INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (2012 – 2017)

Harvey Point Defense Testing Activity
Hertford, North Carolina

June 21, 2013 (Final)

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

HARVEY POINT DEFENSE TESTING ACTIVITY
HERTFORD, NORTH CAROLINA

Plan Years
2012 - 2017

SIGNATURE PAGE

I approve the implementation of activities in this Integrated Natural Resources Management Plan (INRMP) for Department of Defense, Harvey Point Defense Testing Activity (HPDTA) as supporting military mission while sustaining natural resources for future generations. This INRMP has been prepared pursuant to the Sikes Act Improvement Act of 1997 (U.S.C. § 670a et seq.). This INRMP has set appropriate and adequate guidelines for conserving and protecting wildlife and other natural resources of this installation.

Approving Officials:

_____ _____
Installation Director Date

_____ _____
Environmental Manager Date

This Integrated Natural Resources Management Plan (INRMP) meets the requirements for INRMPs listed in the Sikes Act of 1997 as amended (16 § United States Code 670a-f) and sets appropriate guidelines for conserving and protecting the natural resources of HPDTA.

Approved By:

_____

Pete Benjamin Date
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_____

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ACRONYMS

AEC	Area of Environmental Concern
APHIS	Animal and Plant Health Inspection Services
ASTs	Aboveground Storage Tanks
BASH	Bird Aircraft Strike Hazard
BMPs	Best Management Practices
CAMA	Coastal Area Management Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMP	Coastal Management Program
CRC	Coastal Resource Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DBH	Diameter at Breast Height
DMP	Deer Management Plan
DOD	United States Department of Defense
DON	United States Department of the Navy
EM	Environmental Manager
EMP	Environmental Management Policy
EMS	Environmental Management System
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESE	East-southeast
HPDTA	Harvey Point Defense Testing Activity
INRMP	Integrated Natural Resources Management Plan
IP	Individual Permit
ISA	International Society for Arboriculture
mi^2	square miles
MOU	Memorandum of Understanding
MSL	Mean Sea Level
N	North
NC	North Carolina
NCCMP	North Carolina Coastal Management Program
NCCRC	North Carolina Coastal Resource Commission
NCDA&CS	North Carolina Department of Agriculture and Consumer Services
NCDENR	North Carolina Department of Environment and Natural Resources
NCFS	North Carolina Forest Service
NCWRC	North Carolina Wildlife Resources Commission
NE	Northeast
NEPA	National Environmental Policy Act
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NW	Northwest

NWI	National Wetlands Inventory
NWP	Nationwide Permit
OPNAVINST	Office of the Chief of Naval Operations Instruction
PIF	Partners in Flight
POC	Point of Contact
S	South
SAF	Society of American Foresters
SAIA	Sikes Act Improvement Act
SE	Southeast
TSI	Timber Stand Improvements
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USTs	Underground Storage Tanks

AGENCY CONTACT & RESOURCES LIST

Useful Resources:

ORGANIZATION	INTERNET ADDRESS
United States Army Corps of Engineers – Washington Field Office	http://www.saw.usace.army.mil/wetlands/where/washingt.htm
Southern Extension Forest Resource Electronic Library	http://www.uga.edu/~soforext/
North Carolina State University Extension Forest Resources Phone: (919) 515-3184	http://www.ces.ncsu.edu/nreos/forest/
North Carolina Forest Service	http://www.dfr.state.nc.us/
North Carolina Division of Coastal Management Phone: (252) 264-3901	http://dcm2.enr.state.nc.us/
North Carolina Sea Grant Extension 7205 Wrightsville Avenue Wilmington, NC 28403 Phone: (910) 256-2083 Fax: (910) 256-8856 POC - Spencer Rogers, Coastal Construction and Erosion Specialist	http://www2.ncsu.edu/unity/project/www/ncsu/CIL/sea_grant/seagrant.html rogerssp@uncwil.edu
North Carolina Wildlife Resources Commission	http://www.state.nc.us/Wildlife
North Carolina Division of Marine Fisheries	http://www.ncfisheries.net/
North Carolina Natural Heritage Program Division of Parks and Recreation P.O. Box 27687 Raleigh, NC 27611-7687 Phone: (919) 715-8697	http://www.heritage.tnc.org/nhp/us/nc/
Forest Stewardship Council Phone: (877) 37205646	www.fscus.org
EPA Interim Air Quality Policy on Wildland and Prescribed Fires	www.epa.gov/ttnoarpg
USDA APHIS Wildlife Services	http://is.aphis.usda.gov/ws
DoD PIF Strategic Plan	http://www.dodpif.org/plans/stratplan.php
Bird Species of Concern	http://www.dodpif.org/resources/bcrmap.php
State Wildlife Action Plans	http://www.wildlifeactionplans.org
USFWS - Landscape Conservation Cooperatives	http://www.fws.gov/science/SHC/index.html
USFWS - Ecological Service's Raleigh Field Office	http://www.fws.gov/raleigh/es_tes.html

ORGANIZATION	INTERNET ADDRESS
Denix	https://www.denix.osd.mil/portal/page/portal/NaturalResources/IntegratedNaturalResourceManagementPlan
US Forest Service Climate Change Resource Center	http://www.fs.fed.us/ccrc/primers/climate-change-primer.shtml
DOD Natural Resources Conservation Program - Climate Change Tools for Adapting Management Strategies	http://www.dodworkshops.org/CC-Resources.html
Scanning the conservation horizon is an excellent guide to preparing climate change vulnerability assessments	http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2011/Scanning-the-Horizon.aspx
The Strategic Environmental Research and Development (SERDP) Program Site	http://www.serdp.org/Program-Areas/Resource-Conservation-and-Climate-Change
National Conservation Training Center (NCTC) offers on Climate Change and Structured Decision Making	http://nctc.fws.gov/learn/courses.htm
DOD Video Responding to Climate Change	http://www.dodworkshops.org/CC-Animation.html
Forest Service short course: Adapting to Climate Change	http://www.fs.fed.us/ccrc/hjar/index_st.html
Scanning the Conservation Horizon: A guide to climate change vulnerability assessment	http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2011/Scanning-the-Horizon.aspx

PLAN UPDATES

This section is provided so that it may be used for annual updates to this INRMP. This plan covers a five-year period, 2012 - 2017, but is required to be updated annually, and reviewed and revised each five years (DOD Instruction 4715.3). Updates and revisions are a necessary part of maintaining a proactive management plan. Ecosystem management is a dynamic process. Therefore, implementation of management goals and objectives is followed by prescribed monitoring to measure management success or failure. The knowledge gained from observations and testing provides the framework on which to base revisions to the plan. This information can be used to document changes to the plan for the benefit of natural resources management. It is intended to document annual updates and is not intended to replace the five-year review and revision process. Annual updates will provide information that will be incorporated into the five-year review. Each entry in this section should reference the plan section and page number that is being updated to facilitate quick cross-referencing.

DATE	SECTION/PAGE	COMMENT
12/12/13	Executive Summary Page vi	See attached letter from US Fish and Wildlife dated December 4, 2013
12/12/13	Agency Contact & Resources List - Page iii & iv	See attached letter from US Fish and Wildlife dated December 4, 2013
12/12/13	2.11; page 28	See attached letter from US Fish and Wildlife dated December 4, 2013
12/12/13	2.11; page 32	See attached letter from US Fish and Wildlife dated December 4, 2013
12/12/13	Appendix F; page 2	See attached letter from US Fish and Wildlife dated December 4, 2013

EXECUTIVE SUMMARY

Each military installation within the United States is required to prepare and implement an Integrated Natural Resource Management Plan (INRMP) to provide for conservation and rehabilitation of natural resources, sustain multipurpose uses of resources, and provide public access for use of natural resources, subject to safety and military security considerations. This INRMP was written for Harvey Point Defense Testing Activity (HPDTA), Hertford, North Carolina to comply with:

- Sikes Act of 1997 (16 § United States Code 670a-f);
- US Department of Interior Guidance for Coordination of Department of Defense Sikes Act Integrated Natural Resources Management Plans (June 8, 2001)
- Department of Defense (DOD) Instruction 4715.3, Environmental Conservation Program;
- Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, Environmental and Natural Resource Program Manual;
- Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, Chapter 24
- Integrated Natural Resources Management Plan Guidance for Navy Installations (April 2006);
- Department of Defense Legacy Resource Management Program (07-356)(February 2009);
- Interim Policy for Reporting Annual Integrated Natural Resources Management Plan Reviews (19 December 2012);
- Endangered Species Act of 1973, as amended (16 USC 1531 et seq.); and
- HPDTA Environmental Management System Policy.

Scope
The purpose of this INRMP is to update the HPDTA INRMP prepared for the years 2007 through 2011. This INRMP covers the five-year period 2012 – 2017, but will be continually monitored, reviewed annually by the installation, and revised and re-approved after five years. The Environmental Manager (EM) at HPDTA has responsibility for maintaining the currency of this document. All natural resources management aboard HPDTA supports the military mission. The installation depends on sustainable communities to provide the proper environment for training and operations. One goal of this INRMP is to minimize future training restrictions by increasing integration between natural resources management planning, training, and operations.

Organization of Document
This INRMP is organized into the following sections:

- ***Section 1 - Introduction.***
  This section details the purpose, goals, and objectives of the INRMP, policy and regulatory requirements, and provides the general background and military mission of the installation and an overview of the natural resources program.

- ***Section 2 - Existing Conditions.***
  This section describes the climatic, vegetation, and soil conditions of the Atlantic Outer Coastal Plain Physiographic Province, the Albemarle-Pamlico Basin in general, and the existing physical and natural conditions at HPDTA in particular. It includes a general site description, climatic conditions and their importance to the natural resources manager, installation topographic information, a discussion of the soils and water resources, and descriptions of the flora and fauna that inhabit the property.

