeness of your answers and your compliance with the avoidance measures. Using this form inappropriately may put you at risk of disturbing nesting bald eagles and violating BGEPA.

This form's recommendations are specific to the Northeast and may not be effective outside this region. If your project is in another area of the U.S., do not use this form. Instead, consult with your regional eagle biologist or migratory bird permit office for guidance matched to your locality.

This form only relates to managing activities near bald eagle nests. It does not provide direction on how to avoid disturbing bald eagle communal roosts and concentration areas, which, compared to nest sites, have different biological significance to eagles and present different sets of concerns. If you believe your activities have any potential to affect a communal roost or concentration area, consult the [Guidelines](#) document for guidance.

Conditions such as the location and existence of nests and surrounding habitat are subject to change between years. For this reason, the Service recommends revisiting your determinations every breeding season after completing this form until your project is complete. The more time that passes between when you complete this form and when you end your activities, the more likely it is that conditions will change enough that your original determinations no longer apply.

This form only addresses nesting bald eagles. To identify other USFWS-managed resources and suggested conservation measures for your project, go to <https://ecos.fws.gov/ipac/>.

Wind energy developers seeking to address potential take of eagles should use this form in conjunction with the Service's [Eagle Conservation Plan Guidance](#). Use of this form alone will not assure wind projects' compliance with BGEPA's protections on disturbance or other take.

Certain states and localities have their own laws, regulations, and guidelines for protecting bald eagles and their nests. Completing this form does not guarantee that you are also in compliance with these other standards and/or regulations. If you are unfamiliar with your state and local standards, consult with the appropriate agencies and authorities.

You are responsible for ensuring that your activities comply with all applicable Federal, tribal, State, and local laws and regulations. This form will only help you in your compliance with BGEPA and its protections on the nesting activity of bald eagles.



APPENDIX F

APPENDIX F

Glossary of Terms

**Alternate nest** – one of potentially several nests within a nesting territory that is not an in-use nest at the current time. When there is no in-use nest, all nests in the territory are alternate nests. Also sometimes referred to as an inactive nest (e.g., in the Service’s 2009 Eagle Rule).

**Communal roost** – an area where eagles gather repeatedly in the course of a season and shelter overnight and sometimes during the day in the event of inclement weather.

**Disturb** – to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle’s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

**Eagle nest** – any assemblage of materials built, maintained, or used by bald eagles or golden eagles for the purpose of reproduction.

**Fledge** – to leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

**In-use nest** – a bald or golden eagle nest characterized by the presence of one or more eggs, dependent young, or adult eagles on the nest in the past 10 days during the breeding season. Also sometimes referred to as an active nest.

**Landscape buffer** – a natural or human-made landscape feature that screens eagles from human activity (e.g., strip of trees, hill, cliff, berm, sound wall).

**Nest abandonment** – nest abandonment occurs when adult eagles desert or stop attending a nest and do not subsequently return and successfully raise young in that nest for the duration of a breeding season. Nest abandonment can be caused by altering habitat near a nest, even if the

APPENDIX F

alteration occurs prior to the breeding season. Whether the eagles migrate during the non-breeding season, or remain in the area throughout the non-breeding season, nest abandonment can occur at any point between the time the eagles return to the nesting site for the breeding season and the time when all progeny from the breeding season have dispersed.

**Nesting territory** – the area that contains one or more eagle nests within the home range of a mated pair of eagles, regardless of whether such nests were built by the current resident pair.

**Northeast** – Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, and the District of Columbia.

**Project footprint** – the area of land (and water) temporarily or permanently altered by a project.

**Tolerate** – the acceptance of specific human activities by eagles at the nest site. Demonstrated in the eagles' continued ability to successfully feed, breed, and shelter, and the general absence of stress or agitation in their behavior.

**Appendix 7**  
**Hunting, Fishing, and Forest Products Permit Program**  
**Instructions**

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**NSASPINST 5090.2D - Hunting Instruction**

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DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC  
6509 SAMPSON ROAD, SUITE 217  
DAHLGREN, VIRGINIA 22448-5108

NSASPINST 5090.2D  
PRS4  
JUL 20 2018

NAVAL SUPPORT ACTIVITY SOUTH POTOMAC INSTRUCTION 5090.2D

From: Commanding Officer, Naval Support Activity South Potomac

Subj: NAVAL SUPPORT ACTIVITY SOUTH POTOMAC RECREATIONAL HUNTING PROGRAM REGULATIONS

Ref: (a) 16 USC 670 – Conservation Program on Military Reservations (Sikes Act)  
(b) OPNAVINST 5090.1D  
(c) Virginia Annotated Code (VAC); Title 29.1 Game, Inland Fisheries and Boating  
(d) Annotated Code of Maryland (COMAR); Title 08, Subtitle 03 Wildlife  
(e) Naval Support Facility Dahlgren Integrated Natural Resources Management Plan  
(f) Naval Support Facility Indian Head Integrated Natural Resources Management Plan  
(g) Naval Support Facility Dahlgren Annual Hunting Notice  
(h) Naval Support Facility Indian Head Annual Hunting Notice  
(i) Naval Support Activity South Potomac Physical Security Plan, Ch. 2

Encl: (1) Naval Support Activity South Potomac General Hunting Regulations  
(2) Naval Support Facility Dahlgren Hunting Program Procedures  
(3) Naval Support Facility Indian Head Hunting Program Procedures  
(4) Figures 1-4 - Naval Support Facility Dahlgren Hunting Maps  
(5) Figures 1-2 - Naval Support Facility Indian Head Hunting Maps

1. Purpose. To establish recreational hunting and trapping program regulations and procedures governing recreational hunting and trapping on Navy property at Naval Support Activity South Potomac (NSASP) in accordance with references (a) through (i). For purposes of this instruction, NSASP covers Naval Support Facility Dahlgren, VA (NSFDL) and Naval Support Facility Indian Head, MD (NSFIH).

2. Cancellation. NSASPINST 5090.2C.

3. Background. Hunting and trapping is permitted on NSASP property to promote sound game conservation, maintain habitat quality, and provide outdoor recreational opportunities. Hunting and trapping regulations are necessary to provide a safe hunting and trapping environment, to ensure accountability, to maintain required security, and to obtain hunter and trapper harvest data for wildlife conservation purposes. The respective Natural Resources Office (NRO) administers the hunting and trapping programs.

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4. Scope. Established regulations apply to all those who hunt and trap on NSASP property. All hunters and trappers are subject to the rules and regulations established by the NSASP Commanding Officer. Violation of any federal, state, county, or NSASP regulation may be cause for permanent revocation of hunting and trapping on NSASP property and/or prosecution in federal district court. The respective NRO shall investigate alleged violations of rules and regulations. The Natural Resources Violations Committee, comprised of the two Natural Resources Managers and the respective Assistant Installation Environmental Program Manager (AIEPM), shall assign penalties. Hunters and trappers charged with a violation may appeal in writing to their respective AIEPM within 30 days and, upon unsatisfactory resolution, appeal to the NSASP Commanding Officer via the NSASP Installation Environmental Program Director (IEPD) and the NSASP Executive Officer.

5. Action. All authorized hunters and trappers shall comply with the regulations detailed in enclosures (1) through (3) that govern hunting and trapping on NSASP property. An annual hunting and trapping notice will be published to identify the respective facility's hunting and trapping permit fees, hunting and trapping dates and times, harvest limits and other issues related to the NSASP hunting program.

  
M. A. O'LEARY

Distribution: NSASPINST 5216.1 (All Lists)



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Naval Support Activity South Potomac General Hunting Regulations

I. Safety

a. Hunting and trapping are enjoyable and relaxing outdoor activities, but also present safety hazards. Safety is of the utmost concern and importance aboard Naval Support Activity South Potomac (NSASP).

b. The missions and operations at Naval Support Facility Dahlgren (NSFDL) and Naval Support Facility Indian Head (NSFIH) are unique to each respective installation [see enclosures (2) and (3)]. Therefore, all hunters new to the NSASP program must attend a mandatory briefing to discuss hunting regulations and safety, explosive, and security issues relative to each respective installation. The respective Natural Resources Manager (NRM) will conduct the briefing before new NSASP hunters are issued a hunting badge and permit.

c. Due to the mission at NSASP, hunting areas may be contaminated with toxic and/or explosive materials. Unexploded ordnance (UXO) may be encountered during hunting events at NSASP. All hunters shall follow these procedures if UXO is encountered:

(1) Do not touch, move or dig near or around suspected ordnance.

(2) Walk away in the direction you came.

(3) Identify the area on a map or by terrain feature and report immediately to 540-653-8095 (NSFDL) or 301-744-4333 (NSFIH) and the respective NRM.

d. All hunters shall be issued, and are responsible to familiarize themselves with, the hunting instruction and enclosures which clearly identify areas of exclusion.

e. All hunters are required to possess an approved Hunter Safety Course certification. In addition, all archery hunters shall obtain the International Archery Hunter Education certification.

f. Deer hunters using firearms shall conduct their activities from elevated hunting stands at all times. Hunters in an elevated hunting stand shall use either a commercially made web or strap-type safety harness or belt. Rope safety belts are not permitted. All elevated hunting stands shall be positioned at least twelve (12) feet above the ground.

g. Safety clothing is required while hunting at NSASP and follows the respective state regulations.

h. All archery hunters (i.e., long, recurve, compound, crossbow) must pass an annual archery proficiency test administered on-site at the respective installation. Requirements for the test shall be published and posted in references (g) and (h). Archery hunters shall qualify with the bow(s) they intend to use during the season. Archery hunter qualification is restricted to broadheads only. Archery qualifications may be honored from other Department of Defense (DoD)

Enclosure (1)

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installations after verification by the NRM for authenticity on a case-by-case basis. Proficiency is also expected of all NSFIIH hunters using shotgun and muzzleloader [see enclosure (3)].

i. Legal weapon and ammunition requirements shall follow respective state regulations.

j. Archery hunting is prohibited within ten (10) yards of a building, road or field edge adjacent to a road. Hunters shall ensure that their hunting activities are not readily visible from any hard-surfaced road or they will be required to move to an area that is not visible.

## 2. Responsibilities

a. Natural Resources Manager Office (NRM). The respective NRM, Building 182 (540-653-4186) at NSFDL and Building 554 (301-744-2273) at NSFIIH, is responsible for managing fish and wildlife resources including the implementation of the hunting program, enforcement and oversight of program regulations, hunter access and disbursement, and collection of harvest data.

b. Morale, Welfare, and Recreation (MWR) Department. The respective MWR cashiers, Building 106 (540-653-8785) at NSFDL and Building 620 (301-744-4850) at NSFIIH, shall issue permits and collect permit fees. Methods of collection, disbursement, and handling of funds shall be in accordance with standard fiscal operating procedures established by the Navy Comptroller Office. Funds shall be expended on the installation in which collected for the conservation of fish and wildlife resources as outlined in reference (a). This includes covering the costs of the NSASP hunting program.

c. NSASP Law Enforcement (LE). The NSASP LE, Building 237 (540-653-8719) at NSFDL and Building D-339 (301-744-4381) at NSFIIH, shall control access to NSASP property and, only when requested by the respective NRM, provide support in ensuring that all individuals participating in the program are properly licensed, permitted, and adhere to all federal, state, county, and NSASP regulations per references (c), (d), and (i).

d. Volunteers. The Hunt Captain (HC) or Game Check Station (GCS) Assistant is given the authority by the respective NRM to deny access to hunters who they deem are belligerent or otherwise unsafe, resolve conflicts with area quotas, authorize hunters to search for wounded game outside of their hunting areas, provide assistance in the recovery of game, gather biological data from harvested game and notify the respective NRM of any conservation violations. The privileges and authority of the HC or GCS Assistant may be revoked if deemed necessary by the respective NRM. The HC or GCS Assistant shall remain on site and be present after the hunt has ended to ensure all hunters are accounted for and have signed out. The HC or GCS Assistant shall also be responsible for notifying the respective installation LE shift supervisor at NSFDL (540-653-8791) and NSFIIH (301-744-4606 or 301-744-4529) when tracking wounded game outside of regular hunting hours. For site specific details of HC or GCS Assistant appointments and assignments see enclosures (2) and (3).

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e. Guests. Sponsors are responsible for coordinating access for their guests. All guests shall be vetted by NSASP Security prior to hunting. Sponsors shall accompany their guests to the respective MWR cashier office to purchase a recreational hunting permit. Sponsors shall be responsible for their guests at all times, and their hunting privileges may be jeopardized as a result of their guests' actions. All guests are required to hunt in the same area as or adjacent area to their sponsor. All guests are required to scout in the same area as their sponsor.

3. Access

a. NSASP hunting program access shall be determined based on the security level at each hunting area. All hunters shall adhere to access control criteria based on the designated hunting area security level established in reference (i) to be considered for participation in the NSASP hunting program. The following hunters are authorized to hunt in the following areas based on their eligibility status:

(1) Level 1 (NSFDL Mainside, NSFDL Pumpkin Neck and NSFIIH Non-Restricted Area)

- (a) NSASP and supporting/supported command active duty military personnel and civilian government employees and their dependents.
- (b) Active duty and retired military personnel.
- (c) NSASP and supporting/supported command base residents and their dependents.
- (d) NSASP and supporting/supported command contractors possessing a Common Access Card (CAC) and on-site office space.
- (e) NSASP and supporting/supported command retired and former civilian government employees with a DoD retiree CAC.
- (f) Guests sponsored by the above personnel except (e) at NSFDL and only (a) at NSFIIH.

(2) Level 2 (NSFIIH Mainside Restricted Area)

- (a) NSASP and supporting/supported command active duty military personnel and civilian government employees and contractors possessing a valid Restricted Area badge. This does not include a Restricted Area expected visitor badge.
- (b) NSFIIH retired and/or former supporting/supported command military personnel and civilian employees with a DoD retiree badge or CAC and a complete working knowledge of NSFIIH explosive operations and management acquired through prior working experience at NSFIIH.

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(c) Guests of NSFIIH supporting/supported command active duty military personnel and civilian government employees as noted in (a) above.

(3) Controlled Access (NSFIIH Stump Neck Annex).

(a) NSASP supporting and supported command active duty military personnel and civilian government employees and contractors currently possessing credentials authorizing access to the Restricted Area.

(b) NSFIIH retired and/or former supporting/supported command military personnel and civilian employees with a DoD retiree badge or CAC and a complete working knowledge of NSFIIH explosive operations and management acquired through prior working experience at NSFIIH.

(c) Guests of NSFIIH supporting/supported command active duty military personnel and civilian government employees as noted in (a) above.

(4) The following prioritization scheme for access shall be implemented if either hunting program at NSFDL or NSFIIH exceeds their respective hunting quotas [see Enclosures (2) and (3)] to provide hunting opportunities:

(a) NSASP and supporting/supported command active duty military personnel.

(b) NSASP and supporting/supported command civilian government employees.

(c) NSASP and supporting/supported command base residents and their dependents.

(d) Active duty and retired military personnel.

(e) NSASP and supporting/supported command contractors meeting specified requirements.

(f) NSASP and supporting/supported command retired and former civilian government employees.

(g) Guests.

b. Possession of a hunting access badge and hunting permit is required to hunt aboard NSASP. Hunting access badges shall be issued to authorized hunters at the respective installation's Pass and ID office. Interested hunters shall contact their respective NRM prior to badge issuance.

4. Procedure

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a. The respective MWR office will sell base hunting permits to hunters. NSASP permit fees are outlined in references (g) and (h). Recreational hunting permits are available from the NSFDL MWR cashier, Building 106 (540-653-8785), Monday through Friday (1030-1800), Saturday and Sunday (1300-1800), and the NSFIIH MWR cashier, Building 620 (301-744-4850), Monday through Friday (0600-1700).

b. All hunters shall register their weapons with the respective LE prior to hunting aboard an NSASP installation. Weapons shall be brought to the respective LE to input the manufacturer, model, and serial number of each weapon into the LE database. Shotguns, muzzleloaders, and air rifles shall not be stored in vehicles during the workweek (i.e. Monday-Friday) or in a work status, however, hunters are authorized to store bows and crossbows in their vehicles during the workweek. Hunters are only authorized to transport their shotguns, muzzleloaders or air rifles from the front gate to the sign in board or Game Check Station and then to their hunting area and back, unless they are required to check in harvested game at the check in station.

c. While hunting, hunters shall maintain in their possession at all times a current NSASP hunting badge and a NSASP hunting permit. In addition, appropriate state hunting licenses and a weapon registration printout shall be in their possession.

d. LE shall no longer store personal firearms or other weapons at either the NSFDL or NSFIIH armory.

#### 5. Special Restrictions

a. The following special restrictions apply:

(1) NSASP hunters shall comply with the following restrictions concerning injured or dead wildlife at all times. All wildlife found injured or dead shall be reported to the respective NRM, in a timely manner, for determination of disposition. At no time shall a deer be removed from an accident scene or from NSASP unless it has been properly tagged and the respective NRM contacted prior to the animal's removal. Under no circumstances are NSASP personnel allowed to "mercy kill" an injured animal without prior approval by the respective NRM, or to possess an animal found dead. This restriction does not apply to LE personnel responding to an emergency situation.

(2) Parking at NSASP is specific to both NSFDL and NSFIIH [see enclosures (2) and (3)].

(3) Tagging of deer or turkey shall follow state and site specific regulations as outlined in enclosures (2) and (3).

(4) At least one hunter and the designated HC or GCS Assistant for that day must be present for hunting activities to be conducted. The HC or GCS Assistant can be in a non-hunting status but must still be on their respective installation for hunting to be conducted. Hunting for game other than deer or turkey at NSFDL does not require GCS Assistant oversight, but hunting with a partner is strongly encouraged.

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(5) Once signed into an area, a hunter may not leave that area and proceed to another area without first signing out at the NSFDL GCS logbook (Building 1220), the NSFIH Hunter's Board (Building 554), or at the SN target range (behind Building 2073).

b. The following actions are prohibited:

- (1) Ignoring a down barricade or closed gate.
- (2) Discharging a weapon in the direction of a magazine area, production facility, or installation boundary that results in an increased likelihood of a projectile entering these areas.
- (3) Destroying government property.
- (4) Carrying or using an axe, saw, or other tool for felling, mutilating, or destroying trees, except to conduct minor and necessary pruning for portable tree stand placement or when authorized by the respective NRM.
- (5) Transporting loaded weapons in vehicles.
- (6) Firing at any game on or near steam lines, telephone lines or utility lines.
- (7) Blocking roadways or forest-access lanes with vehicles.
- (8) Driving deer (including the use of dogs) except when authorized by the respective NRM; repeated or unnecessary driving of vehicles along roads or firebreaks will be interpreted as an attempt to drive deer.
- (9) Utilizing archery ranges during any hunting time unless authorized by the respective NRM, HC or GCS Assistant.
- (10) Spotlighting wildlife at any time during the year without permission from the respective NRM.
- (11) Littering in hunting compartments and around stand sites (i.e., pick up expended shells and remove surveyor tape or other marking materials).
- (12) Transporting harvested game on or off site in an exposed manner.
- (13) Conducting any unauthorized off-road vehicle use.
- (14) Wanton waste of harvested animals.

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(15) Using deer scents/lures that contain natural deer urine or other bodily fluids per Virginia Department of Game and Inland Fisheries July 1, 2015 Chronic Wasting Disease policy (NSFDL only).

c. Individuals shall not be authorized to establish target ranges on an NSASP installation or its supporting/supported tree commands unless previously approved for establishment by the respective NRM. All ranges approved for establishment shall be available for use by all authorized personnel.

d. Hunters are authorized to use either permanent and/or temporary tree stands. Permanent tree stands may not be installed without approval from the respective NRM. A permanent tree stand shall be defined as any tree stand or steps attached to the tree by nails, spikes, screws or bolts. A temporary tree stand shall be defined as a self-climber, lock-on, or ladder stand. Screw in steps, nails, climbing spikes, or screw-in tree stand hangers are prohibited. All temporary and permanent stands shall be taken down annually following the close of deer season. The Navy is not responsible for any damages and/or theft that may occur to permanent and/or temporary tree stands while installed or in use at NSASP.

e. Hunters desiring to construct permanent or semi-permanent waterfowl blinds shall have the location approved by the respective NRM prior to any construction. The building of a waterfowl blind does not establish a proprietary right to its use.

f. Access to NSASP hunting areas may be restricted/closed due to construction and/or restoration projects, training activities, testing operations and/or bald eagle nesting seasons. Closures shall be identified at the respective installation NRM or GCS.

#### 6. Enforcement and Authority

a. The respective NRM and LE shall enforce all federal, state, and NSASP game laws and regulations in accordance with applicable federal and state statutes. The respective NRM shall establish desired annual harvest quotas as necessary in references (g) and (h).

b. All hunters are reminded access to NSASP installations is granted for hunting related activities only. Wandering or sightseeing on foot or by car, and unauthorized entry to any building or structure will be cause for revocation of hunting privileges and/or prosecution in federal or state courts.

c. Vehicles are subject to search by the respective LE upon entry and departure or at any time while on a NSASP installation.

d. Individuals encountering persons believed to be violating wildlife or conservation laws shall record as much information of the individual violation and report the information to the respective NRM within 24 hours.

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7. Violations

a. Persons allegedly violating federal or state game statutes shall be investigated and may face potential prosecution at U.S. District Court if appropriate. Alleged violations shall be investigated by the respective LE in coordination with the respective NRM. Convictions resulting from violation of state or federal game laws while hunting on an NSASP installation shall result in the assessment of monetary penalties, imprisonment, and/or permanent suspension of hunting privileges. Individuals violating established NSASP hunting regulations may be referred to the Natural Resources Violations Committee for action. Committee membership shall consist of the two Natural Resources Managers and the respective Assistant Installation Environmental Program Manager (AIEPM).

b. Suspensions shall be immediate and may be permanent or carried up to one (1) year from the suspension date. Table 1 provides a list of potential NSASP violations and penalties. The identified penalties shall be used as guidelines. The NSASP Commanding Officer may support additional penalties recommended by the Natural Resources Violations Committee (e.g., surrender harvested game, surrender antlers, community service in support of the respective Natural Resources program, etc.). Appeal of administrative suspensions or revocations shall be made in writing to the respective AIEPM within 30 days of the notice of suspension.

Table 1: NSASP Violations and Penalties

<b>Types of Violations</b>	<b>Suspension/Penalty</b>
Conviction of a state/federal violation	1 year to permanent suspension
Discharging a weapon in an unsafe manner (i.e., poses a safety risk to others, penetrates designated off limit areas)	1 year to permanent suspension
Violation of regulations and guidelines detailed in NSASPINST 5090.2D and/or NSASPNOTE 5090 (NSFIH and NSFDL)	1 week to permanent suspension
Hunting while under the influence of drugs/alcohol	Permanent suspension
Using deer scents/lures that contain natural deer urine or other bodily fluids (NSFDL only)	Permanent suspension
Hunting, tracking or scouting within a closed area during an explosive operation or within a bald eagle nest protection zone	2 weeks to 1 year
Hunting or scouting outside of designated times/days or undesignated area	1 year
Unauthorized harvest of a game animal or a "mercy kill"	1 <sup>st</sup> offense: 1 month 2 <sup>nd</sup> offense: 1 year
Failure to use/wear a safety harness while in stand	1 month
Conducting game drives without authorization	1 year
Violation of the base blaze/fluorescent orange requirement	1 month
Archery hunting without proficiency certification	1 year



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<b>Types of Violations</b>	<b>Suspension/Penalty</b>
Failure of procedure to sign in or out	1 <sup>st</sup> offense: 1 week 2 <sup>nd</sup> offense: 2 weeks 3 <sup>rd</sup> offense: 3 weeks
Failure to receive verbal confirmation from waterfowl HC before hunting (NSFIH only)	1 <sup>st</sup> offense: 1 week 2 <sup>nd</sup> offense: 2 weeks 3 <sup>rd</sup> offense: 3 weeks
Littering	1 month
Violation by a sponsored guest	Dependent upon violation
Hunting prior to purchase of a NSASP base hunting permit	1 year to permanent suspension
Hunting prior to pick-up of NSASP hunter photo badge	1 month
Hunting or scouting an area other than the one signed in for	1 month to permanent suspension
Failure to complete a hunter data sheet (NSFIH only)	1 <sup>st</sup> offense: 1 week 2 <sup>nd</sup> offense: 2 weeks 3 <sup>rd</sup> offense: 3 weeks
Wounding two or more deer (with the same type of weapon) within the same hunting season	Requalify
Parking in an unauthorized area	1 week
Field dressing a harvested deer without permission of the HC or NRM (NSFIH only)	1 week
Failure of the HC or GCS to notify the NRM that he or she will not be able to cover their scheduled duty	1 <sup>st</sup> offense: verbal 2 <sup>nd</sup> offense: 2 weeks 3 <sup>rd</sup> offense: 3 weeks

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Naval Support Facility Dahlgren Hunting Program Procedures

I. General Requirements

a. Access

(1) All hunters shall be at least ten (10) years of age to participate in the Naval Support Facility Dahlgren (NSFDL) hunting program. Hunters under eighteen (18) years of age must be accompanied by an adult at all times while hunting.

(2) Authorized deer hunters may sponsor a maximum of two (2) guests during any hunting event. Other hunters may sponsor a maximum of three (3) guests. Guests shall be vetted prior to hunting. They are required to display picture identification at the Main Gate. Sponsors shall accompany their guests as they enter and exit NSFDL. Sponsors shall escort their guest to Building 106 to purchase a base hunting permit. Sponsors are responsible for their guest's actions. Sponsors shall clearly identify their guest(s) in the Game Check Station (GCS) logbook. Sponsors and their guests shall participate in the same mode of hunting and hunt in proximity to one another. Minors (i.e. under 18 years of age) shall be assigned to the same hunting area as their sponsoring adult and hunt within line-of-sight under direct supervision.

(3) Hunting is permitted every day during established hunting seasons except on Christmas Day. Sunday hunting is limited to only the five waterfowl blind sites at Pumpkin Neck. All other hunting areas are closed on Sunday. See Mainside (Section 2) and Pumpkin Neck (Section 3) Hunting Program Procedures for specific hunting days/times.

(4) Access to hunting compartments is administered on a first-come, first-served basis with the exception of authorized GCS Assistants. They shall be given their choice of hunting area on days they serve in that capacity. Individuals authorized to hunt at NSFDL shall be accommodated before guests up until the time of release from the GCS. Stand sites hunted in the morning may be reserved for the remainder of the day by returning the badge, signing out, and signing back in leaving the "Time In" block blank until your return. Hunters may reserve their same stand for the following day if they hunt that stand the previous evening. The reserved stand becomes open after 0800 if not in use. Waterfowl hunters may reserve some blinds/areas after 1500 the preceding day (see paragraph 2.d). Once registered, hunters shall not leave until the designated release time. Hunters shall travel directly to their assigned stand/compartments. Hunters shall not change hunting stand sites/compartments without reporting back to the GCS for a new badge. Simply sign out and sign back in on a new line in the logbook. Do not make corrections on the current entry. The logbook is an official government document that shall not be used for any purpose other than to provide the requested information. Hunters taking a break from hunting during the day shall return badges and sign out before leaving the premises. All stand/compartments badges shall be returned before departure from the GCS. Strict control of hunting stand sites/compartments shall be maintained (i.e. hunters shall remain conscious of their location and not stray across boundaries). See maps in GCSs that identify approximate stand boundaries.

Enclosure (2)

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(5) Access to hunting stand sites/compartments shall be permitted one and one half hours prior to sunrise. Hunting is permitted until one half hour after sunset unless federal or Commonwealth game regulations specify otherwise. Archery hunters utilizing 'after 1500' areas on Mainside (Figure 2) Monday through Friday shall not depart from the GCS until 1500.

(6) The Pumpkin Neck Gate remains closed. Therefore, access to and from the property is restricted as outlined below:

- (a) From one and one half hours prior to sunrise until release time.
- (b) 1130 – 1330.
- (c) Sunset to closing.
- (d) Other times during the day depending upon the availability of the GCS Assistant.

b. Responsibilities

(1) GCS's on Mainside (Building 1220) and Pumpkin Neck (shed in parking lot) shall be administered by the Natural Resources Manager (NRM) or authorized GCS Assistants during the entire deer and turkey seasons. GCS's will be self-serve at all other times. GCS responsibilities are carried out by the NRM or GCS Assistant volunteers on Mainside. The NRM shall designate the GCS Assistant to administer Pumpkin Neck. Hunters are responsible for reading and adhering to all electronic and posted information that pertains to the hunting program. All harvested game shall be available for display at the GCS upon request.

c. Safety

(1) Hunters shall comply with state law regarding the use of blaze orange. This includes:

(a) When hunting any species during the firearms deer season and youth deer day (see exceptions below), or persons accompanying a hunter, shall wear a blaze orange hat or blaze orange upper body clothing that is visible from 360 degrees, or display at least 100 square inches of solid blaze orange material at shoulder level within body reach and visible from 360 degrees.

(b) Blaze orange is not required of waterfowl hunters and dove hunters, or archery hunters in gun and bow compartments during the firearms season outside of firearms hunting times.

(c) Blaze orange camouflage is not acceptable.

(2) Firearm hunting is prohibited within fifty (50) yards of any building, structure, hard-surfaced road, or runway, except when hunting in established stand sites on Mainside and twenty-five (25) yards of any building, structure, hard-surfaced road, or runway, except when hunting in established stand sites on Pumpkin Neck.

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(3) Hunters shall not position themselves such that discharging a firearm would increase the likelihood that a projectile would enter a magazine area or production facility, or exit the installation.

(4) All hunters are encouraged to carry a cell phone while afield.

d. Tracking

(1) Tracking wounded animals will be accomplished with all possible concern for personal safety. Weapons will be broken or unloaded when tracking. Tracking will be conducted in a manner to ensure that the tracker is as visible and recognizable as possible. A wounded animal shall be given at least thirty (30) minutes before tracking is initiated. Hunters will report back to the GCS for a new stand/compartiment badge if they must leave their designated area to continue tracking. After checking the logbook, tracking activities may be conducted in adjacent areas if not in use.

(2) Hunters may use a trained dog to locate and follow game blood trails for tracking purposes. The NSFDL NRM and the NSFDL Law Enforcement (LE) shall be notified prior to use of a dog for tracking purposes.

(3) Requirements for tracking outside shooting hours include the following:

(a) Report back to the GCS before dusk to report status.

(b) Use the buddy system when tracking.

(c) Identify tracking participants at the GCS either verbally or in writing.

(d) The GCS Assistant may relinquish administrative responsibilities to a member of the tracking party.

(4) Contact NSFDL base police at (540) 653-8719 before and after tracking activities. Provide names, vehicle(s) description, and area. Contact the NRM or GCS Assistant if tracking activities will continue the following morning. Sunday tracking with the potential for discharging a weapon shall be coordinated with the NSFDL base police. Access to Pumpkin Neck and tracking activities shall be coordinated with the base police and the NRM.

(5) Hunters will not track wounded game into areas designated as off limits on Pumpkin Neck under any circumstances. Only authorized personnel onsite may continue tracking activities in the off limits area. Retrieval of a wounded deer on a Sunday may be possible by notifying the NRM and base police to request access.

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(6) Hunters are strongly encouraged to seek assistance in recovering game. All unrecovered, wounded game will be promptly reported to the GCS Assistant and recorded in the logbook.

e. Scouting

(1) Scouting is limited on Mainside to reduce unnecessary disturbance of the deer herd. Scouting is restricted as follows:

- (a) April through August – no scouting
- (b) September – Tuesday and Thursday after 1500
- (c) October through December – Sundays only from 1000 to 1600 hours
- (d) January through March – no day or time restrictions

(2) Hunters shall place a sign on their dashboard identifying their scouting activities. Scouting requires notification in the GCS logbook (i.e. sign in and out, take appropriate area badge, and display sign on your dashboard) during the hunting season. Scouting activities shall be conducted with the courtesy of other sportsmen in mind. No scouting is permitted on Pumpkin Neck outside normal hunting times.

f. Firearms Qualification

(1) A firearms qualification is currently not required to hunt with firearms at NSFDL as access to a firearms range is not available. However, if access becomes available all firearms hunters shall be required to pass a firearms qualification.

g. Parking

(1) Hunters shall not block any roadways, parking lots, or forest-access lanes with vehicles when parking to conduct hunting, tracking, or scouting activities.

h. Target Ranges

(1) The Mainside archery range is located in the pine stand across from the GCS. Individuals interested in using the range during the hunting season shall sign in and out of the GCS logbook.

i. Tree Stands

(1) No additional tree stand restrictions apply at NSFDL.

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j. Tagging and Field Dressing Deer and Turkey

(1) All hunters shall follow state regulations for tagging and field dressing deer and turkey at NSFDL.

k. Baiting

(1) Baiting is not authorized at NSFDL.

2. Mainside Hunting Program Procedures

a. Deer

(1) Annual deer harvest restrictions shall be outlined in reference (g) prior to the deer hunting season. Deer hunters must ensure they have the appropriate tag on their license to hunt legally. All deer shall be tagged at the site of the kill by notching the appropriate state tag in compliance with state law.

(2) There are fifty-seven (57) hunting stand sites available at any one time during the deer-hunting season (see Table 1 and Figure 1). Also, see the map in the GCS that delineates approximate stand boundaries. Hunting stand sites within each compartment shall be regulated as follows:

Table 1: Mainside Deer Hunting Stand Sites

Compartment	Number of Stand Sites	Weapon
1	9	Gun & Bow
2	9	Gun & Bow
3	9	Gun & Bow
4	9	Gun & Bow
5	8	Gun & Bow
6	4	Gun & Bow
7	2	Gun & Bow
8	1	Bow
9	6	Gun & Bow

(3) Firearms

(a) Shotgun and muzzleloader hunting for deer is permitted on Saturdays, federal holidays, and the site-observed 'holiday shutdown' between Christmas and New Year's Day during the general firearms season. Muzzleloader hunting is also permitted during the primitive weapons special season.

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(b) All firearms hunting shall be conducted from an elevated stand. Use of a safety harness is mandatory when in a tree stand.

(c) Two (2) hunters may hunt from the same hunting stand site.

(d) Hunters shall use slugs; buckshot may be used at the discretion of the NRM.

(e) Handicapped hunters may reserve hunting stand sites during the regular deer-hunting seasons by contacting the NRM (540-653-4186) one (1) week in advance.

(4) Archery

(a) Archery hunting for deer is permitted all day Monday through Saturday during the special archery season and general firearms seasons. Daytime hunting Monday through Friday before 1500 is restricted to Compartments 3 (west of Gambo Creek), 5, 6, 7, and 9 (see Figure 2).

(b) The NRM may authorize archery hunters to hunt outside identified compartments. Archery hunters must observe hunting-stand requirements while hunting in gun and bow compartments during the general firearms season during shotgun hunting times.

(c) Archery hunters may hunt from the ground or utilize portable tree stands. However, hunting from the ground shall not be permitted during the general firearms season in gun and bow compartments during firearms hunting times. Crossbow hunting follows identical rules. Use of a safety harness is mandatory when in a tree stand.

(d) Archery hunters may take legal small game and furbearers.

(e) Possession of any firearm in a "Bow Only" compartment is prohibited unless authorized by the NRM.

(f) Compartment 8 and hunting stand sites 1-1, 1-3, 2-2, 2-3, and 9-6 are bow only unless authorized otherwise by the NRM. A change in status will be posted in the GCS and/or via email.

b. Turkey

(1) Figure 3 identifies fourteen (14) spring turkey-hunting compartments. Parties of no more than four (4) hunters per compartment shall be permitted. The small game area is restricted to bow only. Fall turkey hunting shall be conducted in specified deer hunting compartments (see Figure 1).

(2) Firearms

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(a) Hunting for turkey is permitted on Saturdays and federal holidays during the fall firearms turkey season and spring gobbler season. Turkey hunters must ensure they have the appropriate tag on their license to hunt legally.

(b) No shot heavier than #2 bird shot shall be used.

(3) Archery

(a) Archery hunting for turkey is permitted all day Monday through Saturday during the turkey archery season, the fall firearms turkey season, and the spring turkey season. Daytime hunting Monday through Friday before 1500 is restricted to Compartments 3 (west of Gambo Creek), 5, 6, 7, and 9 (see Figure 2).