- ***Section 3 – Primary Natural Resource Management Issues.***
  This section addresses natural resources management units and a discussion of primary management issues. Management recommendations are made for each management unit at HPDTA.

- ***Section 4 - Summary of Management Recommendations.***
  This section compiles the management recommendations from the natural resources management units and organizes them into three levels of prioritization for implementation.

- ***Section 5 - Information Resources and Bibliography.***
  This section provides a list of internet sites that are sources of information for natural resource management and a list of references that were used during the development of this INRMP.

- ***Appendices.***
  The appendices included in this document provide supporting documents to many of the management recommendations offered.

- ***Map Figures.***
  The map figures presented in this INRMP were developed using 2012 digital orthophotography, county tax maps, and United States Geological Survey (USGS) 7.5 minute quadrangle for Harvey Neck, N.C. All of the themes represented will be provided to the HPDTA Environmental Manager in digital format to facilitate the integration of natural resources planning and the implementation of management practices.

The INRMP and the Military Mission

The principal function of HPDTA is to test and evaluate conventional high explosives, fused ordnance, and ballistic materials under simulated field conditions in search of more diversified uses to meet special requirements and to conduct related training. A natural resources management program is important to the military mission in that it helps ensure the continued availability of land and natural resources that are essential to current and future mission activities.

The INRMP provides direct and indirect support to the military mission including assisting with regulatory compliance (Endangered Species Act, Clean Water Act, Clean Air Act, Migratory Bird Treaty Act, National Environmental Policy Act, Sikes Act Improvement Amendments, Executive Orders and Memorandums) and enhancing the quality of life for installation personnel by striving to provide a pleasing natural environment in which to work and recreate. Natural resources management is of further importance to the military mission because the continued practice of sound natural resources management promotes positive public relations and enhances community outreach.

Partnerships

Management of the natural resources of HPDTA is a considerable undertaking. The diversity of resources present creates a need for a wide variety of expertise and assistance in developing sound management practices. The importance of partnerships with other state and Federal resource agencies cannot be overstated. Cooperative agreements between HPDTA and other resource agencies need, in some cases, to be initiated and in other instances, to be continued, to ensure that the best management practices possible are implemented (Appendix A).

Management Recommendations

As part of the preparation of this INRMP, 33 natural resources management recommendations have been developed to address known management issues at HPDTA. These are classified into three general priority groups for implementation:

1) management recommendations that are compliance-driven have been assigned the highest priority,
2) management recommendations that are geared towards responsible environmental stewardship and which have the potential of transitioning into compliance issues, if ignored, are assigned the next highest priority, and
3) management recommendations that are related to environmental awareness are assigned the lowest priority.

Major initiatives recommended during the next five years include efforts to:

- Develop a base wide forestry management plan.
- Remediate severely eroding shoreline along the Perquimans River and Albemarle Sound by preparing Shoreline Protection Plans.
- Continue to refine and institute a Bird Aircraft Strike Hazard (BASH) Reduction Plan in coordination with DON Air Operations.
- Continue to manage the deer herd at HPDTA in a scientific manner by collecting and analyzing data on herd age, sex structure, and body condition and by facilitating adequate harvests.

I. INTRODUCTION

1.1 Purpose and Goals

Under Department of Defense (DOD) Instruction 4715.3, Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, and the Sikes Act (16 § USC 670 a-f), the Department of Navy (DON) is required to implement and maintain a balanced and integrated program for the management of natural resources. The goals of this Integrated Natural Resources Management Plan (INRMP) are to protect and enhance natural resources, to maintain land resources for future potential growth of the military mission, to provide for a pleasing natural environment in which to work, and to promote a general environmental awareness among military and civilian personnel. The INRMP must also address future installation requirements and identify projects to be accomplished over the duration of the plan. This INRMP will utilize annual reviews and updates by the installation to incorporate future changes in environmental regulations and scientific advances in evaluation and implementation methods for resource management. The INRMP itself will be revised and re-approved every five years.

1.2 Policy and Regulatory Requirements

The policy of the DOD is to act responsibly in the public interest to restore, improve, preserve, and properly utilize natural resources on Navy-administered lands. Good stewardship of natural resources is an important and identifiable function of all echelons of command management. The DOD shall strive to manage its lands to support the military mission while practicing the principles of ecosystem management. The DOD shall strive to maintain healthy, contiguous ecosystems on its own lands and, where ecosystem boundaries extend onto adjoining lands, shall strive to work cooperatively with neighboring landowners to manage those ecosystems. This involves a shift from single-species to multiple-species management and habitat management, the formation of partnerships necessary to manage ecosystems that cross boundaries, and the use of the best available scientific information and adaptive management techniques in natural resources management (OPNAVINST 5090.1C and OPNAVINST 5090.1C).

Section 101(a)(1)(B) of the Sikes Act Improvement Act (SAIA) requires that each military department prepare and implement an INRMP, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate. The SAIA is *applicable to all military installations* in the U.S., its territories, and possessions. Military installations include those lands, or interest in land, owned by the U.S. and administered by the Navy. Lands that are withdrawn from the public domain for military uses are also included. Therefore, all installation unimproved property (e.g., natural areas), inclusive of any natural resource areas used by lessees and tenants, must be fully covered by and addressed in an installation's INRMP. Accordingly, an INRMP must address natural resources management on those lands and near-shore areas:

a) Owned by the U.S. and administered by the Navy;
b) Used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility; or
c) Withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility.

An installation is responsible for conservation, protection, and management of natural resources on all lands within its boundaries. Even if an Installation Commander requires a tenant, lessee, or permittee to complete natural resource management actions, as part of the terms of occupancy or lease, an installation is still ultimately responsible for those leased or occupied lands and must address management of those lands in an INRMP.

The SAIA specifically requires, to the extent appropriate and applicable, that an INRMP provide for:

- Fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation.
- Fish and wildlife habitat enhancement or modifications.
- Wetlands protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants.
- Integration of and consistency among the various activities conducted under the plan.
- Establishment of specific natural resources management goals and objectives and timeframes for proposed actions.
- Sustainable use of natural resources by the public to the extent that the use is not inconsistent with the needs of the fish and wildlife resources.
- Public access to the natural resources on the military installation that is necessary and appropriate subject to requirements necessary to ensure safety and military security.
- Enforcement of applicable natural resources laws and 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 Navy determines appropriate.

SAIA requires the Service Secretaries to prepare an INRMP in cooperation with the U.S. Fish and Wildlife Service (USFWS) and appropriate state fish and wildlife agencies. An INRMP reflects mutual agreement of the parties concerning the conservation, protection, and management of fish and wildlife resources.

In addition, HPDTA is also currently implementing an Environmental Management System (EMS) which provides a framework for making program decisions and ensuring daily installation operations account for environmental issues. The EMS includes a policy statement signed by the Base Director stating that the installation will make decisions in a manner that considers environmental impacts.

1.3 General Location, History, and Mission of the Installation

The Harvey Point peninsula was purchased by the Department of the Navy (DON) from private landowners in November 1942 and was established as an air station in support of U.S. defense operations in WWII. The original purchase of the Harvey Point property occurred as a result of a condemnation civil suit in March of 1943, which conveyed 1,264.5 acres to the U.S. Government.

In 1958 and 1962, respectively, drainage ditch and spoil area agreements were obtained from the state of North Carolina for conducting infrastructure upgrades. Upgrades included dredging channels for fuel docks and runway construction. These agreements conveyed another 115.7 acres to the Federal government.

In 1961, the installation came under the auspices of the Department of Defense (DOD) and was named the Harvey Point Defense Testing Activity. Since that time, HPDTA's primary mission has been a DOD operated activity serving the military services plus fulfilling the special needs of US Government agencies and departments. Figure 1-1 shows the regional setting of the installation. HPDTA is generally bounded by the Perquimans River to the north, the Albemarle Sound to the east and south, and by privately-owned woodland, agricultural fields, and single-family residential development to the west. Property in the immediate vicinity of HPDTA's western property line is transitioning from low density rural residential use to high density residential/recreational developments (Holiday Island and Albemarle Plantation).

In 1962, 5.37 acres adjoining the southwest side of the original property were conveyed to the government in another condemnation lawsuit. In January 1967, approximately 198 acres on the southwest side of HPDTA were purchased, and in March of 1985, an additional 112 acres on the

northwest side were purchased (Real Estate Summary Map, Harvey Point, North Carolina 1964; Beltrome et al., 1967; Brown, 1985).

The principal function of HPDTA is to test and evaluate conventional high explosives, fused ordnance, and ballistic materials under simulated field conditions in search of more diversified uses to meet special requirements and to conduct related training. The installation is staffed with permanent DOD civilian specialists in conventional explosives and conventional fused ordnance materials. This staff is augmented as necessary by temporary duty and civilian personnel to meet special requirements.

In more recent years, HPDTA has acquired several hundred acres of property:

- Year 2000 – 77.4 acres
- Year 2001 – 240 acres
- Year 2005 – 380 acres
- Year 2007 – 685.7 acres
- Year 2007 – 4.6 acres

The total acreage today is 2,914.535 acres through recent land purchases (Figure 1-2) which allowed for an increase in the buffer area around the installation.

1.4 Overview of Natural Resources Management

The Environmental Manager (EM) operates the Environmental and Natural Resources Program at HPDTA. The EM strives for good stewardship that provides for the conservation of natural resources. The extensive shoreline along the Perquimans River and Albemarle Sound, bottomland hardwood swamps, and extensive pine forests are the most significant natural resources at HPDTA. The EM is responsible for compliance with state and Federal laws (e.g., National Environmental Policy Act (NEPA) and SAIA) and regulations concerning natural resources.

The natural resources program emphasizes wetlands and water quality, erosion control, forestry, and wildlife management. The primary natural resources management issues outlined in this INRMP are briefly described in the following paragraphs.

- **Wetland/Water Quality Protection** - Wetlands occupy approximately 858.7 acres (29.5 %) of the total land area of HPDTA. Protection goals include erosion/sediment control plans for construction sites; evaluating the health of existing wetlands; and recommendations for preservation.