(b) Archery hunters are encouraged to use game trackers.

c. Small Game

Figure 3 identifies fourteen (14) small-game hunting compartments. Parties of no more than four (4) hunters per compartment shall be permitted for small-game hunting. Legal small game may be harvested from these areas during the deer season. Small game hunters may sign out two (2) adjacent compartments at the same time outside the deer hunting season. The designated small-game areas (i.e. along the Potomac River and Upper Machodoc Creek) are open during the entire hunting season. Deer and turkey may not be harvested in this area with a gun unless authorized by the NRM.

(1) Hunting is permitted on Saturdays, federal holidays, and the site-observed 'holiday shutdown' between Christmas and New Year's Day during the small game seasons.

(2) Small game may be taken by shotgun, air rifle, or bow.

(3) Small-game hunters shall ensure they exercise adequate control over their dogs so as not to conflict with other hunters. During the bald eagle nesting season (25 Dec – 15 Jun), dogs shall be kept from entering areas closed for this purpose.

NOTE: Favorite fishing spots along Upper Machodoc Creek and the Potomac River are in proximity to small game and waterfowl hunting areas. Hunters shall be conscious of their actions as well as those of anglers. Check specific logbooks for daily activity.

d. Waterfowl and Migratory Birds

Twelve (12) waterfowl hunting areas are available along the Mainside Potomac River and Upper Machodoc Creek shorelines and in Gambo Creek and Hideaway Pond (see Table 2 and Figure 1). In addition, there are up to five (5) licensed blinds (11 through 15) along Pumpkin



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Neck's Upper Machodoc Creek and Potomac River shorelines (see Figure 4). Waterfowl hunters may also sign out deer hunting stand sites by following the below procedures.

(1) Hunting is permitted on Saturdays, Sundays (limited to the 5 Pumpkin Neck waterfowl blinds), federal holidays, and the site-observed 'holiday shutdown' between Christmas and New Year's Day during respective waterfowl and migratory bird seasons. Waterfowl hunting areas 1 through 10 on Mainside and duck blinds 14 and 15 along the Pumpkin Neck shoreline shall be hunted at these times only. Sunday hunting is restricted to shoreline blinds 11 through 15 and area 16. Weekday hunting may be possible at shoreline blinds 14 and 15 and area 16 around Thanksgiving and Christmas depending upon testing schedules. Weekday hunting is permitted at shoreline blinds 11, 12, and 13.

Table 2: Waterfowl Hunting Areas

Waterfowl Hunting Area	Location
1	See Figure 1
2	See Figure 1
3	See Figure 1
4	See Figure 1
5	See Figure 1
6	See Figure 1
7	Railroad Bridge – Incinerator
7A	Hideaway Pond South
7B	Hideaway Pond North
8	Incinerator – Middle Bridge
9	Middle Bridge – DRMO Lot
10	DRMO Lot – Gambo Road

(2) Log in and log out procedures shall be conducted at the Mainside GCS for waterfowl-hunting areas/blinds 1 through 15. Areas/blinds may be reserved the day before after 1500; however, for safety reasons, the following is required to reserve waterfowl hunting areas 7 through 10 in Gambo Creek and Hideaway Pond and deer stand sites: a waterfowl hunter may not reserve the above identified areas if they are currently in use. This will avoid conflicts in case the current non waterfowl hunter plans to reserve that area for the next morning. Waterfowl hunters utilizing these areas shall also log in and out the appropriate deer stand during the deer hunting season to eliminate any user conflicts in the field.

(3) Access to waterfowl blinds 11 through 15 shall be accomplished by boat. The boat ramp facility at the Dahlgren Yacht Club may be used if you are a member. The use of the primary Yardcraft boat ramp is restricted to Saturdays, federally observed holidays, and the 'holiday shutdown' period between Christmas and New Year's Day. The boat ramp to the west, adjacent to Building 453, may be used Monday through Saturday although access is encumbered

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by a loading structure. Waterfowl hunters shall ensure the location of their vehicle/trailer does not conflict with mission activities in this area.

(4) Party hunting (i.e. individual hunters exceeding their personal bag limit and donating to less successful hunters) is a federal offense.

(5) Waterfowl hunters are not obligated to identify their harvest during the season in the respective GSC logbooks, but shall provide a report of their total harvest to the NRM at the conclusion of the season.

(6) Woodcock and mourning dove hunting compartments are identical to those identified for small game (see Figure 3).

e. Furbearer Trapping

(1) Furbearer trapping is permitted on Mainside for wildlife population management including nuisance control. The NRM shall authorize all trapping activities.

3. Pumpkin Neck Hunting Program Procedures

a. Deer

Annual deer harvest restrictions shall be outlined in reference (g) prior to the deer hunting season. Deer hunters must ensure they have the appropriate tag on their license to hunt legally. All deer shall be tagged at the site of the kill by notching the appropriate state or DPOP tag in compliance with state law.

There are twenty-two (22) hunting stand sites available at any one time on Pumpkin Neck (see Table 3 and Figure 4) for deer hunting. Also, see the map in the GCS that delineates approximate stand boundaries. Hunting stand sites within each compartment shall be regulated as follows:

Table 3: Pumpkin Neck Deer Hunting Stand Sites

Compartment	Number of Stand Sites	Weapon
1	6	Gun & Bow
2	6	Gun & Bow
3	4	Gun & Bow
4	4	Gun & Bow
5	2	Gun & Bow
OFF LIMITS	flexible	Gun

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The off limits area may be used for deer hunting during the deer hunting seasons by Naval Surface Warfare Center Dahlgren Division (NSWCDD) Ordnance Certified Team Leaders when firearms use is authorized and by other individuals authorized to hunt at NSFDL during Special Hunts. A Plan of Action (POA) shall be prepared with input from the NSWCDD Range Safety Director and the NSWCDD/NSASP Explosive Officer and approved by the NRM to conduct a Special Hunt.

(1) Firearms

(a) Shotgun and muzzleloader hunting for deer is permitted on Saturdays, holidays, and the site-observed 'holiday shutdown' between Christmas and New Year's Day during the firearms season. In addition, muzzleloader hunting is permitted during the primitive weapons special season Monday through Friday after 1500, and all day on Saturdays and holidays.

(b) Hunters shall use slugs; buckshot may be used at the discretion of the NRM.

(2) Archery

(a) Archery hunting for deer is permitted on Saturdays, holidays, and the site-observed 'holiday shutdown' between Christmas and New Year's Day during the special archery and general firearms seasons.

b. Turkey

Figures 3 and 4 identify five (5) spring turkey hunting compartments. Parties of no more than four (4) hunters per compartment shall be permitted.

(1) Hunting is permitted in the fall during the firearms season and on Saturdays during the spring gobbler season.

(2) No shot heavier than #2 birdshot shall be used.

c. Small Game

(1) Small game may be taken while conducting hunting activities for deer and turkey.

d. Waterfowl

Figure 4 identifies waterfowl hunting area 16 in Black Marsh. This hunting area shall be signed out at the Pumpkin Neck GCS while shoreline blinds 11 through 15 shall be signed out at the Mainside GCS.

(1) Hunting is permitted on Saturdays, federal holidays, the site-observed 'holiday shutdown' between Christmas and New Year's Day, possible weekday hunting around

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Thanksgiving and Christmas if testing schedules permit, and Sundays during waterfowl seasons. Waterfowl hunting in area 16 following the close of deer season shall be coordinated with the NRM as necessary.

(2) Log in and log out procedures shall be conducted at the Pumpkin Neck GCS. Area 16 may be reserved the day before after 1500.

e. Furbearer Trapping

(1) Furbearer trapping is limited to that authorized by the NRM for nuisance wildlife control as needed.

Figure 1: NSF Dahlgren Mainside Deer and Waterfowl Hunting Compartments

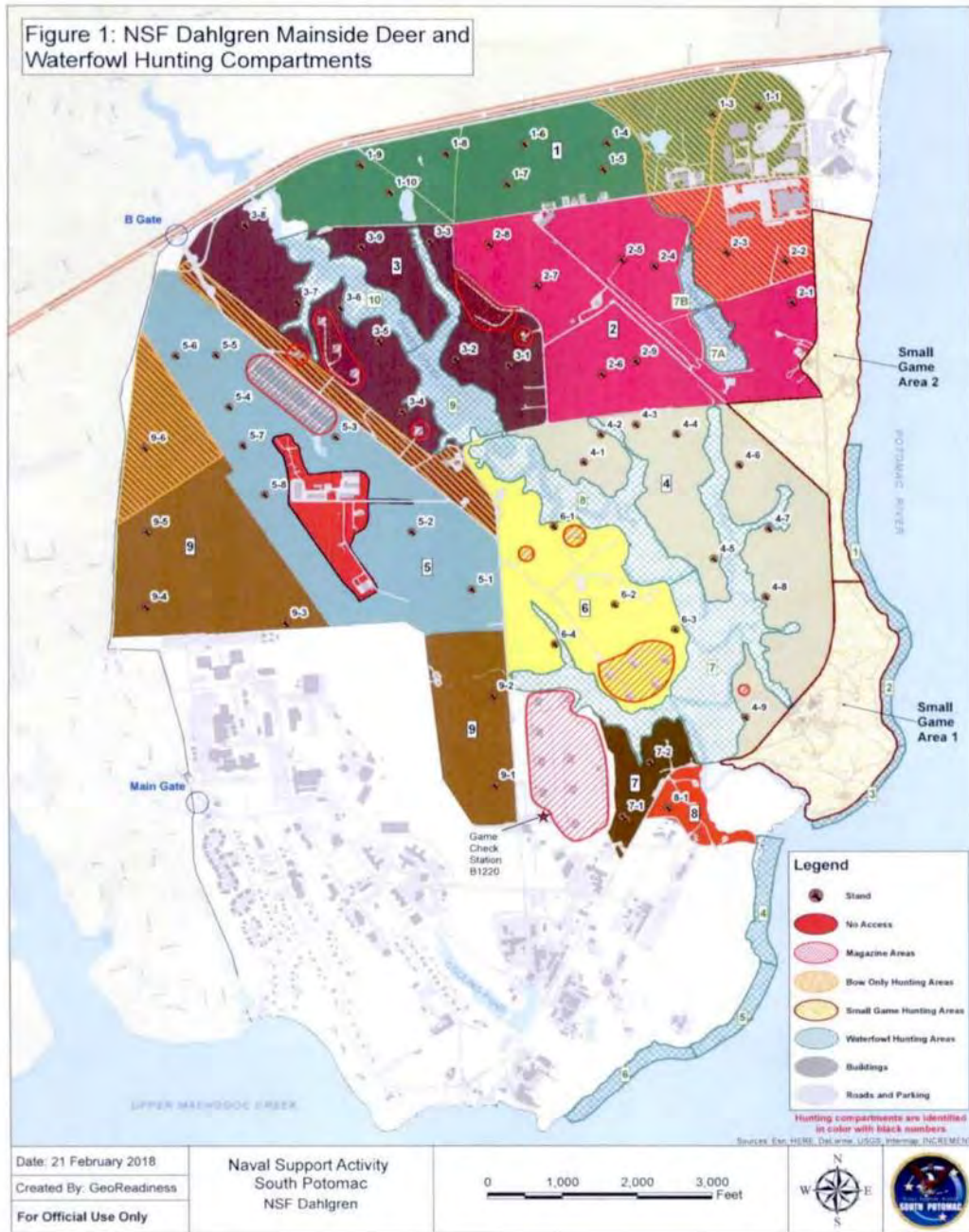
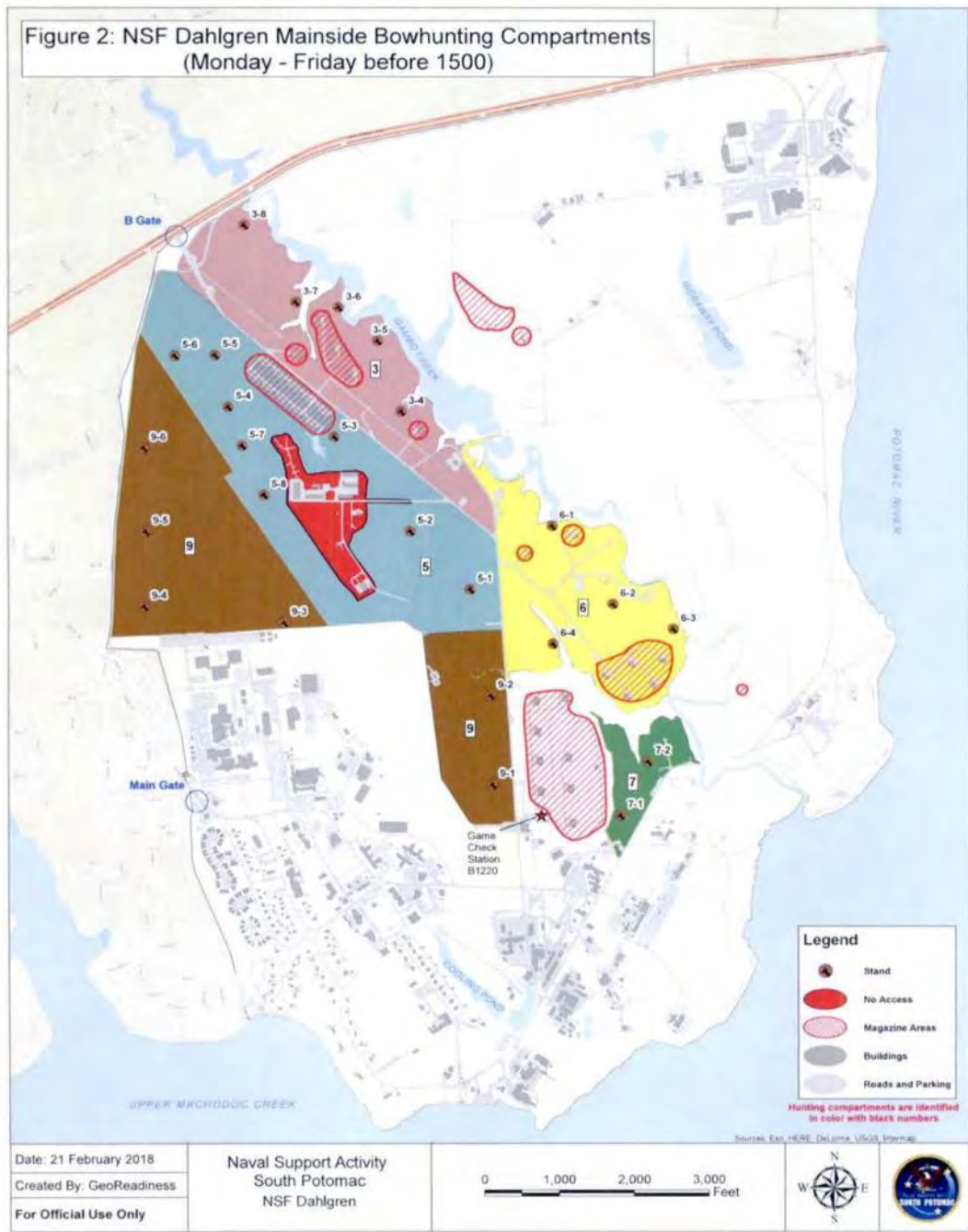
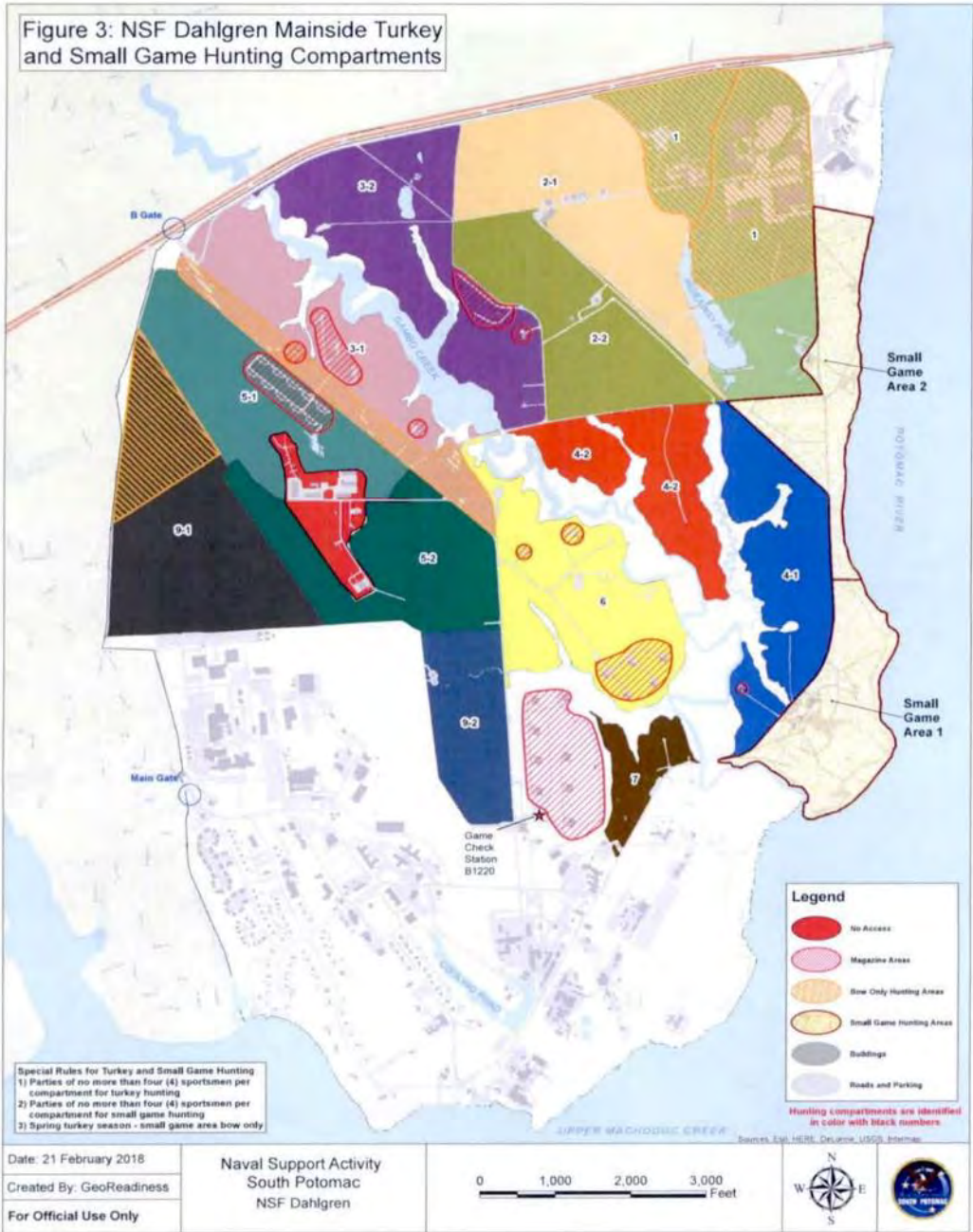
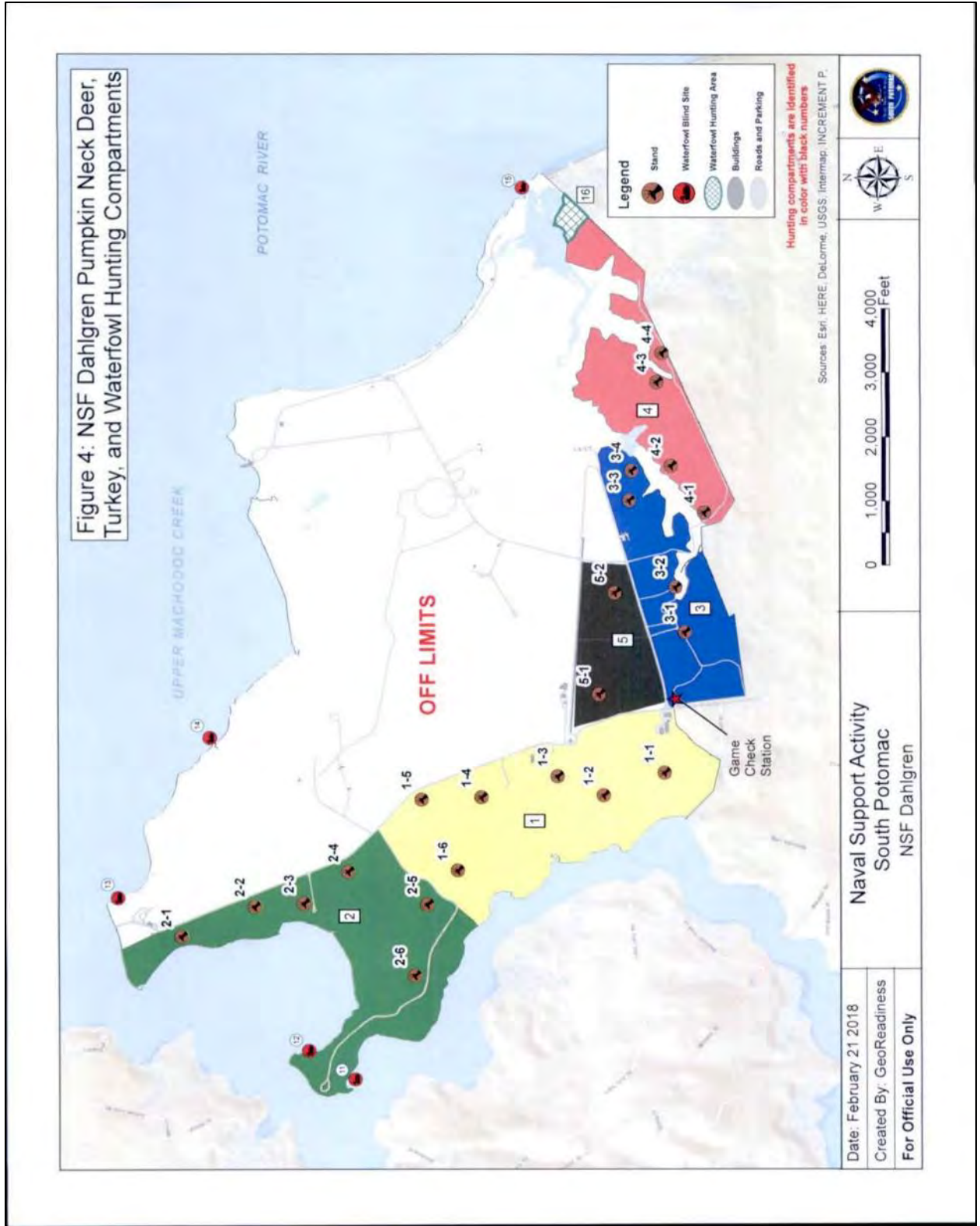