- **Shoreline Erosion Control.** A large portion of the 7.3 miles of shoreline surrounding HPDTA has been bulk headed to prevent erosion from wind and wave action. Erosion control and shoreline protection is a continual natural resources issue.

- **Bird Aircraft Strike Hazard (BASH) Reduction** - With an active runway on the installation, and the variety of bird and wildlife species that occur, the potential for BASH exists. The EM must consider the issue of potential bird and wildlife strikes for all natural resources management activities and develop recommendations on how to reduce BASH in coordination with DON Air Operations.

- **Forest Management -** Protection of forest health from insect and disease infestations and intense storm damage are the primary goals of forest management. A forest resources inventory was conducted in 2009 by the North Carolina Forest Service (NCFS) to facilitate management, harvesting, and regeneration activities. Protection goals include updating the Forest Management Plan.

- **Prescribed Burning -** Discussion on prescribe burning in relation to wildlife habitat improvement, stand regeneration, invasive species infestations, and wildfire impacts.

- **Fish and Wildlife Management -** The diversity of habitats on HPDTA supports a wide variety of wildlife and ensuring the continued availability of high quality natural areas through habitat management is a natural resources priority. Protection goals include promoting ecosystem health, biodiversity and vegetative screening through updating plant and animal inventories and establishing food plots, and analyzing the white-tailed deer hunting program using herd health assessments.

- **Grounds Maintenance–** Management issues are focused on control of invasive species such as kudzu (*Pueraria Montana*), common reed (*Phragmites australis*), as well as Johnson grass (*Sorghum halepense*), and Nepalese browntop (*Microstegium vimineum*). Maintenance of shade trees and grass mowing in the airfield clear zone, fire breaks, and along roads are the primary requirements for grounds maintenance at HPDTA.

- **Installation Restoration Sites.** The Navy Environmental Restoration Program (ERP) is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) releases. In addition, the ERP is responsible for considering risks and assessing impacts to human health and the environment as well as developing and selecting response actions when it is likely that a release could result in an unacceptable risk to human health and the environment. When appropriate, the EM identifies potential impacts to natural resources caused by the release of contaminants.

Figure 1-1. Regional Setting of HPDTA, North Carolina

Figure 1-2. HPDTA Property Acquisitions

II. EXISTING CONDITIONS

This chapter describes the existing conditions and general physical environment of HPDTA.

2.1 Regional Land Use

HPDTA is located on a peninsula in Perquimans County, in northeastern North Carolina in an area that is generally characterized by rural, forested, and agricultural land use (Perquimans County, 1998). The installation is located on a peninsula that is bordered on the north by the Perquimans River, on the east and south by the Albemarle Sound, and rural residential development, woodland and agricultural fields to the west.

State Route 37 and U.S. 17 are the two highways in proximity to HPDTA, and are located to the west of the installation. Hertford is located approximately 10 miles northwest of HPDTA. Examples of the closest recent growth in Perquimans County include the waterfront subdivisions of Holiday Island (subdivision adjoins the 685.7 acres), and Albemarle Plantation (six miles west of HPDTA on the Harvey Neck Peninsula). The Holiday Island residential development currently consists of 100+ residences within Section N of the 500 unit residential development. Albemarle Plantation hosts a large, private, waterfront 300+ unit recreation-oriented residential community in size featuring a golf course, a 212 slip marina, a waterfront clubhouse, and other amenities. State Route 1336, (Harvey Point Road), functions as the only access road into and out of HPDTA.

2.2 HPDTA Land Use

HPDTA encompasses approximately 2,914.535 acres. Major land uses at the installation include administration, an airfield/runway, training and test ranges, a large historic dredge spoil disposal area, areas of undeveloped forested and agricultural land, and station roads that connect the installation's various buildings. The overall management intensity at HPDTA is relatively low. The extensive shoreline along the Perquimans River and the Albemarle Sound, bottomland hardwood swamps, and extensive pine forests are the most significant natural resources at HPDTA (HPDTA INRMP, 2007).

The test range areas are primarily large open areas surrounded by forested buffers that contain bunkers, classroom facilities, and storage buildings. HPDTA's existing administration area is centrally located within the installation; however, various personnel support buildings including Bachelor Officers Quarters facilities, a cafeteria, temporary duty quarters, a gymnasium, a small boathouse, and a conference/recreation building are also located throughout the installation. The airfield and associated 1-mile long runway bisects the installation in a north-south orientation.

2.3 Coastal Zone Management

The Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq.) created a common statutory regime to assist states in comprehensively managing competing uses of and impacts to coastal uses and resources. States submit a Coastal Management Program (CMP) to National Oceanic and Atmospheric Administration (NOAA), which if approved, becomes the basis for Federal agency consistency determinations.

In addition to eligibility for annual operating funds, Federal approval of state CMP triggers the CZMA Section 307 Federal consistency requirement. Section 307 mandates that Federal actions within or outside the coastal zone that affects any land or water use or natural resource in a state's coastal zone be consistent to the maximum extent practicable with the enforceable policies of the state's Federally approved coastal zone management program. Federal agency actions include direct and indirect Federal agency activities, Federal approval activities, and Federal financial assistance activities. Accordingly,

Federal agency activities (direct, indirect or cumulative) reasonably affecting the state's coastal zone must be fully consistent with the enforceable policies of the state's CMP unless compliance is prohibited based upon the requirements of existing laws applicable to the facility. There are no categorical exemptions or exclusions to the Section 307 Federal consistency requirement.

The state of North Carolina has developed and implemented the Federally-approved North Carolina Coastal Area Management Act (CAMA) of 1974 (G. S. 113A- 100 et seq.). The CAMA incorporates a legislative framework that provides a cooperative program for coastal area management between local and state governments. The Act states that local governments shall have the initiative for planning, while the state government establishes areas of environmental concern. With regard to planning, the state government is directed to act primarily in a supportive, standard setting, and review capacity, except in situations where local governments do not elect to exercise their initiative. In addition, the CAMA establishes the Coastal Resource Commission (CRC) within the North Carolina Department of Environment and Natural Resources, whose duties include approval of Coastal Habitat Protection Plans and designation of Areas of Environmental Concern (AEC). The CAMA classifies areas of environmental concern to protect them from uncontrolled development, which may cause irreversible damage to property, public health or the environment. After designation of these areas, the CRC is responsible for issuing all permits, providing input in planning decisions in AEC, and involved in policy direction undertaken by local governments. The property proposed for acquisition is located within the North Carolina coastal zone and is subject to laws and regulations that govern development and changes in land use within Perquimans County. The Perquimans County, North Carolina 1998 Land Use Plan Update was prepared in response to CAMA and ratified by the North Carolina Coastal Resources Commission (NCCRC). This plan establishes land use policies and permitting processes for the:

- Protection of areas of environmental concern (such as wetlands and prime farmland),
- Protection of significant cultural and historic resources, and
- Adoption of planning policies along estuary shorelines, near population centers and along major transportation routes.

Table 2-1 lists the Perquimans County (1998) land use and coastal zone management policy categories. Additionally, an expanded discussion of the applicable policies as they relate to a Proposed Action is also provided. The Perquimans County land use plan (1998) classifies HPDTA as a government installation and designates the areas around HPDTA as rural, agricultural, and forested.

2.4 Floodplains

The Albemarle Sound is a tidal estuary, the inlets of which are channels for rising and falling tidal waters. The widths of the flood hazard areas in Perquimans County, in general, are rather narrow when compared to those of other counties in North Carolina's Coastal Region. Streams and rivers in Perquimans County cut relatively deep channels. Wind tides are the most frequent cause of flooding in the county. Flooding generally occurs along the short, minor tributaries draining into the Perquimans River and along the northern section of the Perquimans River north of Hertford. The 100-year floodplain, which is the level at which a flood is likely to occur only once in a 100 year period, is used to evaluate flood hazard areas. The majority of the shoreline at HPDTA is located within the 100-year floodplain (Figure 2-1) with the largest area of floodplain located south and southwest of the airstrip as mapped by the Federal Emergency Management Agency (Flood Insurance Rate Map, North Carolina (panel 7886)).

Table 2-1. Perquimans County (1998) Land Use/Coastal Zone Management Policy Categories

Resource Protection Policies
1. Areas of Environmental Concern (AEC) and Appropriate Land Use in AECs. Minimize development within AECs/areas with serious environmental constraints.
2. Constraints to Development Including Soil Limitations, Flood Prone Areas Hazardous and Fragile Land Areas. Minimize development on soils that have severe limitations and in floodplains.
3. Freshwater, Swamps, and Marshes. Encourage Best Management Practices BMPs recommended by the Soil Conservation Service SCS.
4. Preserve Cultural and Historic Resources.
5. The Use of Package Treatment Plants. Department of Health and Division of Environmental Management to control installation, placement, and operation of package treatment plant.
6. Protection of Potable Supply. Coordinate with Federal and state agencies.
7. Storm Water Run-off Residential Development. Prevent the over-burdening of existing waterways and drainage systems by excessive surface run-off.
8. Marina, Floating Home Development, and Stack Storages.
9. Industrial Impacts on Fragile Areas.
Resource Production and Management Policies
10. Productive Agricultural Lands. Encourage land owners to keep their land in productive use.
11. Commercial Forest Land. Encourage use of most efficient and productive forest practices. Encourage reforestation as an ongoing management practice.
12. Commercial and Recreational Fishing.
13. Off-Road Recreational Vehicles.
14. Residential, Commercial, and Industrial Impacts, and Resources.

Source: Adapted from 1998 Perquimans County CAMA Plan Update.