Figure 2: NSF Dahlgren Mainside Bowhunting Compartments  
 (Monday - Friday before 1500)









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Naval Support Facility Indian Head Hunting Program Procedures

I. General Requirements

a. Access

(1) Naval Support Facility Indian Head (NSFIH) hunters, that are sixteen (16) to seventeen (17) years of age, are restricted to archery hunting only on the Mainside Non-Restricted Area and must be dependents of personnel living on the installation. All other hunters shall be at least eighteen (18) years of age to participate in the NSFIH hunting program on the Mainside and Stump Neck Annex (SN) Restricted Areas.

(2) NSFIH active duty military and civilian hunters are allowed one (1) guest per hunting season. NSFIH hunters are not allowed to change guests during the season. No other NSFIH hunters are allowed to sponsor a guest.

(3) Hunting is allowed every day during established hunting seasons except Christmas and as otherwise noted by the Natural Resources Manager (NRM). Sunday hunting is limited to deer only during Sundays authorized by the state for deer hunting. No hunting shall take place if a designated Hunt Captain (HC) is not on duty.

(4) Hunting access is restricted to authorized personnel, limited by hunting area quotas, and further requires that a HC be on duty. Hunters shall not leave before they have registered at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073) and have been released by the NRM or by the HC. Deer hunters may not reserve their area or stand selection for the following morning. Additionally, individuals desiring to hunt waterfowl at Mainside or SN shall sign in at the Hunter's Board (Building 554) no more than 72 hours in advance based on the hunter's status. The designated deer HC, for that day, shall have the privilege of signing up first. The designated waterfowl HC for the assigned week shall have the privilege of signing up 96 hours in advance of the hunting event. Absentee sign outs or signing out early to hunt at a later time is prohibited except to hunt waterfowl. Only the NRM or HC can sign out other hunters on an absentee basis. Individuals authorized to hunt at NSFIH shall be accommodated before guests up until the time of release from Building 554 or the SN target range (behind Building 2073).

Before and after normal working hours, access to Mainside and SN shall be regulated by the NRM and HC's. The deer HC may monitor the daily hunting activity from a remote location but the HC shall be required to verify on site that all hunters have signed out at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073). The waterfowl HC may coordinate daily hunting activity on site or from a remote location.

(5) All hunters shall sign in at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073) no earlier than 1500 on weekdays, 0500 for hunting areas that are open to all day hunting and 0500 on weekends and federal holidays. Outside designated daylight

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savings time, hunters are authorized to sign in at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073) no earlier than 1430 on weekdays. All hunters shall sign out at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073) no later than one hour after sunset. Prior to moving to another area, hunters must sign in and out at the Hunter's Board (Building 554) or at the SN target range (behind Building 2073).

b. Responsibilities

(1) All NSFIIH HC's are either NSFIIH active duty military or active/retired employees of supporting/supported commands of NSFIIH and are appointed by the NRM based on their knowledge of explosive safety procedures and operations, security procedures, volunteerism and demonstration of safe and ethical behavior. HC's shall also be able to demonstrate the necessary experience needed to run the harvest check station, collect appropriate biological data and run the Mainside and SN sign in and out boards. The HC's tenure shall remain in effect for the current hunting season or until terminated by the NRM. HC's are responsible for managing hunting activities on a day-to-day basis at Mainside and SN.

(2) Each hunter shall be required to complete a hunter data form each day upon termination of all hunting activities and shall deposit the completed form at Building 554 within 24 hours of completion of hunting activities. Failure to complete and return hunter data forms may result in the suspension of NSFIIH hunting privileges.

c. Safety

(1) Safety clothing requirements shall follow state regulations.

(2) The NRM shall confirm each week with Naval Surface Warfare Center Indian Head Division (NSWCIHD) personnel, through NSWCIHD's after-hours email notification procedures, which areas are conducting remote explosive operations and shall close those specific areas or portions of those areas during that particular operation. In addition, the NRM shall also coordinate each week with NSWCIHD personnel directly responsible for the scheduling of explosive operations to determine any additional constraints previously unidentified through the email notification procedure. Waterfowl HCs shall also coordinate on a weekly/daily basis the activity of Strauss Avenue Thermal Treatment Plant (SATTP), Caffee Road Thermal Treatment Plant (CRTTP), Old Safety Burn Point, Large Motor Test (LMT), Small Motor Test (SMT), Fine Grind, Biazzzi Plant, Range 2 and Range 3 to ensure operation schedules are known before waterfowl hunters are authorized to hunt within these areas. This coordination will also include Saturday and federal holiday explosive operation scheduling.

(3) Matches, cigarette lighters, flame producing devices, transmitting radios, portable (cell) phones, cameras, or video recorders are strictly prohibited in all restricted area hunting areas and in all explosive operating areas.

d. Tracking

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(1) Hunters tracking or attempting to track wounded game shall not leave their assigned hunting area or track after authorized hunting hours unless authorized to do so by the NRM or HC's at Mainside or SN. The NRM or the HC shall notify the NSFIH Law Enforcement (LE) supervisor at (301) 744-4381, (301)744-4606 or (301) 535-1534 that tracking activities will be conducted outside regular hunting hours, which may include the following morning or afternoon. Access for tracking activities is provided by the hunter photo badge. Notification shall be done before and after tracking activities. Designated parking areas shall be used by all participating in the tracking effort. No weapon shall be carried in one's possession while tracking game outside of the assigned hunting area or after authorized hunting hours. All weapons shall be unloaded and left in a locked vehicle or locked compartment when tracking game outside of assigned hunting area. Anyone tracking game outside of their assigned hunting area without prior authorization shall be considered to be hunting illegally and subject to suspension or revocation of hunting privileges.

(2) Hunters may use a trained dog to locate and follow game blood trails for tracking purposes. The NRM and the NSFIH LE shall be notified prior to use of a dog for tracking purposes. All hunters shall ensure their dogs are current on rabies vaccinations prior to bringing on NSFIH.

e. Scouting

(1) Scouting is defined as searching for game, animal travel routes, game locations, animal sign, or preparing for hunting by searching out hunting locations or placing tree stands. Scouting is allowed Monday through Sunday from sunrise to sunset. Access for scouting activities is provided by the hunter photo badge. All hunters who want to scout shall sign in and out at the Hunter's Board at Building 554 or at the SN target range (behind Building 2073) no earlier than one hour prior to scouting. Prior to scouting, hunters shall confirm with the NRM on a daily basis that no explosive operations are being performed adjacent to the hunting areas. Hunters may sign out to scout only two (2) areas at a time. Scouting shall not take place within an area being hunted or an adjacent area. Weapons shall not be carried in one's possession or in the vehicle while scouting, except during legal hunting hours.

f. Firearms Qualifications

(1) It is the responsibility of each hunter to obtain the appropriate Maryland State Shooter Qualifications prior to the deer firearm season. Shots may be taken from the kneeling, standing or sitting positions. To qualify with shotgun, three (3) out of five (5) shots shall be placed in a nine-inch pie plate target from a distance of 40 yards. To qualify with muzzleloader two (2) out of three (3) shots shall be placed in a nine-inch pie plate target from a distance of 40 yards. Qualifications may be attempted any number of times but shall be no earlier than the next day following a failed qualification. Upon completion of a successful qualification the qualifying official shall issue hunters an annual Maryland State Shooter Qualification Program card.

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g. Parking

(1) Parking for recreational hunting, trapping, scouting, and tracking shall occur only in designated parking areas unless otherwise specified by the NRM. The reverse side of the hunter data form is used as a parking pass that shall be conspicuously displayed on the vehicle's dashboard denoting the hunters name, date and hunting area while hunting. The parking pass provides authorization to park on grass areas and informs LE that the vehicle belongs to a hunter. Parking areas at NSFIIH are denoted by parking signs located on the perimeters of hunting areas [see Figures (1) and (2)]. Use of privately owned vehicles (POV) is prohibited beyond "Authorized for Government Vehicles Only" signs. No parking signs are installed at SN, therefore, hunters are authorized to park on the perimeter of hunting areas, off main roads and off well-defined gravel roads. Hunters parking on the perimeter of hunting areas shall minimize disturbance to wildlife and other hunters and vehicles shall not block gates, roads, roadways, firebreaks, or trails.

h. Target Ranges

(1) Hunters may use the archery qualification range at the hunter check station (Building 1890) or the target range (behind Building 2073) at SN for target practice. Target practice is authorized Monday through Sunday from sunrise to sunset. Access for target practice is provided by the hunter photo badge. These ranges cannot be used if the surrounding area is being hunted. Hunters are responsible for verifying that the area is not currently being hunted by checking the sign in boards.

i. Tree Stands

(1) Only two (2) manufactured tree stands per hunter shall be placed on NSFIIH at any one time. One (1) of these stands shall be semi-permanent (i.e. the stand may be left in place more than one (1) hunting day) and the other stand must be removed each day. In addition, each stand shall have the hunter's name (printed legibly with a minimum of one-inch lettering) on the underside of the stand. Hunters may begin to place their stands no earlier than one (1) week prior to the opening day of archery season. Hunters may then move or place their stands during authorized hunting days. Exceptions to this section shall be reviewed on an individual basis by the NRM. At the end of the hunting season, all hunters are required to remove their tree stands. The NRM shall confiscate all tree stands remaining after the hunting season has closed. Confiscated tree stands may be picked up at Building 554. Tree stands that are not claimed within two (2) weeks of being confiscated shall become property of the NSFIIH hunting program for disposal or donation. All tree stands found on the installation without required identification markers or prior notification to the NRM of installation shall be immediately confiscated by the NRM and reported to LE.

j. Tagging and Field Dressing Deer and Turkey

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(1) The hunter check station (Building 1890) has been established for checking harvested deer and turkey. A hunter harvesting a deer or turkey shall immediately tag the animal with a field possession tag, fill out the Maryland Big Game Harvest Record form, and then transport the animal by the most direct route to the hunter check station for collection of biological data. Hunters are also instructed that during transport of the animal to the check station care should be taken to ensure that the carcass remain inconspicuous to the public. Once at the hunter check station, hunters shall not begin to field dress the deer until the hunt captain or NRM has authorized him or her to do so. Under no circumstances shall any deer be field dressed in the field unless otherwise authorized by the NRM. Deer hunters shall register their game by using the Internet at [www.gamecheck.dnr.state.md.us](http://www.gamecheck.dnr.state.md.us) or by calling the Big Game Registration Phone Line at 1-888-800-0121. Hunters are to check their deer as one taken on public land. The public land code for NSFIIH is 400. After a deer is checked the deer must either be removed by the hunter or donated to the Maryland's Hunter Harvestshare Program.

k. Baiting

(1) The use of bait shall be authorized only during specific times of the year and at specific locations as determined by the NRM. Once the times and locations are determined, baiting shall be authorized Monday through Sunday from sunrise to sunset. Access for baiting is provided by the hunter photo badge. A sign-up sheet for baiting will be posted at Building 554 once the specific times of year and locations have been determined. A list will be posted noting each hunter and bait pile locations by hunting area and land feature. A 250-yard buffer will be enforced around each bait pile to ensure other hunters are not using the bait site. The 250-yard buffer is not enforced at bait sites bordering the wildlife field plots in hunting areas 4A, 4B, 7A and 8A. The 250-yard buffer shall be removed from bait sites that are not hunted for a 2-week period. The hunter will be notified that he/she is no longer authorized to bait that site or he/she may continue to bait there but the buffer shall no longer be enforced.

(2) The following prioritization scheme shall be followed in assigning bait sites to hunters based on the hunter's access status:

- (a) NSASP and supporting/supported command active duty military personnel.
- (b) NSASP and supporting/supported command civilian government employees.
- (c) Active duty and retired military personnel.
- (d) NSASP and supporting/supported command contractors meeting specified requirements.
- (e) NSASP and supporting/supported command retired civilian government employees.

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2. Mainside Hunting Program Procedures

a. Deer

(1) Annual deer harvest restrictions and bag limits shall be outlined in reference (h) prior to the beginning of the deer hunting season. All hunting areas are designated in figure (1). Hunting areas shall be defined as Mainside, which includes all of Cornwallis Neck, Marsh Island, Thoroughfare Island and Bullitt Neck. Specific areas within these sites may be closed at any time by the NRM. Announcements noting closures, openings and date changes will be posted at Building 554 and become effective on the posted date. Hunting in NSFIIH non-restricted areas is restricted to Saturdays, Sundays and federal holidays only and shall be coordinated by the NSFIIH NRM. Authorized hunters shall consist of HC's and other hunters meeting Level 1 access criteria. However, authorized hunters must have demonstrated the utmost in ethical hunting behavior and demonstrated thorough knowledge of NSFIIH hunting and safety requirements due to the close proximity of non-restricted area hunting to the administrative and housing areas.

(2) Firearms

(a) Shotgun hunting on Mainside shall take place only for deer management purposes as deemed necessary by the NRM and approved by the Maryland Department of Natural Resources (MDNR). Areas 1A, 1C, 2A, 3A, 4A, 4B, 5A and 7A are open to firearms hunting during the managed hunts. All other areas shall be closed to firearms hunters, unless otherwise noted by the NRM. The use of muzzleloaders on Mainside is not authorized during the managed hunts. Firearm stand site F-2 shall be closed if the SATTP is operating.

Table 1: Deer Firearm Stand Sites and Areas

Stand #	Area	Stand #	Area
F-1	1C	F-8	4B
F-2	1A	F-9	4B
F-3	2A	F-10	5A
F-4	2A	F-11	7A
F-5	3A	F-12	1A
F-6	3A	F-13	5A
F-7	4A	F-14	1C

(b) During the managed hunts, the number of hunters in an area may not exceed the stand sites in Table 1. Hunters shall hunt within 50 yards of the firearm stand site, which is marked by a sign on a metal post or tree.

(3) Archery

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(a) During the archery season (bow/crossbow) deer may be hunted in all areas (except 1AA, 2AA, 3AA and 5E) Monday through Friday from 1500 (1430 outside designated daylight savings time) to one-half hour after sunset and on Saturdays, authorized Sundays (as allowed for Charles County by the State), and federal holidays from one-half hour before sunrise to one-half hour after sunset, unless otherwise noted by the NRO. Areas 4A, 4B, and 8A may be hunted on Fridays from one-half hour before sunrise to one-half hour after sunset. Areas 1AA, 2AA, 3AA, 5E may be hunted only on Saturdays, authorized Sundays (as allowed for Charles County by the State), and federal holidays from one-half hour before sunrise to one-half hour after sunset. In the event of a managed firearm hunt, archery hunting is closed in those areas that are open during the managed firearm hunt, unless otherwise noted by the NRM.

(b) The following quotas are determined to be the maximum number of hunters permitted within the unit boundary. The number of hunters in each area may not exceed the quotas listed below in Table 3 unless permitted by the NRM. Quotas are filled on a first-come first-served basis. No hunter may call in to reserve an upland hunting area or stand.

Table 3: Mainside Upland Hunting Areas and Quotas

Area	Quota	Acres	Area	Quota	Acres
1AA	3	42	6A	2	43
2AA	3	14	6B	2	12
3AA	2	16	6C	2	8
1A	2	35	6D	3	7
1B	2	25	7A	3	42
1C	3	46	7B	2	5
1D	2	10	8A	4	55
1E	2	8	9A	4	42
2A	3	63	9B	3	27
3A	3	33	10A	2	11
4A	2	19	10B	2	3
4B	3	23	HCa	1	2
5A	3	33	HCb	2	6
5B	2	8	HCc	2	8
5C	3	15	HCd	2	14
5D	2	7	HCe	2	8
5E	3	7			
TOTAL	43	404	TOTAL	38	293

(c) Archery only stand sites are limited by a specific distance radiating from the placard posted on an individual tree, metal post, or marked archery stand site as noted in Table 2. Archery stand sites 45 and 48 are HC access only archery stand sites.

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Table 2: Mainside Archery Stand Sites, Quotas, and Corresponding Radius

Stand	Quotas	Radius
45	2	50-YDS
48	2	50-YDS

b. Turkey

(1) Turkey hunting is allowed during the Maryland January and spring turkey seasons, see reference (h) for season dates. Turkey may be hunted in the January season in accordance with hunting hours authorized for deer hunting. Turkey may be hunted in the spring season in all hunting areas on Mainside on Saturdays (Sunday turkey hunting is not allowed) from one-half hour before sunrise until noon, or until one-half hour after sunset the last two weeks of the spring turkey season. Turkey may be hunted with a bow/crossbow on weekdays in Areas 1A, 1B, 2A, 3A, 4A, 4B, 8A from one-half hour before sunrise until noon, or until one-half hour after sunset the last two weeks of the spring turkey season. The NRM may authorize hunting in additional areas during the weekday as long as installation operations are not impacted.

(2) During the January and spring turkey seasons, the number of hunters in a hunting party may not exceed more than two (2) hunters and one (1) caller without a weapon, unless authorized by the NRM.

(3) Hunting turkey on Mainside with firearms is prohibited.

c. Small Game

(1) Hunting for certain species shall be restricted to specific areas and type of weapon and ammunition. All hunting areas at Mainside are restricted to archery or air rifle use from Monday through Saturday and federal holidays.

(2) Weekends and holidays are generally divided into two (2) half-day periods. An area may be hunted only once during each half-day period by an individual or by a party of hunters. Each half-day period is defined as beginning one half-hour before sunrise to 1230 and beginning at 1300 until one half-hour after sunset. Only the individuals registered and signed in to hunt an area or members of his/her party are authorized to hunt within that area. No other hunter may hunt that area for rabbit except as an invited member of the hunting party.

(a) Squirrels: Shall be hunted in all areas with archery or air rifles, Monday through Saturdays and federal holidays.

(b) Rabbit: Shall be hunted in all areas with archery or air rifles, Monday through Saturdays and federal holidays.



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(c) Raccoon, opossum and fox: Shall be hunted in all areas with archery or air rifles, Monday through Saturdays and federal holidays.

(d) Coyote: Shall be harvested incidentally during deer or small game hunting activities. Harvesting of coyotes shall follow state regulations for weapon, season and bag limit. No coyote season shall be established at NSFIIH unless otherwise noted by the NRM.

(3) Hunting parties shall be limited to no more than three (3) people. Individuals or hunting parties may not hunt more than two (2) areas per day.

d. Waterfowl and Migratory Birds

(1) Due to base activities, range operations, bald eagle nest buffer restrictions and required distances between hunting parties, waterfowl hunting areas have the potential to be limited on a daily basis. As a result, NSFIIH has set an annual quota of 55 waterfowl hunters combined for Mainside and SN to ensure NSASP active duty military personnel and civilian government employees are provided hunting opportunities, unless otherwise noted by the NRM. The annual quota does not include guests that are sponsored by NSFIIH active duty military and civilian waterfowl hunters. The total number of guests shall not exceed 15 individuals per waterfowl hunting season.

(2) The following prioritization scheme shall be followed in determining the total number of waterfowl hunters each season based on the hunter's access status:

(a) NSASP and supporting/supported command active duty military personnel.

(b) NSASP and supporting/supported command civilian government employees.

(c) Active duty and retired military personnel.

(d) NSASP and supporting/supported command contractors meeting specified requirements.

(e) NSASP and supporting/supported command retired civilian government employees.

(f) Guests.

(3) If the annual quota is reached, guests and other hunters lower on the prioritization scheme will be notified that they are no longer authorized to hunt. This will provide hunting access to NSASP active duty military personnel and civilian government employees (or other hunters with a higher ranking status on the prioritization scheme). Guests will be removed from the access list first to provide hunting access for NSASP active duty military personnel and

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civilian government employees, beginning with the most recent guest added to the list. If no guests are on the access list, then the next lowest ranking hunter status on the prioritization scheme shall be removed from the list starting with the most recent addition. All hunters that are removed from the access list shall be refunded their hunting permit fee.

(4) Waterfowl can be hunted Monday through Saturday and federal holidays that occur during the Maryland waterfowl season. Waterfowl may be hunted from one half hour before sunrise until 1000 hours and from 1430 hours until sunset, except Thoroughfare Island (WBS17 and WBS15), Bullitt Neck (WBS16), WBS11, WB5, WB6 and WB13, which may be hunted from one half hour before sunrise to sunset. Areas WS3, WS7, WS9, WS10 and WBS10 are restricted to Saturday and federal holiday hunting only from one half hour before sunrise to sunset. WS3 and WS7 will be closed to hunting on Saturdays and federal holidays if the SATTP and CRTTP are active. Access to WB5, Monday through Thursday, shall be from water only, unless otherwise noted by the NRM. Waterfowl hunting is authorized during the concurrent deer season.

(5) Waterfowl hunting areas on Mainside, which consists of permanent waterfowl blinds and offshore blind sites, are identified in Figure (1). The remaining portion of Mainside authorized for waterfowl hunting consists of marsh or tidal shoreline. Waterfowl hunters are authorized to hunt anywhere in their assigned hunting area but not within 250 yards of another hunting party.

(6) Reservations and sign ins are made by placing the hunter's name, home phone number, date and time of sign in, names of all members of the hunting party, desired hunting date and hunting times and the desired blind or area number at Building 554. Waterfowl hunting reservations for employees of NSFIIH and active duty military shall be made at Building 554 no earlier than 72 hours in advance. Retired military and retired or former federal employees from NSFIIH or its supporting/supported commands are eligible to make reservations 48 hours in advance and all other eligible hunters are limited to 24 hours before the hunt. Guests are not authorized to make reservations. A waterfowl hunting party may not consist of more than four (4) individuals. Only base permitted waterfowl hunters, with a hunter photo badge, are authorized as members of a waterfowl hunting party. Non-permitted observers shall not be authorized to join waterfowl hunting parties at any time.

(7) All waterfowl hunters shall coordinate their hunting activity with waterfowl HC's before and after each hunting event to ensure that operational areas are avoided and hunter safety is followed. All hunters and hunting parties shall check-in from hunting or cancel an existing reservation prior to reserving another area with the designated waterfowl HC. Waterfowl hunters and/or hunting parties are not authorized to hunt an area until a verbal confirmation has been received from the waterfowl HC confirming explosive operations, including but not limited to range and burning activities, are inactive during requested hunting dates and times. All hunters and/or hunting parties shall contact the designated waterfowl HC no later than one and one half hour after a hunting event is over. This procedure is essential for accountability and safety purposes. Waterfowl hunters may not hunt a permanent blind or blind stake for more than two

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(2) consecutive days. Waterfowl hunters may not hunt other permanent blinds or blind sites without signing out of the previous area, blind or blind site.

(8) Waterfowl hunters are authorized to bring their dogs on Mainside as part of their hunting party without prior notification. Waterfowl hunting dogs are to remain with the hunting party at all times and be used only for waterfowl hunting purposes, which includes but is not limited to retrieval of harvested waterfowl. All hunters shall ensure their dogs are current on rabies vaccinations prior to bringing on NSFIH.

(9) Possession of lead shot while waterfowl hunting is strictly prohibited and is considered "*prima facie*" evidence of hunting illegally. Waterfowl may be hunted with a muzzleloader shotgun or shotgun from 20 gauge to 10 gauge. Waterfowl hunters shall retrieve expended shotgun shells or shell casings and dispose of appropriately.

(10) All hunters shall make every attempt to retrieve all waterfowl wounded or killed. Hunting privileges may be suspended or revoked if the NRM or waterfowl HC determines that the hunter(s) are not making every attempt to retrieve waterfowl.

(11) An annual Youth Waterfowl Hunt may be conducted during the concurrent state Youth Waterfowl Hunt and shall comply with all state and federal regulations. A waterfowl HC will be present in each hunting party. Hunting parties are not authorized to access hunting areas through NSFIH property. Authorized hunting areas are limited to the following: WBS12, WBS15, WBS16, WBS17, WB5 and WB13. The Youth Waterfowl Hunt shall require approval from Security and the ICO prior to annual authorization.

(12) Migratory bird hunting is not authorized on Mainside, other than waterfowl hunting. See the Stump Neck Hunting Program Procedures for crow and dove.

e. Furbearer Trapping

(1) Personnel authorized to trap on Mainside are limited to active duty and civilian employees attached to NSASP or its supporting/supported commands. All other active duty, retirees, dependents and guests are not authorized to trap on Mainside. Trapping for furbearers, which include beaver, muskrat, mink, red or gray fox, raccoon, and opossum shall occur Monday through Saturday in authorized areas from sunrise to sunset; except from sunrise to midnight on Sunday. All traps shall be checked at least once every 24 hours. Trapping may also be authorized by the NRM for nuisance wildlife control as needed.

(2) Individuals wishing to trap shall register in person with the NRM prior to any trapping. They will be given an area assignment on a first-come, first-served basis until such time that access shall be controlled by a lottery when it is anticipated that demand for these zones exceeds the resource base.

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(3) Individuals may request trapping zones after 01 September of each year. Once an area is assigned, the trading of zones is prohibited. All traps shall be identifiable to the owner and a stake shall be placed near the trap to enable identification of the trap location by the NRM or other personnel in the area. Traps without name tags shall be confiscated by the NRM. No leg hold traps shall be set within 150 yards of an occupied building. No traps shall be set within 50 yards of visibility of any building, road, parking lot, utility line or steam line. Set traps that violate the designated stand-off distance shall be confiscated by the NRM. Dens or houses of furbearers shall not be disturbed at any time while hunting or trapping. No furbearers may be transported from place of capture unless they have been killed.

(4) All Mainside trappers shall report their catch weekly to the NRM by submitting an upland game data sheet. This shall include species numbers, weight, and sex legibly written and signed by the trapper. Trapping of beaver shall be authorized only by the guidance of the NRM. Each trapper is limited to only one incidental harvest of otter per trapping season, unless otherwise noted in the annual notice. All harvested beaver and otter shall be brought to the NRM for sexing and weighing. If the NRM cannot be contacted then the trapper shall weigh each beaver and otter or estimate the weight, record the sex of the animal and report the information to the NRM within the next 24 hours. Trappers may set traps during the white-tailed deer archery and firearms season.

(5) All Mainside trappers shall coordinate placement of traps during the waterfowl hunting season with the NRM to ensure trap placement in waterfowl hunting areas does not impact or jeopardize the safety of the waterfowl hunters or waterfowl hunting dogs.

(6) Upland hunting areas have been divided into trapping zones to control the number of individuals in specific areas. Mainside Zone 1 shall include areas 1B, 1C, 2A, 3A, 4A, and 4B. Mainside Zone 2 includes areas 5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, and 8A.

(7) A .22 caliber short or long rifle, rimfire cartridge fired from a pistol is the only single projectile ammunition that may be used to dispatch trapped animals. Pistols used by trappers shall be registered with the respective Police Department prior to trapping. A shotgun may only be used on Saturdays during authorized hours.

### 3. Stump Neck Hunting Program Procedures

#### a. Deer

(1) Annual deer harvest restrictions and bag limits shall be outlined in reference (h) prior to the beginning of the deer hunting season. All hunting areas are designated in figure (2). Hunting areas shall be defined as Stump Neck and Rum Point. Specific areas within these sites may be closed at any time by the NRM. Announcements noting closures, openings and date changes will be posted at Building 554 and become effective on the posted date.

#### (2) Firearms

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(a) Shotgun and muzzleloader hunting on Stump Neck and Rum Point shall take place only during the ongoing state shotgun and muzzleloader seasons, unless otherwise noted by the NRM and approved by the Maryland Department of Natural Resources (MDNR) for deer management purposes. During the deer shotgun and muzzleloader seasons, hunting will be restricted to Saturdays and federal holidays only, from one half-hour before sunrise to one half-hour after sunset. Areas 9SN, 10SN, 11SN, 12SN, 13SN, 14SN, 15SN, 16SN, 17SN, 18SN and 19SN are open to deer hunting during shotgun and muzzleloader seasons. All other areas shall be closed to shotgun and muzzleloader hunters, unless otherwise noted by the NRM. Firearm stand sites F-32, F-33 and F-35 shall be closed if Ranges 2 and 3 are active.

Table 1: Deer Firearm Stand Sites and Areas

Stand #	Area	Stand #	Area
F-20	12SN	F-34	15SN
F-21	12SN	F-35	18SN
F-22	12SN	F-36	12SN
F-23	15SN	F-37	14SN
F-24	15SN	F-38	15SN
F-25	15SN	F-39	12SN
F-26	15SN	F-40	15SN
F-27	15SN	F-41	15SN
F-28	14SN	F-42	17SN
F-29	17SN	F-43	13SN
F-30	16SN	F-44	13SN
F-31	16SN	F-45	11SN
F-32	18SN	F-46	13SN
F-33	19SN	F-47	13SN

(b) During the firearm season, the number of hunters in an area may not exceed the firearm stand sites in table 1. Firearm deer hunters shall hunt within 50 yards of the firearm stand site, which is marked by a sign on a metal post or tree.

(c) A sign in sheet shall be posted at the Building 554 one (1) week prior to each firearm event. A drawing shall be conducted by the NRM two (2) days prior to the date of the firearm event to assign each hunter one of the firearm stand sites listed in table 1. An email shall be sent out to all hunters on the sign in sheet to identify their assigned firearm stand site. Firearm stand site assignments from the drawing shall only be valid until one hour before sunrise of the first day. A hunter failing to report for his/her assignment shall forfeit the assigned firearm stand site to the next available hunter. Firearm stand site assignments shall be for one full day beginning from one half-hour before sunrise to one half-hour after sunset, unless otherwise noted by the NRM.

(3) Archery

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(a) During the archery season deer may be hunted in all areas Monday through Friday from 1500 (1430 outside designated daylight savings time) until one half-hour after sunset and Saturdays and federal holidays from one half-hour before sunrise until one half-hour after sunset. In areas 9SN, 10SN, and 11SN deer may be hunted with a bow and crossbow Monday through Saturday and federal holidays from one half-hour before sunrise until one half-hour after sunset, unless otherwise noted by the NRM. The archery deer season is closed in those areas that are open during the concurrent deer firearms season, unless otherwise noted by the NRM. Hunters may hunt with a bow and crossbow during this season in all other areas. Sunday archery hunting is authorized in all areas during the concurrent Charles County Sunday hunting dates. Access to areas 16SN, 18SN and 19SN, within Ranges 2 and 3 explosive arcs, shall be coordinated daily by the deer HC. Hunting is not authorized in these areas if the ranges are active.

(b) Hunters may access Chicamuxen Wildlife Management Area (CWMA) from Area 15SN for archery hunting, but may not cross Navy property to the CWMA to hunt deer or turkey with firearms. Archery hunters desiring to access the CWMA through area 15SN must first notify a SN HC that they intend to do so, and sign in and out of the Hunter's Board at the SN target range (behind Building 2073).

(c) The following quotas are determined to be the maximum number of hunters permitted within the unit boundary. The number of hunters in each area may not exceed the quotas listed below in table 2 unless permitted by the NRM. Quotas are filled on a first-come first-served basis. No hunter may call in to reserve an upland hunting area or stand.

Table 2: Stump Neck Upland Hunting Areas and Quotas

Area	Quota	Acres	Area	Quota	Acres
9SN	2	25	15SN	6	189
10SN	2	54	16SN	3	46
11SN	3	99	17SN	2	29
12SN	3	73	18SN	2	19
13SN	4	85	19SN	3	32
14SN	3	60			
<b>TOTAL</b>	<b>17</b>	<b>396</b>		<b>16</b>	<b>315</b>

b. Turkey

(1) Turkey shall only be hunted during the Maryland January and spring turkey seasons, see reference (h) for season dates and harvest limits. Turkey shall be hunted with a firearm or bow on Saturdays from one half-hour before sunrise until 1200 in all areas at SN, unless otherwise noted by the NRM. Hunters may only hunt two (2) adjoining upland hunting areas at any one time. Turkey may be hunted with a bow in all other hunting areas at SN on Saturdays from one half-hour before sunrise until 1200. Turkey may also be hunted with a bow in areas 9SN, 10SN, 11SN, 12SN, 13SN, 14SN and 15SN, Monday through Friday from one-half hour

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before sunrise until noon or unless otherwise noted by the NRM. During the last two weeks of the spring turkey season, hunters are authorized to hunt from one-half hour before sunrise until one-half hour after sunset. The NRM may authorize hunting in additional areas during the weekday as long as installation operations are not impacted.