2.5 Climate

The climatic regime in the HPDTA region is classified as humid temperate and is typified by small to moderate annual temperature ranges. Climatic data for the HPDTA vicinity were recorded at Elizabeth City, North Carolina, (Table 2-2) which is approximately 20 miles northwest of the installation.
The average annual temperature of the area is approximately 61degrees F, with prevailing winds from the southwest. Elizabeth City, NC climate is warm during summer when temperatures tend to be in the 70 degrees F and cold during winter when temperatures tend to be in the 40 degrees F. The warmest month of the year is July with an average maximum temperature of 89.20 degrees Fahrenheit, while the coldest month of the year is January with an average minimum temperature of 32.30 degrees Fahrenheit.

Source: North Carolina Floodplain Mapping Information System.

Figure 2-1. Map of Floodplain at HPDTA

Temperature variations between night and day tend to be fairly limited during summer with a difference that can reach 19 degrees Fahrenheit, and moderate during winter with an average difference of 21 degrees Fahrenheit.

Rainfall is abundant and well distributed throughout the year (Table 2-3). Rainfall is evenly distributed throughout the year. The annual average precipitation at Elizabeth City is 48.20 Inches. The wettest month of the year is July with an average rainfall of 5.59 Inches.

Table 2-2. Normal Climate Data Recorded at Elizabeth City, North Carolina.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max °F	52.5	55.4	63.2	72.1	78.8	85.6	89.2	87.7	83.1	73.6	65.0	56.2	71.9
Mean °F	42.4	44.7	51.8	60.1	67.9	75.7	79.8	78.3	73.3	62.6	54.1	45.9	61.4
Min °F	32.3	34.0	40.4	48.1	57.0	65.7	70.3	68.8	63.4	51.6	43.1	35.6	50.9

Source: Reference: http://www.idcide.com/weather/nc/elizabeth-city.htm.

Table 2-3. Average Total Monthly Precipitation for Elizabeth City, NC.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Inch	4.40	3.28	4.03	3.07	4.14	4.31	5.59	5.47	4.55	3.32	2.97	3.07	48.20

Source: Reference: http://www.idcide.com/weather/nc/elizabeth-city.htm.

The above climatological data are important to a natural resources manager because climatic conditions govern planting times and species selection for trees, shrubs, forbs, and grasses; determine migration and hibernation and/or aestivation periods of migratory and resident wildlife; are relevant in determining wetland hydrology under Section 404 of the Clean Water Act; and can be important in planning access to, and conducting timber harvests in wet areas. The recognized growing season for the Elizabeth City area (based on 28 °F) is 251 days.

Climate Change Issues

A purpose of this INRMP, it to support the installation's training readiness mission by ensuring continued access to realistic habitat conditions, while simultaneously working to ensure the long-term sustainability of the local natural heritage. Global mean temperatures have increased significantly over the last century, causing changes in local temperature and precipitation. HPDTA understands that managing these threats against the vulnerabilities of species and ecosystems is a central tenet of climate change adaptation. Impacts that must be considered include shifts in species' ranges and distributions, changes in phenology, rising sea levels, and variations in ecological processes such as drought, fire, and flood.

DON INRMP Guidance (2006) requires an ecosystem based adaptive management approach and encourages partnerships to ensure that all considerations for future climate projections relevant to the region are understood and support at a minimum the development and updating of vulnerability assessments. Climate change vulnerability assessments typically determine

(1) the sensitivity of a species or system to changes in the climate,
(2) the level of exposure to change, and
(3) the adaptive capacity of the species or system, in the context of existing threats.

This information helps an EM develop effective strategies to promote resilient and sustainable conservation targets, as well as manage for change when conditions exceed a species' or community's ability to recover.

2.6 Watershed and Topography

The Albemarle-Pamlico Drainage Basin, located in North Carolina and Virginia, drains an area of about 28,000 square miles (mi^2). Four physiographic regions, the Valley and Ridge, Blue Ridge, Piedmont, and Coastal Plain Provinces, are included within the Albemarle-Pamlico Drainage area. HPDTA is located on a low-lying peninsula that is part of the Albemarle-Pamlico Drainage Basin (Figure 2-2). This watershed includes four major river basins: the Chowan, Roanoke, Tar-Pamlico, and Neuse. A small portion of the HPDTA drains into the Perquimans River, with the majority flowing into the Albemarle Sound. In general, more than one-half of the water flowing in streams discharging to the Albemarle-Pamlico Drainage Basin comes from ground water. Thus, the quality of ground water has substantial influence on surface-water quality. The Albemarle-Pamlico Basin is dominated by a patchwork of forested (50 percent of the area) and agricultural (more than 30 percent) land, with large tracts of wetlands (about 15 percent)

located in the east along the Atlantic coast. Less than five percent of the overall basin area contains developed land (USGS Circular 1157).

HPDTA lies within the Outer Atlantic Coastal Plain physiographic province (Bailey, 1995) (see Figure 2-3). Over 50 percent of the Outer Coastal Plain is gently sloping, with relief of less than 30 feet above mean sea level (MSL). The topography of the Harvey Neck area is largely flat and undifferentiated with elevations ranging from sea level along the shoreline of the Albemarle Sound and the Perquimans River to 9.0 feet above MSL (Figure 2-3). The higher elevations occur primarily along Towers Boulevard, which traverses the center of the property from east to west, and at Harvey Point, the far eastern tip of the installation.

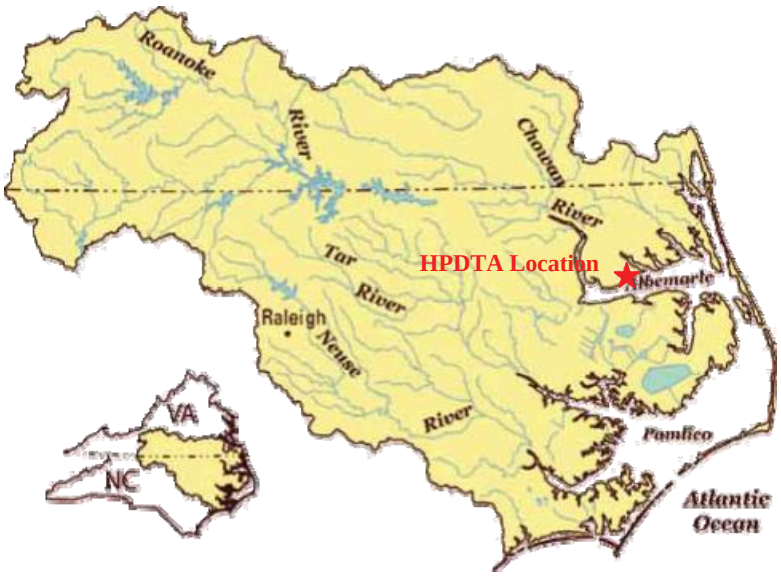


Figure 2-2. HPDTA Location within the Outer Coastal Plain Physiographic Province and the Albemarle-Pamlico Drainage Basin of North Carolina

Source: http://nc.water.usgs.gov/albe/index.htm).

Due to the area's flat terrain, much of the land is poorly drained. Sluggish streams, marshes, and swamps are common. The natural hydrology at HPDTA has been altered by ditches to improve drainage. Extensive drainage systems and relic furrows are visible on land that was previously drained and used for agriculture. This probably occurred up to and including the very late 19th century, as evidenced by tree-ring data taken from old field pines.

2.7 Soils

Soils in the Outer Coastal Plain are primarily unconsolidated sands with some consolidated to partly consolidated limestone and sandy limestone (Bailey, 1995). These soils are mainly Ultisols, Spodosols, and Entisols, which tend to be wet, acidic, and low in major plant nutrients. The soils are derived mainly from coastal plain sediments ranging from heavy clay to gravel, with sandy materials predominant. Silty soils occur mainly on level expanses. The soils of HPDTA are Ultisols, which is the most prevalent soil order found in the southeastern U.S.

Five soil types occur on HPDTA (USDA, 1986) (Figure 2-4; Table 2-4). Hydric soils including Chowan silt loam, Roanoke silt loam, and Tomotley fine sandy loam comprise 61 percent of the soils on the installation. Dogue fine sandy loam is the only non-hydric soil on the installation. Udorthents (human altered soils) found on the installation exhibit both hydric and non-hydric characteristics based on the hydrology of the area where the soils are found. The majority of the area of Udorthent soil on the installation is dredge spoil. The historic dredge spoil dates to the 1940's when HPDTA was a Navy seaplane base and channels were dredged to bring fuel barges to the installation. Excavations for a

seaplane ramp and runway on the installation also produced spoil and fill that were deposited on top of other soils, creating more Udorthent soils. Although Roanoke silt loam is listed as a hydric soil (USDA, 1991) and occurs extensively at HPDTA, very little wetland acreage was delineated on it. Ditches throughout areas of Roanoke silt loam have lowered the land's water table enough to remove characteristic wetland hydrology (USDA, 1986). Areas of Roanoke soil represent an opportunity for wetland mitigation by re-establishing wetland hydrology.

Table 2-4. Soils of HPDTA.

TYPE	*DESCRIPTION*
Chowan Silt Loam CO Area = 675 acres (20%).	This nearly level, very poorly drained soil is found on floodplains of small streams. Permeability is moderately slow and pH is extremely to moderately acid in the upper mineral horizons. This soil is frequently flooded for very long periods and is on the National Hydric Soils List (USDA, 1991).
Dogue Fine Sandy Loam DgA, DgB Area = 376 acres (11%).	This nearly level to gently sloping (0% to 6%) soil is moderately well drained and is found on ridges near small streams. Permeability is moderately slow and the available water capacity is moderate. Soil pH ranges from extremely to strongly acid. The seasonal high water table is from 1.5 to 3 feet below the surface.
Roanoke Silt Loam Ro Area = 2,042 acres (60%).	This soil is found on broad flats and in depressions. It is nearly level and is poorly drained. Permeability is slow and pH is very strongly to strongly acid. The seasonal high water table is at or near the surface but flooding is rare. This soil is on the National Hydric Soils List (USDA, 1991).
Tomotley Fine Sandy Loam To Area = 7 acres (< 1%).	This soil is nearly level, poorly drained, and found in flats and in slight depressions. Permeability is moderate to moderately slow. Soil pH is extremely to strongly acid. The seasonal high water table is at or near the surface but flooding is rare. This soil is on the National Hydric Soils List (USDA, 1991).
Udorthents, loamy UD Area = 302 acres (9%).	This map unit consists of areas of altered soil where the normal soil profile has been destroyed or covered by grading and digging operations. Three distinct types are borrow pit, dredge and fill, and landfill.