(2) A sign-up sheet shall be posted at the Building 554 one (1) week prior to the SN Saturday turkey gun hunt for interested hunters. A drawing will be conducted by the NRM two (2) days prior to the date of the hunt and areas will be assigned based on the drawing results. The Saturday turkey gun hunt is limited to four (4) combined hunting areas which are 9SN/10SN/11SN; 12SN/14SN; 13SN/15SN and 16SN/17SN/18SN. Therefore, all hunters signing up may not be chosen during the drawing. The hunters not chosen shall have priority for the subsequent Saturday hunt, if they sign up again. An email shall be sent out by the NRM to notify all hunters their assigned areas or that they were not chosen during the drawing. Hunting area 16SN/17SN/18SN shall be closed if Ranges 2 and 3 are active.

(3) During the Maryland January and spring turkey seasons, the number of hunters in a hunting party may not exceed more than two (2) hunters and one (1) caller without a weapon, unless authorized by the NRM.

c. Small Game

(1) See the Mainside Hunting Program Procedure Small Game section for program hunting areas, hours and restrictions.

d. Waterfowl and Migratory Bird

(1) See the Mainside Hunting Program Procedure Waterfowl and Migratory Bird section for program hunting areas, hours and restrictions. SN specifics are listed below.

(2) Waterfowl can be hunted Monday through Saturday and federal holidays that occur during the Maryland waterfowl season. Waterfowl may be hunted from one half hour before sunrise until 1000 hours and from 1430 hours until sunset, except Rum Point (WB17, WS17 and WS18) and WB26 which may be hunted from one half hour before sunrise to sunset. Areas WS19, WS20, WS22 and WBS29 are restricted to Saturday and federal holiday hunting only from one half hour before sunrise to sunset. WS20 and WS22 will be closed to hunting on Saturdays and federal holidays if Ranges 2 and 3 are active. Waterfowl hunting is authorized during the concurrent deer season.

(3) Waterfowl hunting areas on SN, which consists of permanent waterfowl blinds and offshore blind sites, are identified in Figure (2). The remaining portion of SN authorized for waterfowl hunting consists of marsh or tidal shoreline. Waterfowl hunters are authorized to hunt anywhere in their assigned hunting area but not within 250 yards of another hunting party.

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(4) Waterfowl hunters are authorized to bring their dogs on SN as part of their hunting party without prior notification. Waterfowl hunting dogs are to remain with the hunting party at all times and be used only for waterfowl hunting purposes, which includes but is not limited to retrieval of harvested waterfowl. All hunters shall ensure their dogs are current on rabies vaccinations prior to bringing on NSFIH.

(5) An annual Youth Waterfowl Hunt may be conducted during the concurrent state Youth Waterfowl Hunt and shall comply with all state and federal regulations. A waterfowl HC will be present in each hunting party. Hunting parties are not authorized to access hunting areas through NSFIH property. Authorized hunting areas are limited to the following: WB17, WS17 and WB26. The Youth Waterfowl Hunt shall require approval from Security and the ICO prior to annual authorization.

(6) Crow hunting is restricted to Saturdays and federal holidays only at SN. Weekends and holidays are generally divided into two (2) half-day periods. An area may be hunted only once during each half-day period by an individual or by a party of hunters. Each half-day period is defined as beginning one half-hour before sunrise to 1230 and beginning at 1300 until one half-hour after sunset.

(7) Dove hunting is restricted to areas 9SN, 10SN, 11SN, 12SN, 13SN and 15SN, Saturday and federal holidays only. Weekends and holidays are generally divided into two (2) half-day periods. An area may be hunted only once during each half-day period by an individual or by a party of hunters. Each half-day period is defined as beginning one half-hour before sunrise to 1230 and beginning at 1300 until one half-hour after sunset.

e. Furbearer Trapping

(1) See the Mainside Hunting Program Procedure Furbearer Trapping section for program trapping areas and restrictions. SN specifics are listed below.

(2) Upland hunting areas have been divided into trapping zones to control the number of individuals in specific areas. SN Zone 1 includes areas 9SN, 10SN, 11SN, 12SN, 14SN and the headwater marsh of Chicamuxen Creek at the intersection at Archer and Roach Roads. SN Zone 2 includes areas 15SN, 16SN, 17SN and the Chicamuxen Creek marsh at the end of Porter Road. Trapping in the Chicamuxen Creek marsh at the end of Porter Road shall be conducted outside of the Range 2 and 3 explosive arcs. Trapping is not authorized in areas 13SN, 18SN and 19SN.



# Naval Support Facility Indian Head Hunting Map

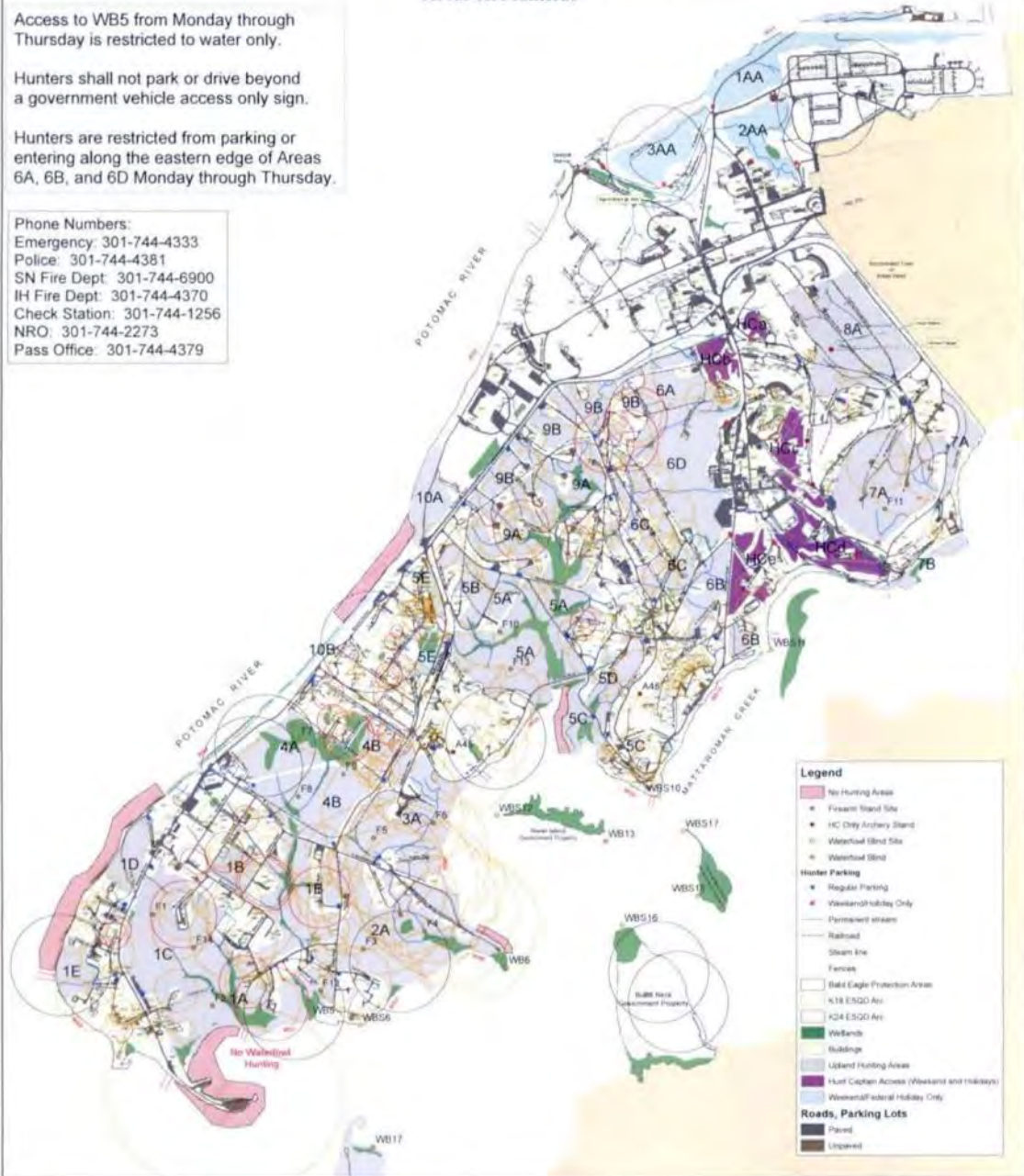
Figure 1: Deer and Waterfowl Hunting Areas on Mainside

Access to WB5 from Monday through Thursday is restricted to water only.

Hunters shall not park or drive beyond a government vehicle access only sign.

Hunters are restricted from parking or entering along the eastern edge of Areas 6A, 6B, and 6D Monday through Thursday.

Phone Numbers:  
 Emergency: 301-744-4333  
 Police: 301-744-4381  
 SN Fire Dept: 301-744-6900  
 IH Fire Dept: 301-744-4370  
 Check Station: 301-744-1256  
 NRO: 301-744-2273  
 Pass Office: 301-744-4379



Date: 14 December 2017  
 Created By: GeoReadiness  
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Naval Support Activity South Potomac  
 NSF Indian Head





**NSASPINST 5090.3D - Fishing Instruction**

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DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC  
8509 SAMPSON ROAD, SUITE 217  
DAHLGREN, VIRGINIA 22448-5108

NSASPINST 5090.3D  
N00  
AUG 01 2016

Naval Support Activity South Potomac Instruction 5090.3D

Subj: NAVAL SUPPORT ACTIVITY SOUTH POTOMAC RECREATIONAL FISHING  
PROGRAM REGULATIONS

Ref: (a) OPNAVINST 5090.1D  
(b) 16 USC 670 - Conservation Program on Military  
Reservations (Sikes Act)  
(c) Virginia Annotated Code; Title 28.2 Fisheries and  
Habitat of Tidal Waters and Title 29.1 Game, Inland  
Fisheries and Boating  
(d) Annotated Code of Maryland; Title 08, Subtitle 02  
Fisheries Service  
(e) Naval Support Facility Dahlgren Integrated Natural  
Resources Management Plan  
(f) Naval Support Facility Indian Head Integrated Natural  
Resources Management Plan  
(g) Naval Support Activity South Potomac Physical  
Security Plan, Ch.2

Encl: (1) Naval Support Activity South Potomac General Fishing  
Regulations  
(2) Naval Support Facility Dahlgren Fishing Program  
Procedures  
(3) Naval Support Facility Indian Head Fishing Program  
Procedures

1. Purpose. To establish recreational fishing program regulations and procedures governing recreational fishing on Navy property at Naval Support Activity South Potomac (NSASP) in accordance with references (a) through (g). NSASP is comprised of Naval Support Facility Dahlgren, VA (NSFDL) and Naval Support Facility Indian Head, MD (NSFIH).

2. Cancellation. NSASPINST 5090.3C

3. Background. Recreational fishing is permitted on ponds, creeks, and the Potomac River, except where otherwise posted or noted. NSASP fishing program regulations are established to

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ensure compliance with local fishing regulations, to provide a safe fishing environment, and to prevent conflicts between recreational fishing activities and the military mission. The respective Natural Resources Manager (NRM) administers the fishing program.

4. Scope. Established regulations apply to all anglers fishing on NSASP property. All anglers are subject to the rules and regulations established by the Installation Commanding Officer. Violation of any Federal, State, Commonwealth, County, or NSASP regulations may be cause for permanent revocation of fishing privileges on the Installation and/or prosecution in federal district court. The respective NRM shall investigate alleged violations of rules and regulations. In addition, all Federal, State, Commonwealth or County violations will be turned over to NSASP Law Enforcement and respective State or Commonwealth conservation law enforcement officers. Anglers convicted of a Federal, State, Commonwealth, County or NSASP violation may appeal to their respective Assistant Installation Environmental Program Manager (AIEPM) and NRM within 30 days.

5. Action. All authorized anglers shall comply with the enclosed regulations that govern fishing on NSASP property. Failure to adhere to the provisions of this instruction may result in administrative or disciplinary action including the temporary or permanent loss of privileges. This decision shall be based upon the input from the respective AIEPD and NRM.

  
M. J. FEINBERG

Distribution: NSASPINST 5216.1 (All List)

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AUG 01 2016

NSASP General Fishing Regulations

1. Safety. Safety is of the utmost concern and importance on Naval Support Activity South Potomac (NSASP) property. Fishing is an enjoyable and relaxing outdoor pastime, but also presents safety hazards. All anglers are advised to watch for changing weather patterns, strong river currents, and floating debris. Anglers are advised to remain cautious when near the water and adults shall ensure that adequate personal protective devices (PPD) are worn when warranted, especially for children.

2. Responsibilities

a. Natural Resources Manager (NRM). The respective NRM, Building 182 (540-653-4186) at Naval Support Facility Dahlgren (NSFDL) and Building 554 (301-744-2273) at Naval Support Facility Indian Head (NSFIH), are responsible for managing fish and wildlife resources including the implementation of the fisheries management program, and enforcement and oversight of program regulations.

b. Morale, Welfare, and Recreation (MWR) Department. The respective MWR cashiers, Building 106 (540-653-8785) at NSFDL and Building 620 (301-744-4850) at NSFIH, shall issue permits and collect permit fees. Methods of collection, disbursement, and handling of funds shall be in accordance with standard fiscal operating procedures established by the Navy Comptroller Office. Funds shall be expended, on the Facility in which collected, for the conservation of fish and wildlife resources, which includes covering the cost of the NSASP fishing program.

c. NSASP Law Enforcement (LE). NSASP LE, in Building 237 (540-653-8719) at NSFDL and Building D-339 (301-744-4381) at NSFIH, shall control access to NSASP property and, only when requested by the respective NRM, provide support in ensuring that all individuals participating in the program are properly licensed, permitted, and adhere to all Federal, State, Commonwealth, County, and NSASP regulations; per references (c), (d) and (g).

3. Access

a. NSASP Fishing Program access shall be determined based on the security level at each fishing area. All anglers shall

Enclosure (1)

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adhere to access control criteria, based on the designated area security level, established in reference (g), to be considered for participation in the NSASP fishing program. The following anglers are authorized to fish in the following areas based on their eligibility status.

(1) Level I (NSFDL Mainside and NSFIIH Mainside Non-Restricted Area):

(a) NSASP supporting and supported command active duty military personnel and civilian government employees

(b) Active and retired military personnel

(c) NSASP supporting and supported command base residents and their dependents

(d) NSASP supporting and supported command contractors possessing a Common Access Card (CAC) and onsite office space

(e) NSASP supporting and supported command retired civilian government employees with a DoD Retiree CAC

(f) Guests of all the above

(2) Level II (NSFIIH Mainside Restricted Area):

(a) NSASP supporting and supported command active duty military personnel and civilian government employees and contractors currently possessing credentials authorizing access to the Restricted Area.

(3) Controlled Access (NSFIIH Stump Neck Annex).

(a) NSASP supporting and supported command active duty military personnel and civilian government employees and contractors currently possessing a CAC (that has been approved for access). Those without after-hours CAC access shall be limited to fishing Monday-Friday from 0600-1800.

b. The respective MWR Office shall sell base fishing permits to anglers. Recreational fishing permits are available from the NSFDL MWR cashier, Building 106, Monday through Friday



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(0900-1800) and Saturday and Sunday (1200-1800), and the NSFIIH cashier, Building 620, Monday through Friday (0930-1700). The base fishing permits are \$6.00 (\$5.00 permit fee with a \$1.00 issuing fee for MWR). If a combination hunting/fishing permit at NSFIIH is purchased, then the cost of the fishing permit is already included. NSASP anglers under 16 or over 65 years of age shall not be charged permit fees and will be issued a no-cost permit.

c. An individual shall present appropriate identification credentials as to their status and display the appropriate State fishing license. The respective MWR Cashier shall inspect the credentials prior to issuing a recreational fishing permit. Fishing permits are valid for 1 year from the date of purchase. The permit shall remain in the individual's possession while fishing on NSASP property.

d. Sponsors are responsible for their guest's actions and shall be in their company at all times. Sponsors shall accompany their guests to the respective MWR cashier office to purchase a recreational fishing permit and to the Visitor Control Office for a daily Visitor Badge, as necessary.

4. Non-tidal and Tidal Fishing Seasons

a. All NSFIDL and NSFIIH non-tidal and tidal fishing seasons shall follow the seasons determined by the Commonwealth and State fishing regulations, per references (c) and (d).

5. Non-tidal and Tidal Fishing Possession and Size Limits

a. All NSFIDL and NSFIIH non-tidal and tidal fishing possession and size limits shall follow the limits determined by the Commonwealth and State fishing regulations, per references (c) and (d).

6. Special Restrictions

a. The following special restrictions apply:

(1) The use of crab pots, cast nets, seines and bait traps shall be in accordance with applicable Potomac River Fisheries Commission and Commonwealth of Virginia and State of

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Maryland regulations and shall require prior authorization from the respective NRM.

(2) Open-air fires are strictly prohibited without prior authorization from the respective Fire Departments.

(3) Littering is strictly prohibited.

(4) Ice fishing is prohibited.

(5) Consuming alcoholic beverages while fishing at NSASP is strictly prohibited.

(6) Turtle trapping is prohibited.

(7) Do not disturb or handle any unidentified objects (e.g., ordnance) found while fishing. If ordnance is found, call 301-744-4333 at NSFIH or 540-653-8095 at NSFDL so that appropriate personnel can be notified.

(8) Transporting and releasing fish from one body of water to another is prohibited.

(9) Using minnows or other live "bait-fish" when fishing in ponds is prohibited.

(10) Attempting to capture, harm, or take wildlife species or disturb their nesting places is prohibited.

(11) Do not cut, mutilate, or destroy trees.

(12) Do not block roadways or fire lanes with vehicles.

(13) The use of gasoline powered motors on ponds is prohibited.