Source: USDA, 1986.

Source USGS Topographic Quadrangle 36076-A3 Harvey Neck, NC.

Figure 2-3. Topography at HPDTA

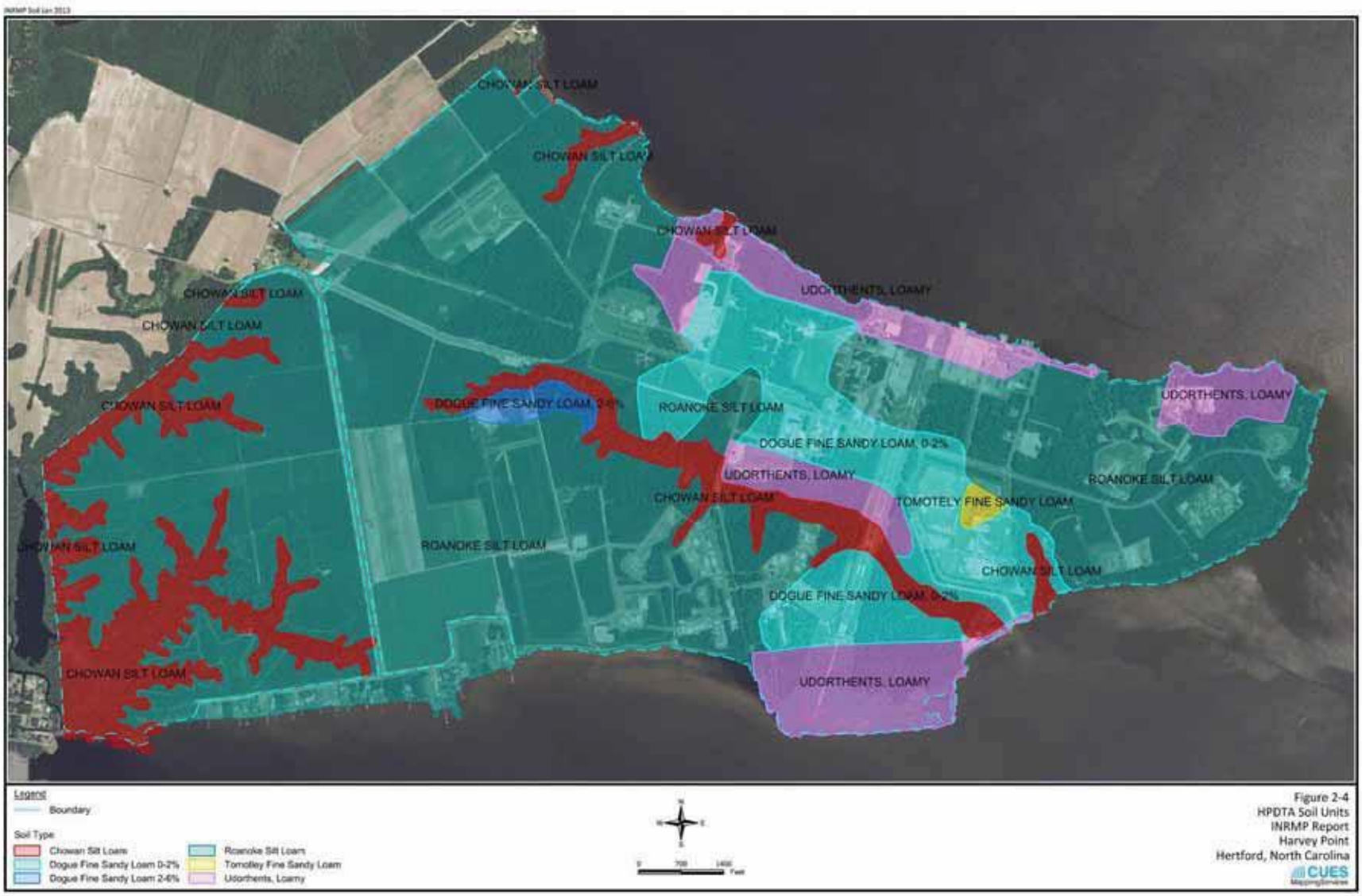


Figure 2-4. Soil Map Units at HPDTA

2.8 Wetlands

A wetland survey was completed at HPDTA in 1998 as part of the installation's INRMP (2007). The results of the survey indicated that 237.1 acres of wetlands occur at HPDTA, which represents approximately 13% of the total facility land area at the time. Approximately 90 acres (36 hectares) of the wetlands found at HPDTA are located in a historic dredge spoil disposal area on the south side of the facility. About half of the disposal area is forested while the other half is a marsh dominated by a nearly pure stand of common reed (*Phragmites australis*). Common reed is an invasive species that frequently colonizes disturbed sites to the exclusion of other species. Monocultures of common reed lack the diversity and wildlife value of more diverse wetland communities. There are also several large ponds in the marsh where the fill material has settled and is now under water.

An additional survey in 2000 related to land acquisitions resulted in the delineation of an additional 19.2 acres of wetlands. In more recent years, HPDTA has acquired several hundred acres of property bringing the total installation acreage to 2,914.535 acres though recent land purchases which allowed for an increase in the buffer area around the installation. Wetland determinations within the acquisition areas were made utilizing National Wetlands Inventory (NWI) mapping from the USFWS and limited field investigations using the Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1 (January, 1987) (Table 2-5) (Figure 2-5) bringing the total wetland acreage on the installation up to 858.7 acres with the most abundant wetland type is palustrine mixed needle and broad-leaved deciduous forest. These wetlands occur in the bald cypress-tupelo or water tupelo forest cover type.

Table 2-5. Wetland Types at HPDTA for the total 2,914.535 acres of property to date (NWI Mapping and limited field investigations).

Type	*Description*	*Area (Acres)*
PFO6	Palustrine Forested Deciduous	702.1
PEM1	Palustrine persistent emergent	82.9
PSS1	Palustrine Scrub-Shrub Broad-Leaved Deciduous	23.6
E2EM1	Estuarine intertidal persistent emergent	9.6
R2UBH	Riverine Lower Perennial Unconsolidated Bottom	13.1
PUB	Palustrine Unconsolidated Bottom	6.6
PAB	Palustrine Aquatic Bed Rooted Vascular	20.8
	Total	**858.7**
	Percent of Total HPDTA Acreage	**29.5 %**

The most abundant (approximately 702 acres) wetland type delineated was palustrine deciduous forest largely in part to the extensive wetland system located on the most recent 2007 land parcel acquisition area. This wetland type occurs primarily on the Chowan soils on the installation's major drainages. Past ditching and the construction of roads and the runway have altered the hydrology of these swamps. Construction of the runway interrupted normal flow of a swamp it bisects, causing water retention on its western side and a lack of flow on its eastern side. A large canal that parallels Towers Boulevard diverts much of the water that previously flowed eastward through this drainage.

The extensive wetland system located on the most recent 2007 land parcel acquisition area also contains large areas of former agriculture fields. Hydrologic well monitoring during the onset of the growing season (the wettest time of year) would be necessary to determine if the fields meet hydrologic requirements of a wetland. The fields have been out of agricultural production since 1985, thus they no longer carry a *prior conversion* agricultural exemption under Section 404 of the CWA. The fields are underlain by the hydric Roanoke soil and have been channelized and ditched; however, hydrophytic vegetation exists in isolated areas. Thus, the monitoring of sub-surface hydrology for positive

determination of water within 12 inches of the soil surface for 12 consecutive days (five percent) of the growing season would be the pivotal criteria in determination of wetland status. When this area was observed during ground-truthing, neither primary nor secondary hydrological characteristics were evident. In the event HPDTA plans any development in this area, a jurisdictional delineation must be conducted and a permit sought from USACE for any soil disturbing activity within the jurisdictional area if appropriate.

First order (field or lateral) ditches in the Outer Coastal Plain physiographic province usually do not have perennial flow or significant aquatic life; however, flowing water and significant aquatic life often do occur in third order (transport outlet) ditches. Therefore, many ditches or canals on HPDTA might be subject to Sections 401 and 404 regulations of the CWA relevant to effluent and dredge and fill discharge into a jurisdictional water of the U.S., particularly if the ditch is adjoined by Roanoke, Chowan, or Tomotley soils. A ditch traversing a hydric soil can be assumed to be a water of the U.S. and therefore be under jurisdiction of the USACE. There are approximately 184,007 linear feet (34.8 miles) of ditches in hydric soils on HPDTA over which USACE could potentially claim jurisdiction. Conversely, there are 97,680 linear feet (18.5 miles) of ditches through non-hydric soils that are not likely (a hydric soil inclusion could occur within an otherwise non-hydric mapped soil) to be claimed as jurisdictional Waters of the U.S. by USACE. Ditches are illustrated in Figure 2.6.

As part of HPDTA's 2007 INRMP development, an environmental stewardship recommendation was to develop an operations and maintenance standard operating procedure for proper drainage of ditches that includes best management practices for minimizing soil disturbance as well as control of invasive species. As part of that effort, HPDTA completed a field review with the U.S. Army Corps of Engineers to verify which drainage ditches on the installation were considered jurisdictional Waters of the U.S. (HPDTA Base Ditch Map – dated May 28, 2009 (ditches are identified on Figure 2-6 for reference)).