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AUG 01 2016

**NSFDL Fishing Program Procedures**

1. General Requirements

a. All anglers under 16 years of age shall be accompanied by a permitted parent or guardian at all times.

b. All anglers shall initiate and terminate their activities by signing in and out of the Fishing Logbook in the Game Check Station. This requirement will provide information to all sportsmen on their distribution across the property, reduce user conflicts, and ensure a safe fishing environment.

c. Appropriate Commonwealth, County, Potomac River Fisheries Commission, or nonresident fishing licenses are required to obtain a NSFDL fishing permit. Licenses required to fish in the following bodies of water are:

(1) Hideaway and Cooling Ponds - Commonwealth or County Freshwater Fishing License.

(2) Gambo and Upper Machodoc Creeks - Commonwealth or County Freshwater License, Commonwealth Saltwater Fishing License, or Potomac River Fisheries Sport Fishing License.

(3) Potomac River (shoreline) - Commonwealth Saltwater Fishing License.

(4) Potomac River (boat) - Commonwealth Saltwater, Potomac River Fisheries Commission Sport Fishing, or Maryland Tidal Sport Fishing License.

(5) A Commonwealth fishing license is not required for anglers under 16 years of age.

d. Fishing is permitted in the Cooling Pond year round. Fishing in other bodies of water is restricted during the workweek except during lunchtime and non-duty hours (i.e., leave and liberty) unless testing operations are in progress. Access for fishing in these bodies of water is restricted as follows:

(1) Hideaway Pond. Fishing is permitted year round except during the deer firearms hunting season from November through January on Saturdays, holidays, and during the site-

Enclosure (2)

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observed 'holiday shutdown' between Christmas and New Years, and during the spring gobbler season from mid-April through May on Saturdays (before 1200 during first four Saturdays; no fishing the last two Saturdays).

(2) Gambo Creek. Fishing is permitted year round but only at the following locations during the hunting season (October-May): Blandy Blvd, the middle bridge, and the mouth.

(3) Upper Machodoc Creek. Fishing is permitted year round except in the 'No Fishing' areas identified in Figure (1) with the exception of the housing area. Navy personnel who reside along Upper Machodoc Creek may access their shoreline to fish at any time. Fishing on the Yardcraft piers is permitted Monday-Friday from 1700 to 0600 and all day Saturday, Sunday, and holidays. Fishing from the piers is restricted to those with appropriate signage. No vehicles are permitted on the piers at any time. The Yardcraft boat ramp is off limits to launching boats for recreational fishing purposes at all times.

(4) Potomac River. Fishing is permitted year round, except in the 'No Fishing' areas as noted in Figure (1).

NOTE: Favorite fishing spots along Upper Machodoc Creek and the Potomac River may be in proximity to small game and waterfowl hunting areas. Anglers shall be conscious of their activities as well as those of hunters.

(5) Fishing is not permitted on Pumpkin Neck at any time.

e. All Commonwealth of Virginia and Potomac River Fisheries Commission fishing creel limits shall be observed. The respective NRM may establish stricter requirements as necessary.

## 2. Specific Requirements

a. Fishing is permitted in the ponds, Gambo Creek, and along the Potomac River and Upper Machodoc Creek shorelines except where specified in Figure (1). OFF LIMITS areas include the shoreline from the Nice Bridge to the upriver boundary of Terminal Range, from Building 200 to Yardcraft, and from Yardcraft to the NSF DL property boundary at the Dahlgren Yacht

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Club pier. However, fishing is permitted along the Yacht Club bulkhead.

(1) Hideaway Pond

(a) Persistent elevated mercury levels warrant a catch and release fishery. Trophy fish may be kept for mounting purposes only.

(b) Bow and arrow fishing for carp is permitted.

(2) Gambo Creek. Bow and arrow fishing for snakehead and carp is permitted.

(3) Potomac River and Upper Machodoc Creek. Strict adherence to season and creel restrictions established by the Commonwealth of Virginia and Potomac River Fisheries Commission is mandatory. Figure (1) includes the shoreline boundary between the river and the creek.

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AUG 0 1 2016

**NSFIH Fishing Program Procedures**

1. General Requirements

a. All anglers shall be at least 18 years of age to fish at areas designated as restricted at NSFIH. There is no age restriction for fishing at NSFIH non-restricted areas, however, children shall be accompanied by a permitted parent or guardian at all times.

b. All fishing regulations follow the State of Maryland and the Potomac River Fisheries Commission fishing regulations, unless otherwise noted. A Maryland tidal license is required to fish the mainstream of the Potomac River from the shore. A Potomac River Fisheries Commission or Maryland Tidal license is required while fishing the Potomac River from a boat. A Maryland tidal license is required while boat fishing that portion of Mattawoman Creek and Chicamuxen Creek authorized for fishing. A Maryland tidal license is also required while fishing from the shore in the areas authorized for fishing in the Mattawoman Creek and Chicamuxen Creek. A Maryland non-tidal license is required while fishing the Area 8 pond.

c. During the striped bass season, a valid striped bass permit must be in the angler's possession during the open season either on the Potomac River or Maryland tidal waters. During the trout season, a Maryland Non-tidal license and a Maryland Trout Stamp is required to fish in the Area 8 pond if trout stocking occurred in the previous year.

d. Maryland Tidal Creek Boundaries. The boundaries of Mattawoman Creek and Chicamuxen Creek are identified as follows: The Mattawoman Creek confluence is defined from the boundary just offshore of Building 755, down river to the Stump Neck Annex Building 2076 Dive Locker Pier. Potomac River Fisheries Commission demarcation signs are installed to show the exact location of the Mattawoman Creek confluence. The Chicamuxen Creek confluence is defined from the boundary just offshore of Building 2000, down river to where the electrical transmission lines intersect the Maryland shoreline.

Enclosure (3)

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AUG 01 2016

2. Specific Requirements

a. Restricted and Controlled Access Areas. Recreational fishing privileges are dependent upon access to the Restricted and Controlled Access Areas. There is one Restricted Access Area and one Controlled Access Area associated with NSFIIH. The Restricted Access Area is defined as the portion of NSFIIH that is accessible beyond the NSFIIH Mainside Security Gates II and III and the Controlled Access Area is the entire facility at Stump Neck Annex.

(1) NSFIIH Mainside. Fishing is authorized along the Potomac River within 150 yards in either direction of Building 739, as shown in Figure (2). This area is open for fishing Monday through Friday from 0630 to 1700 hours.

(2) Stump Neck Annex. This area is open to fishing Monday through Sunday from 0630 to 1700 hours, unless otherwise noted. Fishing is authorized along the Potomac River shoreline from the intersection of Archer and Roach Road down river to Building 2076, Dive Locker Pier. Fishing hours at the Building 2076, Dive Locker Pier are Monday through Sunday from 0530 to 2330 hours. Fishing is also authorized at the Chicamuxen Creek pier behind Buildings 2083/2084, as shown in Figure (3), from 0530 to 2330 hours. The Area 8 pond, above Building 2110, is open for fishing Monday through Friday from 1600 to 2030 hours and Saturday through Sunday from 0630 to 2030 hours.

b. Non-Restricted Access Areas. The Non-Restricted Access Area includes that portion of NSFIIH Mainside from the Post I Security Gate to the Post II and III Security Gates and Bullitt Neck.

(1) NSFIIH Mainside. Fishing is authorized at the Dashiell Marina and along the Potomac River, downriver from Dashiell Marina, to the first visible point along the shoreline. This area is open to fishing Monday through Sunday from 0530 to 2330 hours.

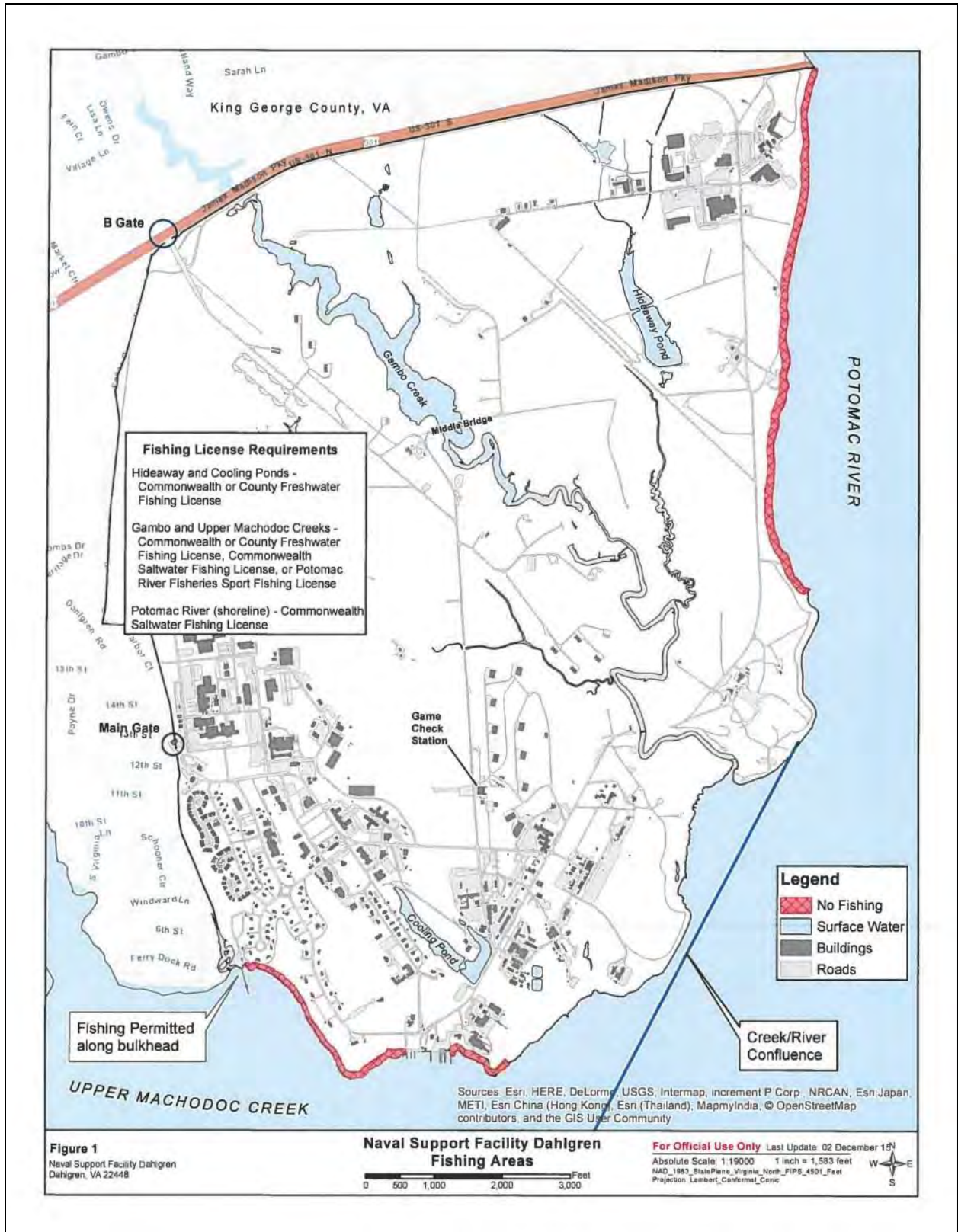
c. Special Access Areas. The following areas, unless otherwise noted, are open to all personnel with a NSASP fishing permit. Authorization shall be obtained from the NRM at 301-744-2273, prior to accessing these areas.

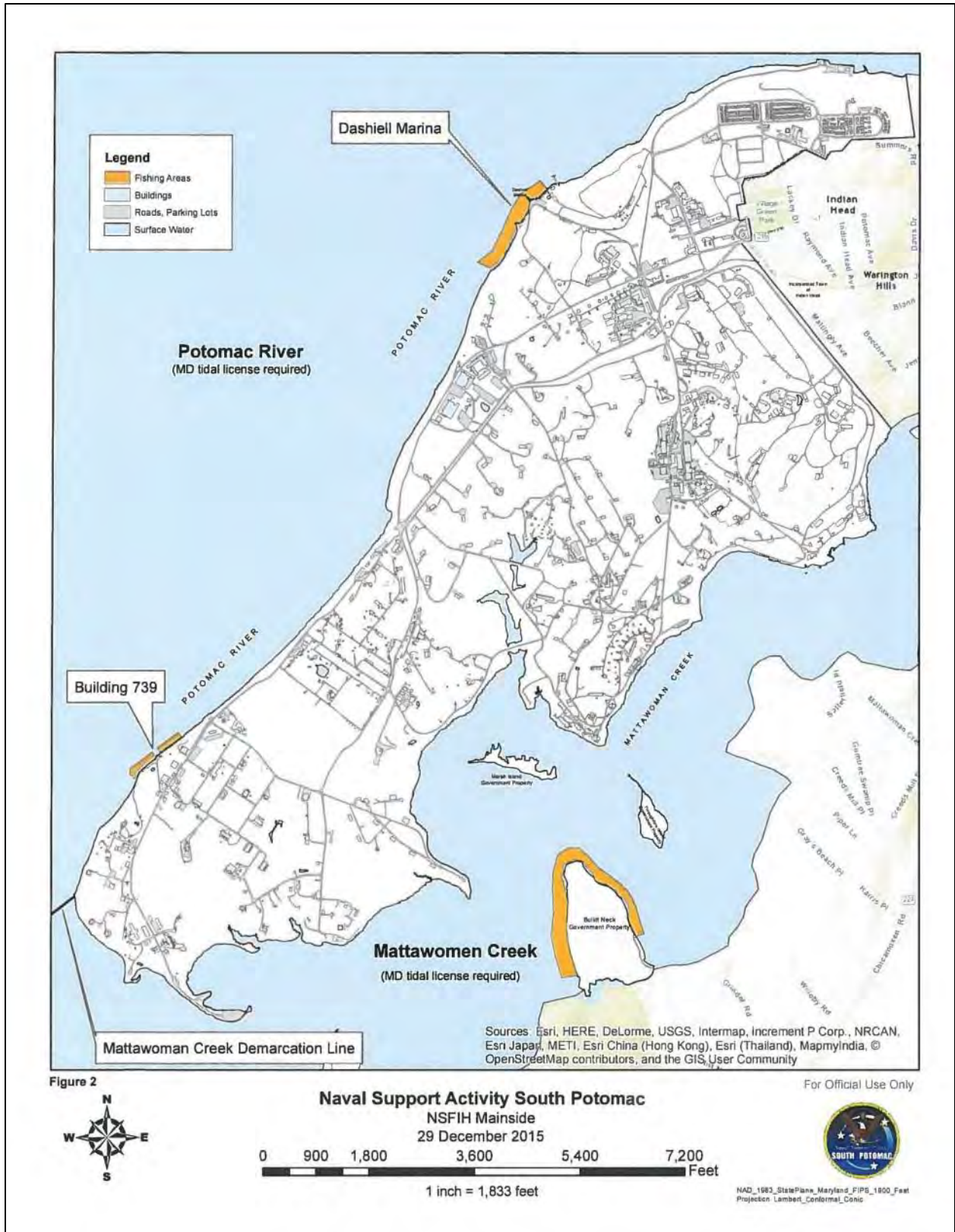
NSASPINST 5090.3D

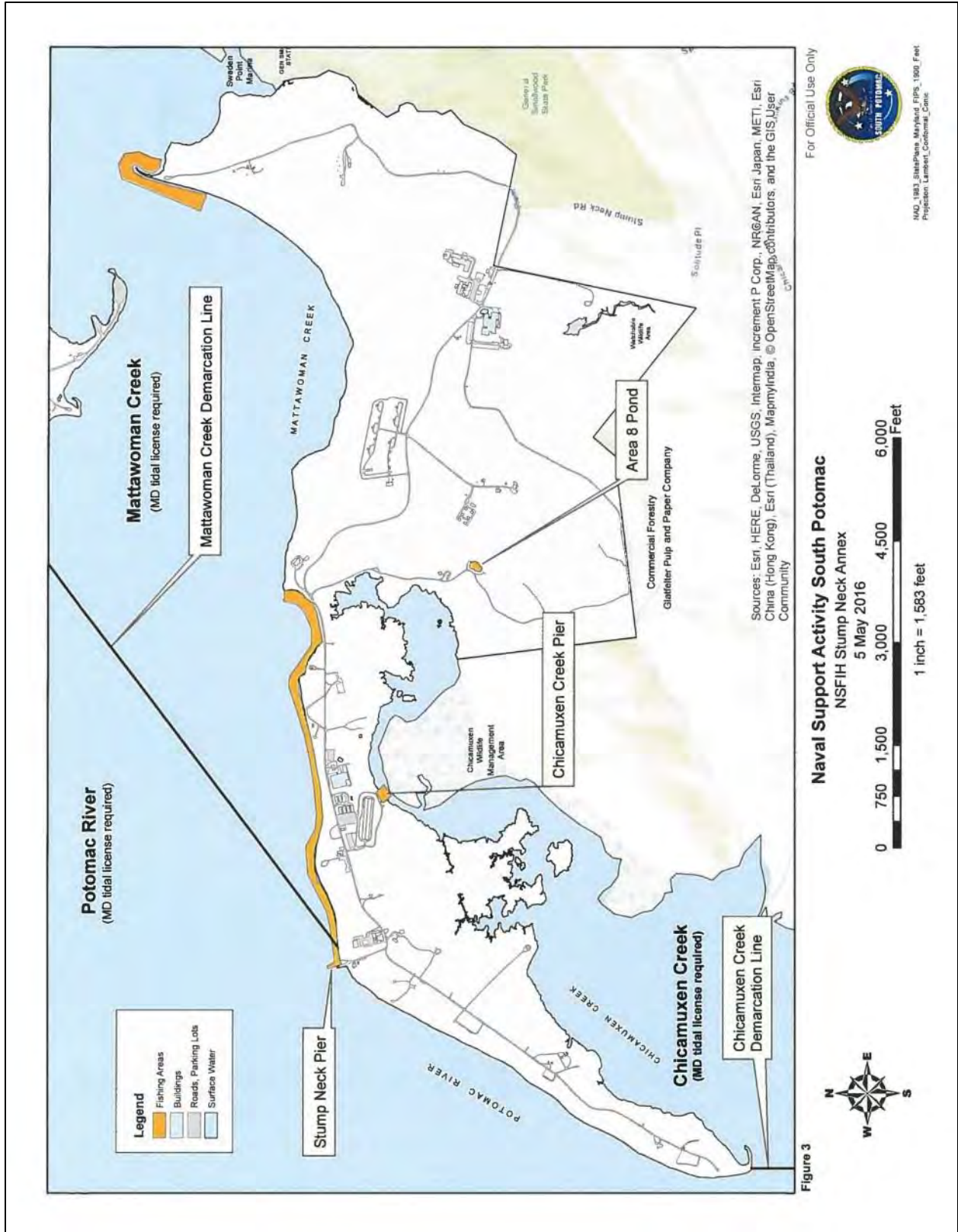
AUG 0 1 2016

(1) Bullitt Neck, Rum Point, Thoroughfare Island, and Marsh Island. Special access to Bullitt Neck and Rum Point shall be granted by the NRM prior to use. Thoroughfare Island and Marsh Island shall not be controlled for regulated fishing access. These areas are open to fishing Monday through Sunday from 0530 to 2330 hours.