The maintenance efforts on each of the ditches cannot increase drainage capacity beyond the original as-built capacity nor can it expand the area drained by the ditch as originally constructed (i.e., the capacity of the ditch must be the same as originally constructed and it cannot drain additional wetlands or other waters of the US). In addition, the location of the centerline of the drainage ditch must be approximately the same as the location of the centerline of the original drainage ditch.

Maintenance Requirements and Conditions:

- Remove 20 foot buffer of vegetation on each side of the ditch to allow for maintenance easement.
- All tree stumps must remain in place. However, mechanized vegetation clearing may be conducted from the top of bank.
- All original ditch profiles must be maintained. Historical profile data is not available; therefore, Public Works will maintain positive drainage from the Perquimans River/Albemarle Sound to upstream in the ditch. No equipment will be placed in the ditch. All mechanized equipment will be situated on the top of bank.
- All material removed from the ditch will be side cast at an approved offsite location.
- Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during maintenance efforts, and all exposed soil must be permanently stabilized at the earliest practicable date.
- Silt fencing must be utilized during maintenance efforts at all ditch entrances with the Perquimans River/Albemarle Sound to minimize the potential for soil plumes into these receiving waters.
- The activity must comply with applicable FEMA-approved state or local floodplain management requirements.
- No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody. Culverts placed in streams must be installed to maintain low flow conditions.

- Should any existing culverts need to be replaced during maintenance efforts, HPDTA must comply with all conditions listed in Nationwide Permit 3 – Maintenance. All construction activities must be completed in dry conditions; therefore all proper sheeting and dewatering techniques must be strictly adhered to. Earthen berms or sand bags shall not be used as the means of retaining water flow in the channels. All dewatering activities shall ensure that sediment is not pumped into the downstream channel causing sedimentation in the ditches. The PCN submittal is not required for culvert replacements.

As part of the coordination efforts, the U.S. Army Corps of Engineers also requested the following specific maintenance requirements.

Specific Maintenance Notes: (HPDTA Base Ditch Map – dated May 28, 2009 (ditches are identified on Figure 2-6 for reference))

- *Ditches 1-8:* Remove 20 foot buffer of vegetation on each side of the ditch to allow for maintenance easement and follow all *Maintenance Requirements and Conditions* listed above.
- *Ditch 9 (Two areas):* Photographs have been submitted to the U.S. Army Corps of Engineers as part of coordination efforts to develop the best method for a solution for the constant sand filling the ditch entrances due to wave action. Initial general consensus determined that extending the pipe will not resolve the problem and may cause a worse maintenance issue. Coordination efforts are currently ongoing to resolve this issue.
- *Ditches 10:* The existing vegetation buffer on of the western side of the ditch will remain in place since. Efforts will follow all *Maintenance Requirements and Conditions* listed above.

2.9 Vegetation

The dominant vegetation of mesophytic environments, or moderately moist environments, within the Outer Coastal Plain is considered to be evergreen-oak and magnolia forest. The dominant vegetation in excessively wet habitats within this province is bald cypress (*Taxodium distichum*) and tupelo gum (*Nyssa* spp.). The dominant vegetation within excessively dry habitats tends to be loblolly pine (*Pinus taeda*) (Bailey, 1995). There is usually a well-developed lower stratum of vegetation that may include tree ferns, shrubs, grasses, and other herbaceous plants. Vines and epiphytes (e.g., Spanish moss) are generally abundant. In this physiographic province, non-draining shallow depressions in savannas form upland bogs or pocosins in which evergreen shrubs predominate.

At HPDTA, the majority of the land area is forested. Other, less abundant plant community types present include open areas that are maintained by mowing and emergent wetlands. A general description of each of the plant community types found at HPDTA follows with a more comprehensive species list in Appendix D. Forestry management is an important issue at HPDTA, one of the current INRMP management recommendations is to develop a current Forestry Management Plan to inventory the current forest types and condition.

Forest Cover Types

According to the Society of American Foresters (SAF) six forest communities occur at HPDTA (SAF, 1980) (Table 2-6). Forest cover type is defined as a descriptive classification of forestland based on present occupancy of an area by tree species. The classification is based on existing tree cover. Three criteria are recognized: the dominant cover must be of trees; the type must occupy a fairly large area in the aggregate, but not necessarily in continuous stands; and forest cover type must be based on entirely biological considerations. This system of vegetation classification is useful in that it relates existing tree cover to historical land use, succession, and soil moisture conditions.

Figure 2-5. Detailed Map of the Wetlands Located on HPDTA

Figure 2-6. Detailed Map of the Drainage Systems Located on HPDTA

Table 2-6. Society of American Foresters (SAF) Forest Types at HPDTA.

SAF Forest Type	*Acreage*	*Percent*
Loblolly Pine	609	50
Loblolly Pine-Hardwood	165	13
Sweetgum-Yellow Poplar	207	17
Willow Oak-Water Oak-Laurel Oak	132	11
Baldcypress-Tupelo	107	9
Water Tupelo-Swamp Tupelo	7	<1
Total Acreage*	**1,227**	**100**

Loblolly Pine Type. Loblolly pine is the most abundant forest cover type at HPDTA, equaling about 50 percent of the forested area. This cover type is comprised of either pure stands of loblolly pine or mixtures in which the species makes up the majority of the stocking. Associated tree species are typically sweetgum (*Liquidambar styraciflua*), cherrybark oak (*Quercus pagodaefolia*), swamp chestnut oak (*Q. michauxii*), red maple (*Acer rubrum*), and yellow poplar (*Liriodendron tulipifera)*. Stands of this type on HPDTA occur on abandoned agricultural fields that seeded to loblolly, or were planted more recently. In areas where a majority of the stand is loblolly, furrows from past row crops, extensive ditching, and side cast piles are still evident.

Loblolly Pine-Hardwood. This cover type makes up about 13 percent of the forest at HPDTA. Loblolly pine is not dominant in this cover type but comprises 20 percent or more of the stocking in mixture with hardwoods. This type can be considered a successional stage to various hardwood types. It occurs on wet to dry sites and often occurs after old-field pine stands are harvested. Southern red oak (*Q. falcata*), sweetgum, yellow poplar, and red maple are common associates.

Sweetgum-Yellow Poplar. This mixed bottomland hardwood cover type comprises 17 percent of the HPDTA forests. It generally includes red maple, ash (*Fraxinus spp*.), willow oak (*Q. phellos),* blackgum (*Nyssa sylvatica*), and American elm (*Ulmus americana*). This cover type often occurs on abandoned farmlands that were too wet for the colonization of loblolly pine to occur, predictably on the hydric Roanoke soils on HPDTA. On several dryer sites that have been ditched, mature American beech (*Fagus grandifolia*) and shagbark hickory (*Carya ovata*) are also found.

Willow Oak-Water Oak (*Q. nigra*)-Laurel (Diamondleaf) Oak (*Q. laurifolia)*. This type is common on alluvial floodplains that are poorly drained, flat sites, and are often adjacent to drainages at HPDTA. It comprises about 11 percent of the forestland at HPDTA. Willow oak usually occupies the wetter sites, with cherrybark oak and swamp chestnut oak occupying the better-drained areas within these types.

Bald cypress-Tupelo. Bald cypress, together with water tupelo and swamp tupelo, comprise the majority of the stock of this cover type at HPDTA. Common associates are red maple, green ash (*F. pennsylvanica*), Carolina ash (*F. caroliniana*), swamp cottonwood (*Populus heterophylla*), American elm (*Ulmus americana*), sweetgum, redbay (*Persia borbonia*), sweetbay (*Magnolia virginiana*), and loblolly pine. This forest cover type is found mainly in the major drainage that traverses the installation from northwest to southeast and was likely more prevalent before runway construction and ditching. Bald cypress-Tupelo swamps are found on the hydric Chowan soil type.

Water Tupelo (*N. aquatica)* -Swamp Tupelo (*Nyssa sylvatica* var. *biflora)*. Where this cover type prevails at HPDTA, swamp tupelo is pure or provides a majority of the stock. Common associates include black willow (*Salix nigra*), Carolina ash, swamp cottonwood, American elm, green ash,

sweetgum, persimmon (*Diospyros virginiana*), and sweetbay. This type is found in a small swamp on the south side of the installation and is growing on the hydric Chowan soil type.

Mid-story and Under-story Species
On drier upland sites, small trees and shrubs that form the mid-stories and under-stories include persimmon, flowering dogwood (*Cornus florida*), black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*). On wet or transition sites the shrub and sapling layer may include ironwood (*Carpinus caroliniana*), American holly (*Ilop opaca*), hophornbeam (*Ostrya virginiana*), and pawpaw (*Asimina parviflora*). On the wettest areas, saplings of the canopy species and shrubs of sweet pepperbush (*Clethra alnifolia*), wax myrtle (*Myrica cerifera*), and redbay occur frequently.

Herbaceous Species
Important vine species that are found in most of these communities include poison ivy (*Toxicodendron radicans*), several greenbriar species (*Smilax* spp.), Japanese honeysuckle (*Lonicera japonica*), yellow jessamine (*Gelsemium sepervirens*), and Virginia creeper (*Parthenocissus quinquefolia*).

Ground cover in many of these communities often consists of a carpet of two non-native grasses, microstegium (*Microstegium vimineum*) and joint-head arthraxon (*Arthraxon hispidus*). Switch cane (*Arundinaria gigantea)* is also prevalent in the herbaceous understory of mixed pine and hardwood stands, as is dog fennel (*Eupatorium leptophylum*).

Dominant species in palustrine emergent wetland areas include softrush (*Juncus effusus*), common reed, woolgrass (*Scirpus cyperinus*), coast cockspur (*Echinochloa walteri*), warty panic grass (*Panicum verrucosum*), and swamp loosestrife (*Decodon verticilatus*). There are saplings of bald cypress, sweetgum, and red maple in these areas as well.

North Carolina – Gypsy Moth Program

The North Carolina Department of Agriculture and Consumer Services (NCDA&CS) (http://www.ncagr.gov/plantindustry/Plant/entomology/GM.htm) has been survey trapping the entire state of North Carolina for gypsy moth (*Lymantria dispar*) since 1982. Since then, more than 100 intervention programs have been initiated to either eradicate isolated populations or suppress populations close to the leading edge of the gypsy moth's advancing front. One county, Currituck, and a portion of a second county, Dare, are currently quarantined for gypsy moth. Each year, NCDA&CS places and checks between 18,000 and 21,000 gypsy moth traps which are placed in mid-spring and retrieved in mid- to late-summer.

Gypsy moth (*Lymantria dispar*) is a European forest pest that feeds on the leaves of over 300 different species of trees in North America. The damaging stage is the larval or caterpillar stage. Larvae have been known to consume up to one square foot of leaves each by the time they reach maturity. The gypsy moth life cycle starts when the larvae hatch in the spring. Hatch usually occurs shortly after oak foliage begins to expand. Larvae often remain on the spent egg masses until a warm day arrives, at which time they journey to the foliage and begin eating. Larval growth is categorized by instar, of which there are five or six. Molting, the process where the caterpillar sheds its exoskeleton so it can grow larger, defines the transition between each instar. Male gypsy moth caterpillars go through five instars, while females go through six. Each instar lasts roughly two weeks, depending on weather. Gypsy moths then move into pupation by transforming into a cocoon and spinning a thin web of silk around themselves. Male and female pupae differ in size and coloration. This phase lasts roughly three weeks. Upon completion of pupation, the gypsy moth splits the cocoon to emerge. The male emerges first, several days prior to emergence of the female. The female of the European gypsy moth is flightless (the female of the Asian gypsy moth, *Lymantria dispar dispar* is able to fly; North Carolina had a serious infestation that was

eradicated in 1994). Adult gypsy moths do not feed; their sole function is to reproduce. Once the female emerges, she is sexually mature, and almost immediately begins releasing sex pheromone to attract male moths. Male moths use this pheromone to locate the female moth. After mating, the female lays an egg mass, usually composed of between 300 and 1,000 viable eggs. Both the female and male moths die shortly after mating. Localized gypsy moth infestations are identified and treated. Because of the intensive nature of North Carolina's trapping program, the extent of a particular infestation is known with precision. Only infested areas are treated with the use of only environmentally-friendly products.

HPDTA is coordinating with NCDA&CS to collect additional gypsy moth trapping data (Figure 2-6A). NCDA&CS has places two gypsy moth traps on HPDTA in April 2013 and the traps are to be on base until August 2013 by the NCDA&CS representative for them to count.

2.10 Fauna

The diversity of habitats on HPDTA supports fauna that is characteristic of the Outer Coastal Plain. The lists below were compiled from published field guides, reports, and field observations. There are more than 20 mammal species, 100 bird species, 22 amphibians, 25 reptiles, and 49 fin fish and shellfish species that are known or potentially occur on the installation and in adjacent waters (Appendix E).

Mammals
The general mammalian fauna of the region includes white-tailed deer (*Odocoileus virginiana*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), cottontail rabbit (*Sylvilagus floridanus*), black bear (*Ursus americanus*), marsh rabbit (*Sylvilagus palustris*), gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), river otter (*Lutra canadensis*), long-tailed weasel (*Mustela frenata*), eastern mole (*Scalopus aquaticus*), hispid cotton rat (*Sigmodon hispidus*), white footed mouse *(Peromyscus leucopus*), marsh rice rat (*Oryzomys palustris*), meadow vole (*Microtus pennsylvanicus*), pine vole (*Microtus pinetorum*), southern bog lemming (*Synaptomys cooperi*), and eastern harvest mouse (*Reithrodontomys humilis*). Introduced species include nutria (*Myocaster coypus*), black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), and house mouse (*Mus musculus*). The striped skunk (*Mephitis mephitis*) and red fox (*Vulpes vulpes*) are common to most of the southeast and coastal plain areas but are not known to occur in eastern North Carolina. Coyotes and black bears are not uncommon in the Outer Coastal Plain, but might be discouraged from occupying HPDTA by the chain-link fence partitioning the installation from adjacent properties. Mink *(Mustela vison*) might or might not exist on HPDTA, as their range excludes a broad band of eastern North Carolina.

Most of the above species are found in the forest habitats of HPDTA. However, the hispid cotton rat, eastern harvest mouse, and house mouse are commonly found in upland old field or early successional habitats. The meadow vole and southern bog lemming may be found in marshy meadows, bogs, and occasionally in upland old field habitat. The marsh rice rat prefers open wetlands such as marshes and vegetated agricultural field ditches. The pine vole prefers woodland habitats with lots of herbaceous cover and leaf litter, but can occasionally be found in old field habitats.

There are two common species of bats that roost in trees year-round and are likely to be winter residents of the Coastal Plain and HPDTA: red bat (*Lasiurus borealis*) and silver haired bat (*Lasionycteris noctivagans*). Most other bats of North Carolina and Virginia use caves during the winter but may occur at HPDTA during the summer. These species include the eastern pipistrelle (*Pipistrellus subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*).

Figure 2-6A. Detailed Map of the Gypsy Moth Traps Located on HPDTA

Birds
In 1999, a bird survey was conducted at HPDTA, which included stops in each of the installation's major habitat types. Birds that were observed are indicated on the species list in Appendix C.

The most common upland game birds include eastern wild turkey (*Meleagris gallopavo silvestris*), bobwhite (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). Though wild turkey were not recorded during the 1999 bird survey, the abundance of mature hardwood forest at HPDTA provides excellent habitat and they are expected to be common on the installation. However, openings for nesting and foraging are not common at HPDTA, which may be somewhat limiting to game bird populations.

Wading birds such as great blue heron (*Ardea herodias*), little green heron (*Butorides striatus*), black-crowned night heron (*Nycticorax nycticorax*), and yellow-crowned night heron (*N. violaceus*) are expected to be common at HPDTA. No rookeries, however, have been observed on the installation.

Common raptors at HPDTA include turkey vulture (*Cathartes aura*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). Typical owls of the area are common barn owl (*Tyto alba*), eastern screech-owl (*Otus asio*), great horned owl (*Bubo virginianus*), and barred owl (*Strix varia*).

Waterfowl are found along the southern shore of HPDTA in the Albemarle Sound. Mallards (*Anas platyrhynchos*), black ducks (*A. rubripes*), and wood ducks (*Aix sponsa*) are the most abundant species. Other common waterfowl include the Canada goose (*Branta canadensis*), northern pintail (*A. acuta*), northern shoveler (*A. clypeata*), gadwall (*A. strepera*), American wigeon (*A. americana*), blue-winged teal (*A. discors*), ring-necked duck (*Aythya collaris*), and ruddy duck (*Oxyura jamaicensis*).

Shorebirds include laughing gull (*Larus atricilla*), herring gull (*L. argentatus*), and common tern (*Sterna hirundo*). Killdeer (*Charadrius vociferus*), willet (*Catoptrophorus semipalmatus*), spotted sandpiper (*Actitis macularia*), long-billed dowitcher (*Limnodromus scolopaceus*), and common snipe (*Gallinago gallinago*) are among the sandpiper-like species found at HPDTA.

Common woodpeckers include red-bellied woodpecker (*Melanerpes. carolinus*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*P. villosus*), northern flicker (*Colaptes auratus*), and pileated woodpecker (*Dryocopus pileatus).* Nightjar birds include common nighthawks (*Chordeiles gundlachii*) and whip-poor-wills (*Caprimulgus vociferus*).

Passeriformes, or more commonly known songbirds, observed at HPDTA are numerous. Of note was the relative infrequency of brown-headed cowbird observations. These birds are nest parasitizeres that are considered to be a threat to the survival of several species of songbirds. The low numbers of cowbirds may be due to the largely unfragmented nature of the installation landscape.

Common introduced or non-native birds include English house sparrows (*Passer domesticus*), European rock dove (*Columba livia*), and European starlings (*Sternus vulgaris*).

Reptiles
Turtles are represented by the eastern box turtle *(Terrapene carolina*), spotted turtle (*Clemmys guttata*), yellow-belly slider (*Chrysemys scripta*), red-bellied turtle (*Pseudemys rubriventris*), stinkpot turtle (*Sternotherus oderatus*), and snapping turtle (*Chelydra serpentina*). The five-lined skink (*Eumeces fasiatus*) and the southeastern five-lined skink (*E. inexpectatus*) are likely to be the most common lizards at HPDTA. A few of the nonpoisonous snakes from the area include black racer (*Coluber constrictor*), rat snake (*Elaphe. obsoleta*), eastern king snake (*Lampropeltis getulus*), brown water snake (*Nerodia taxispilota*), and eastern garter snake (*Thamnophis sirtalis*). The venomous snakes found in the area are copperheads (*Agkistrodon contortrix*) and cottonmouth (*A. piscivorus*). There is no record of the timber

rattlesnake (*Crotalus horridus*) occurring in Perquimans County (North Carolina Natural Heritage Program Species List, 2012).

Amphibians

Amphibians found in the Outer Coastal Plain in the vicinity of HPDTA include various species of salamanders (both aquatic and terrestrial), frogs, and toads. The aquatic salamanders include the lesser siren (*Siren intermedia*), greater siren (*S. lacertina*), dwarf waterdog (*Necturus punctatus*), and the two-toed amphiuma (*Amphiuma means*). Terrestrial salamanders include the eastern newt (*Notophthalmus viridescens)*, marbled salamander (*Ambystoma opacum*), two-lined salamander (*Eurycea bislineata*), slimy salamander (*Plethodon glutinosus*), and many-lined salamander (*Stereochilus marginatus*).