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**NSASPINST 5090.14A - Forest Products Permit Instruction**

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DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC  
8509 SAMPSON ROAD, SUITE 217  
DAHLGREN, VIRGINIA 22448-5108

NSASPINST 5090.14A  
PRSD4  
JUN 14 2016

Naval Support Activity South Potomac Instruction 5090.14

From: Commanding Officer, Naval Support Activity South Potomac

Subj: NAVAL SUPPORT ACTIVITY SOUTH POTOMAC FOREST PRODUCTS  
PERMIT PROGRAM

Ref: (a) OPNAVINST 5090.1D  
(b) NAVFAC P-73 Volume II  
(c) 10 USC 2665  
(d) Naval Support Facility Dahlgren Integrated Natural  
Resources Management Plan  
(e) Naval Support Facility Indian Head Integrated Natural  
Resources Management Plan

Encl: (1) NSASP Forest Products Permit Program Procedures  
(2) Chainsaw Safety Illustration  
(3) Permit for Sale of Forest Products

1. Purpose. To set forth regulations and procedures for selling forest product permits at Naval Support Activity South Potomac (NSASP) in accordance with references (a) through (e). For purposes of this instruction, NSASP includes Naval Support Facility Dahlgren, Virginia (NSFDL) and Naval Support Facility Indian Head, Maryland (NSFIH).

2. Cancellation. NSASPINST 5090.14A

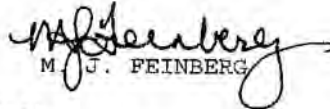
3. Background. The sale of forest products from Navy property is authorized by references (a) through (e). A substantial amount of potential firewood and other forest products are generated annually on NSASP through maintenance, construction, and various natural resource activities. These forest products often must be removed and transported for disposal at the Navy's expense. Establishment of a Forest Products Permit Program will promote the wise use of this renewable resource, reduce disposal costs, and provide an alternate energy source for NSASP personnel. Proceeds from the sale of forest products are

NSASPINST 5090.14A  
JUN 14 2016

deposited in the Department of Defense (DoD) Forestry Account. These funds are then made available to finance DoD natural resources forestry related projects.

4. Scope. The sale of forest products on military installations is controlled by published Activity instructions that follow applicable regulations and federal and state laws. The NSASP Commanding Officer has the authority to change any provision contained in this instruction at his/her discretion. The Forest Products Permit Program will be administered by the respective NSASP Natural Resources Manager (NRM).

5. Action. All personnel shall comply with the enclosed regulations that govern the sale of forest products on NSASP property. Failure to adhere to the provisions of this instruction shall result in administrative or disciplinary action including the temporary or permanent loss of privileges. This decision shall be based upon the input from the respective Assistant Installation Environmental Program Manager (AIEPD) and NRM.

  
M. J. FEINBERG

Distribution: (NSASPINST 5216.1)  
All Lists



NSASPINST 5090.14A  
JUN 14 2016

NSASP Forest Products Permit Program

1. Safety

a. Participation in the removal of forest products from NSASP property is an activity that incurs safety risks. Permittees (the person[s] to whom the permit has been issued) shall conduct their collection and removal activities in a safe manner. This should include the presence of a second person onsite when using a chainsaw and notification to the respective NRM when collection activities will take place.

b. Protective eye glasses, hearing protection, footwear such as steel toe boots, chaps, and chainsaws with safety bars shall be utilized when cutting firewood. An illustration detailing chainsaw safety apparel and techniques is provided in Enclosure (2).

c. Hazardous oil/fuel spills shall be immediately reported to the NSFIIH Fire Department (301-744-4333) or the NSFDL Emergency Operations Center (540-653-8095) and properly addressed before departure from the site. Only Underwriters Laboratory (UL) approved fuel containers and chainsaws equipped with approved spark arrestor/mufflers shall be used.

2. Responsibilities

a. The respective NRM, Building 182 (540-653-4186) at NSFDL and Building 554 (301-744-2273) at NSFIIH, is responsible for managing installation natural resources including the implementation of the Forest Products Permit Program. The NRM shall ensure that the collection of forest products does not conflict with mission operations, hunting activities and the bald eagle nesting season.

b. The respective NRM shall ensure that federal, state, and/or local forestry related quarantines are enforced. The respective NRM shall ensure that permittees are informed of any restrictions related to current quarantines.

c. The NSFIIH NRM shall conduct permit sales in Building 554 between 0800 - 1600 hours, Monday through Friday. Permits shall be issued on a first-come, first-served basis, dependent on availability of resources. NSFDL permits are issued by the

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Morale, Welfare, and Recreation (MWR) Department at Building 106 (540-653-8785) Monday through Friday from 0900-2200 and Saturday and Sunday 1200-2200.

(1) The NSFIH NRM conducts permit sales to ensure that firewood collection activities do not conflict with mission operations within building explosive arcs, ranges and burn areas.

d. The permittee shall:

(1) Make payment by check or money order made payable to the Treasurer of the United States upon receipt of a signed permit.

(2) Use only the installation route(s) designated by the respective NRM.

(3) Remove forest products from designated area(s) only. Removal of unauthorized forest products may result in disciplinary action and denial of future permits.

(4) Keep the signed forest products collection permit in possession at all times during collection and removal.

(5) Complete the cutting and loading activities on the assigned date during daylight hours.

### 3. Access

a. Access to undertake forest products collection and removal shall be determined based on the security level of the desired area. The following groups are authorized to collect forest products in the following areas based on their eligibility status.

(1) Level 1 (NSFDL Mainside and NSFIH Mainside Non-Restricted Area):

(a) NSASP supporting and supported command active duty military personnel and civilian government employees.

(b) Active and retired military personnel.

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JUN 14 2016

(c) NSASP supporting and supported command base residents and their dependents. Dependents shall be 18 years or older to be issued a firewood collection permit.

(d) NSASP supporting and supported command contractors with a Common Access Card and onsite office space.

(e) NSASP supporting and supported command retired civilian government employees with a DoD Retiree ID.

(2) Level II (NSFIH Mainside Restricted Area):

(a) NSASP supporting and supported command active duty military personnel, civilian government employees and contractors currently possessing credentials authorizing access to the Restricted Area.

(b) Level II collection after normal working hours and on holidays and weekends will be limited to those that are currently approved for after-hours access by security. After-hours access for firewood cutting shall be limited to daylight hours only.

(3) Controlled Access (NSFIH Stump Neck Annex).

(a) NSASP supporting and supported command active duty military personnel and civilian government employees and contractors currently possessing a CAC.

4. Permit Specific Requirements

a. Permits shall be sold for the collection of forest products such as firewood, driftwood, mulch, and pine needles. Availability of this resource is dependent upon on-going and proposed activities, such as maintenance, construction, natural resources projects, etc. A Permit for Sale of Forest Products is provided in Enclosure (3).

b. Firewood collection is restricted to previously cut timber or down timber only. Removal of standing trees (live or dead) is not permitted.

c. Forest products acquired through this permit program are for personal use only.

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d. Each permit shall allow the permittee to remove one pickup truck load (approximately 2/3 cord) of products at a cost of \$10. Additionally, a trailer load of firewood costs \$25. Mulch shall be sold at the cost of \$3.00/cubic yard. A full-sized truck shall have capacity for approximately four yards. A half-size truck shall have the capacity for approximately two yards.

e. Each permit shall be valid for one month from the date of permit issuance. Failure to pick-up forest products within the allotted time shall result in forfeiture of the prepaid permit fee. Each permit holder shall be required to identify one date and an alternative date to remove authorized forest products. In the event inclement weather precludes pickup on the assigned or alternative dates, additional dates may be scheduled as long as no extension of the permit is required. In the event that the assigned date cannot be met, permittees shall notify the NRM and receive authorization before performing these activities on the alternative date.

f. Forest products may be transported off NSASP property only if the permittee has a Permit for Sale of Forest Products (Enclosure 3) in his/her possession. The NRM shall maintain records of annual permit sales for reference purposes.

5. Site Specific Requirements

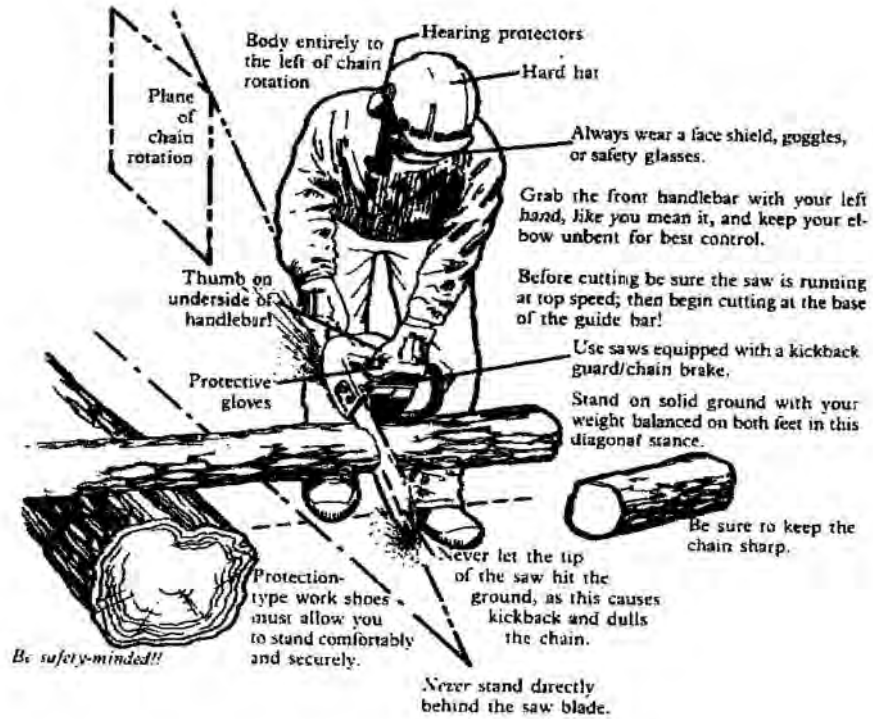
a. NSFIH Mainside. Firewood may be collected only at the designated firewood lot located behind Building 1581 unless otherwise authorized by the NRM. In other authorized areas, only downed trees at the forest's edge may be removed. Any other special requirements will be identified at the time of permit issuance.

b. NSFIH Bullitt Neck, Rum Point and Stump Neck Annex. Collection of firewood in these areas is authorized with the approval of the NRM and is limited to only downed trees at the forest's edge.

c. NSFDL Mainside and Pumpkin Neck. Only downed trees at the forest's edge may be removed in areas authorized by the NRM. Any other special requirements will be identified at the time of permit issuance.

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JUN 14 2016

### Chainsaw Safety Illustration



Enclosure (2)

NSASPINST 5090.14A

JUN 14 2016

PERMIT FOR SALE OF FOREST PRODUCTS

The following individual is authorized by NAVFAC P-73 Volume II, OPNAVINST 5090.1D, and NSASPINST 5090.14 to remove forest products from NSASP as identified below on \_\_\_\_\_ or an alternate date on \_\_\_\_\_

NAME: \_\_\_\_\_ PHONE: \_\_\_\_\_  
DATE: \_\_\_\_\_

Vehicle Make/Model: \_\_\_\_\_  
License Plate: \_\_\_\_\_

PERMIT NUMBER: \_\_\_\_\_  
AREA(S) AUTHORIZED: \_\_\_\_\_

Forest products covered under this permit  
\_\_\_\_\_  
\_\_\_\_\_

PERMIT REQUIREMENTS:

1. A permit shall be issued before work begins. Payment shall be made by check or money order payable to the Treasurer of the United States.
2. While on NSASP, this permit must be in the permittee's possession at all times when cutting, loading, or transporting forest products.
3. The permittee shall have in their possession, an original Permit for Sale of Forest Products to transport forest products off NSASP property. Copies shall not be acceptable and their attempted use may result in disciplinary action.
4. Work shall be accomplished during daylight hours within 1 month of permit issuance.
5. The work area shall not be littered.
6. Hazardous oil/fuel spills shall be immediately reported to the NSFIH Fire Department (301-744-4333) or NSFDL Emergency Operations Center (540-653-8095).
7. The permittee, and all others involved in activities authorized herein, shall abide by all NSASP regulations, instructions, and directives.

Enclosure (3)

NSASPINST 5090.14A  
JUN 14 2016

NOTE: All individuals who are cutting firewood on NSASP property shall adhere to the following safety guidelines:

1. The use of chainsaws to collect and remove forest products should require the presence of a second individual onsite.
2. Protective eye glasses, hearing protection, footwear such as steel toe boots, chaps and chainsaws with safety bars shall be required when cutting firewood.
3. All fuels shall be stored in approved Underwriters Laboratory containers only.
4. Individuals desiring to cut firewood at NSFIIH in the restricted area behind "Government Vehicle Only" signs shall be prohibited from entry until acceptable coordination with the area supervisors are provided by the NRM.
5. Individuals failing to adhere to these guidelines may be denied the privilege of collecting forest products on NSASP.

I agree to abide by the permit requirements.

\_\_\_\_\_  
SIGNATURE OF PERMITTEE

\_\_\_\_\_  
DATE

\_\_\_\_\_  
AUTHORIZING OFFICIAL

\_\_\_\_\_  
DATE OF ISSUANCE

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**Appendix 8**  
**Natural Resources Manager Designation Letter and**  
**Relevant Training Certificates**

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DEPARTMENT OF THE NAVY  
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC  
6509 SAMPSON ROAD, BLDG 101  
DAHLGREN, VIRGINIA 22448

5090  
Ser N4/406  
10 Nov 21

From: Commanding Officer, Naval Support Activity South Potomac  
To: Mr. Travis Wray

Subj: DESIGNATION NATURAL RESOURCES PROGRAM MANAGER

Ref: (a) OPNAVINST 5090.1E

1. Purpose. To identify and assign the duty of Natural Resources Program Manager, Environmental Division, Public Works Department South Potomac (PWDSP) onboard Naval Support Facility Dahlgren (NSFDL).
2. Per reference (a) and effective immediately, you are assigned the duties as the Natural Resources Program Manager for the Environmental Division, PWDSP onboard NSFDL.
3. Your duties involve the management of the installation's natural resources and environmental planning and review through implementation of the Integrated Natural Resources Management Plan.
4. This designation will remain in effect until you transfer or are officially relieved by the Commanding Officer.

A handwritten signature in black ink, appearing to read "T. P. Copeland".

T. P. COPELAND

Copy to:  
NAVFACWASH PWDSP (J. Bossart)



## Certificate of Graduation

*This Certifies That*

**TRAVIS WRAY**

*Successfully Completed*

**BASIC ENVIRONMENTAL LAW SEMINAR #10030**

**CIN: A-4A-0058**

**(24 Academic Hours)  
at Washington, D.C.**

*Presented by*

*Naval Civil Engineer Corps Officers School (CECOS)*

*under the auspices of the*

*Interservice Environmental Education Review Board (ISEERB)*

28 – 30 APRIL 2010

DATE

A handwritten signature in black ink, appearing to read "J. J. Heinzl".

J. J. HEINZEL  
CAPTAIN, CEC, USN  
COMMANDING OFFICER





Naval Civil Engineer Corps Officers School  
Port Hueneme, California

## Certificate of Graduation

*This Certifies that*

**TRAVIS W. WRAY**

*Successfully Completed*

**NATURAL RESOURCE COMPLIANCE**

**COURSE # 13020**

**CIN: A-4A-0087**

*(Recommended/Academic/Professional Development Hours: 32)*

**21 - 24 MAY 2013**

DATE

A handwritten signature in black ink, appearing to read "KLB", written over a horizontal line.

KEVIN L. BROWN  
CAPTAIN, CEC, USN  
COMMANDING OFFICER





Naval Civil Engineer Corps Officers School  
Port Hueneme, California

## Certificate of Graduation

*This certifies that*

**TRAVIS WRAY**

*Successfully Completed*

**ENVIRONMENTAL PROTECTION COURSE**

**OFFERING #10010**

**CIN: A-4A-0036**

**(32 Academic Hours)**

**17 – 20 NOVEMBER 2009**

DATE

**J. J. HEINZEL**  
CAPTAIN, CEC, USN  
COMMANDING OFFICER



Naval Civil Engineer Corps Officers School  
Port Hueneme, California

## Certificate of Graduation

*This certifies that*

**TRAVIS WRAY**

*Successfully Completed*

**NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)  
APPLICATION COURSE**

**CIN: A-4A-0077  
(24 Academic Hours)  
held in NEWPORT, RI**

13-15 JULY 2010

DATE

R. D. COOK  
CAPTAIN, GEC, USN  
COMMANDING OFFICER



## Certificate of Graduation

*This Certifies That*

**WRAY, TRAVIS W.**

*Successfully Completed*

**ENVIRONMENTAL NEGOTIATION WORKSHOP  
CIN: A-4A-0067**

*Presented by  
Naval Civil Engineer Corps Officers School (CECOS)  
under the auspices of the  
Interservice Environmental Education Review Board (ISEERB)*

29-31 JANUARY 2019

DATE

A handwritten signature in black ink, appearing to read "C. M. Kurgan".

CHRISTOPHER M. KURGAN  
CAPTAIN, CEC, USN  
COMMANDING OFFICER