Toad species include the eastern spadefoot (*Scaphiopus holbrooki*), oak toad (*Bufo quercicus*) and southern toad (*B. terrestris*). Frog species include southern cricket frog (*Acris gryllus*), gray treefrogs (*Hyla chrysoscelis* and *H. versicolor*), green treefrog (*H. cinerea*), spring peeper (*Pseudacris crucifer*), bullfrog (*Rana catesbeiana*), green frog (*R. clamitans melanota*), pickerel frog (*R. palustris*), and southern leopard frog (*R. sphenocephala*).

Fish

A number of anadromous species utilize the Albemarle Sound and its tributaries as spawning and nursery grounds. Important species in this group include striped bass (*Morone saxatilis*), white perch (*Morone americana*), American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*).

The Albemarle Sound and Perquimans River also host many important resident and migratory fin fish and shellfish species (Appendix F). These commonly include southern flounder (*Paralichthys lethostigma*), red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomous xanthurus*), sheepshead (*Archosargus probatocephalus*), bluefish (*Pomatomus saltatrix*), and striped mullet (*Mugil cephalus*). Common recreationally and commercially important shellfish found off the coasts of HPDTA include blue crab (*Callinectes sapidus*) and grass shrimp (*Palaemonetes spp.*).

2.11 Rare Plants, Animals, and Communities

The Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants, and the habitats in which they are found. The DON ensures that consultations are conducted as required under Section 7 of the ESA for any action that may affect a threatened or endangered species. In conjunction with the preparation of the INRMP, efforts were made to assess the status of any rare plants, animals, and communities that could occur at HPDTA. Since 2012, there have been no documented occurrences of Federal or state listed rare, threatened, or endangered species at HPDTA, with agency coordination assessments indicating that HPDTA does not contain suitable habitat for any Federally-listed endangered or threatened species known to occur in the area (USFWS, 1998; NCDENR, 1998; NCWRC, 2004).

A current database search conducted by the North Carolina Natural Heritage Program provided a list by county of the elements of natural diversity (rare plant and animal species, exemplary natural communities, and special animal habitats) known to occur in North Carolina (Table 2-7). According to North Carolina Natural Heritage Program records, there is a Significant Natural Heritage Area, Menzies Pond approximately 1.0 miles west of HPDTA which has two high quality natural communities, Nonriverine Wet Hardwood Forest and Small Depression Pond (NCDENR, 1998). Nonriverine Wet Hardwood Forests are among the most threatened of North Carolina's natural communities, and in some ways among the least well known. Also called oak flats, they were once widespread in the outer Coastal Plain of northeastern North Carolina, but were long ago reduced to a small fraction of their presettlement

abundance. In contrast to bottomland hardwood forests along rivers, wetland conditions in Nonriverine Wet Hardwood Forests are caused by the limited runoff of rainfall, due to flatness and natural absence of streams. In addition, there is one record of the North Carolina Threatened plant, Carolina grasswort (*Lilaeopsis carolinensis*), which is found in freshwater marshes, pools, and tidal marshes. The Significant Natural Heritage Area identified by the NC Natural Heritage Program is contained within an area of HPDTA in which development is not anticipated. This natural area creates a natural screening along HPDTA's southwestern installation boundary and thus fragmentation or habitat disturbance will not occur in this location.

**Note - the HPDTA boundary shown on the map is not correct.*

Figure 2-7. North Carolina Natural Heritage Program Areas Identified on HPDTA

Colonial nesting wading birds are a taxonomically diverse group composed of several different genera. Members of this guild belong to two families: *Ardeidae* (herons and egrets) and *Plataleidae* (ibises). Colonial nesting wading birds are medium to large birds that have long legs, necks and bills; these features are specially adapted for capturing prey while wading in shallow water. The glossy and white ibises have long, narrow bills that enable sub-surface, tactile feeding. Nesting sites are found in a variety of habitats. Colony sites for most guild members are found on islands in fresh and brackish water ponds. Water surrounding a nesting site deters mammalian predators and alligators frequently provide an additional deterrent. When suitable island sites are lacking, guild members may use vegetation around the edge of a pond for nesting. These sites are generally unsuccessful as a result of predation except for ponds in residential areas that are not affected by predators. Colonies are also sustained on estuarine islands that are free of mammalian predators. While most species in this guild prefer snags and mature trees with large lateral limb structures, yellow-crowned night-herons, little blue herons, tricolored herons and snowy egrets nest lower and prefer shrubby habitat (http://www.dnr.sc.gov/cwcs/pdf/Colonialnestingwadingbird.pdf).

Statewide North Carolina has several dozen endangered animals and plants that have already been listed under the Federal Endangered Species Act. From examining statewide lists and comparing them to species range maps, the only Federally threatened or endangered species ranges in HPDTA area are the Atlantic sturgeon and bald eagle. All of the Federally endangered plants are outside of the HPDTA area. This information is confirmed by the state office of FWS: http://www.fws.gov/raleigh/species/cntylist/perquimans.html and was further confirmed by Agency coordination with North Carolina Natural Heritage Program, Office of Conservation, Planning, and Community Affairs, North Carolina Department of Environment and Natural Resources. This information is also corroborated by past surveys on HPDTA. See also FWS threatened and endangered species maps:http://www.fws.gov/raleigh/es_tes.html.

Table 2-7. North Carolina Natural Heritage Program Species List - Federal or State Listed Endangered or Threatened Plants and Animals, and Rare Species and Communities of Perquimans County, North Carolina (May 2012).

Major Group	*Scientific Name*	*Common Name*	*State Status*	*Federal Status*	*State Rank*	*Global rank*
Animal Assemblage	*Colonial Wading Bird Colony*	None	None	None	S3	G5
Natural Community	*Floating bog*	None	None	None	S1	G1?
Natural Community	*Mesic mixed hardwood forest (coastal plain subtype)*	None	None	None	S3	G3
Natural Community	*Tidal Swamp (cypress--gum swamp)*	None	None	None	S4	G?
Vascular Plant	*Didiplis diandra*	Water Purslane	SR-P	None	S1	G5
Vascular Plant	*Eriocaulon aquaticum*	Seven-angled Pipewort	SC-V	None	S2	G5
Vascular Plant	*Heteranthera multiflora*	Multiflowered Mud-plantain	SR-P	None	S1	G4
Vascular Plant	*Iris prismatica*	Slender Blue Iris	SR-T	None	S1S2	G4G5
Vascular Plant	*Lilaeopsis carolinensis*	Carolina Grasswort	SR-O	None	S2	G3G5
Vascular Plant	*Ludwigia ravenii*	Raven's Seedbox	T	FSC	S1	G1G2
Vascular Plant	*Potamogeton nodosus*	American Pondweed	SR-D	None	SH	G5
Vascular Plant	*Ranunculus ambigens*	Water-plantain Spearwort	SC-H	None	SH	G4
Vertebrate Animal	*Acipense brevirostrum*	Shortnose Sturgeon	E	E	S1	G3
Vertebrate Animal	*Acipenser oxyrinchus*	Atlantic Sturgeon	E	E	SC	G3
Vertebrate Animal	*Corynorhinus rafinesquii macrotis*	Rafinesque's Big-eared Bat - Coastal Plain Subspecies	SC	FSC	S3	G3G4TNR
Vertebrate Animal	*Crotalus horridus*	Timber Rattlesnake	SC	None	S3	G4
Vertebrate Animal	*Haliaeetus leucocephalus*	Bald Eagle*	T	removed from the list in the Lower 48 States on July 9, 2007	S3B S3N	G5

Source: Agency coordination with North Carolina Natural Heritage Program, Office of Conservation, Planning, and Community Affairs, North Carolina Department of Environment and Natural Resources.

* Although removed from the list of threatened and endangered species in 2007, the bald eagle is still federally protected under the Bald and Eagle Protection Act and the Migratory Bird Treaty Act.

Explanation of Rankings used in Table 2-7.

S1 Critically imperiled in North Carolina because of extreme rarity or otherwise very vulnerable to extirpation in the state.
S2 Imperiled in North Carolina because of rarity or otherwise vulnerable to extirpation in the state.
S3 Rare or uncommon in North Carolina.
S4 Apparently secure in North Carolina, with many occurrences.
G1 Critically imperiled globally because of extreme rarity or otherwise very vulnerable to extinction throughout its range.
G3 Either very rare and local throughout its range, or found locally in a restricted area.
G4 Apparently secure globally, although it may be quite rare in parts of its range (especially at the periphery).
G5 Demonstrably secure globally, although it may be quite rare in parts of its range (especially at the periphery).
T_ Rank of subspecies
SH Of historical occurrence in North Carolina, perhaps not having been verified in the past 25 years, and suspected to be still extant in the state.
SR Reported from North Carolina, but without persuasive documentation for either accepting or rejecting the report. Significantly Rare
SC Special Concern
T Threatened
C Candidate
FSC Federal "Species of Concern" (also called "Species at Risk"). Formerly defined as a taxon under consideration for which there is insufficient information to support listing; formerly designated as a Candidate 2 (C2) species. Currently, the US Fish and Wildlife Service does not recognize this as an official designation.
DP Delisted Taxon, Discovered Previously Unknown Additional Populations and/or Habitat
****** Historic record: the element was last observed in the county more than 50 years ago

A floating bog is a wetland that accumulates peat and is one of the four main types of wetlands which occur where the water at the ground surface is acidic and low in nutrients. In some cases, the water is derived entirely from precipitation, in which case they are termed ombrotrophic (or rain-fed). Water flowing out of bogs has a characteristic brown color, which comes from dissolved peat tannins. In general the low fertility and cool climate results in relatively slow plant growth, but decay is even slower owing to the saturated soil. Hence peat accumulates. Bogs have a distinctive group of plant and animal species, and are of high importance for biodiversity, particularly in landscapes that are otherwise settled and farmed.

Significant natural communities that occur at HPDTA include mesic mixed hardwood forest (Coastal Plain subtype), nonriverine wet hardwood forest, and tidal cypress-gum swamp. Human disturbance is evident throughout the examples of these communities at HPDTA; therefore, they are not of especially high quality. The mesic mixed hardwood and nonriverine wet hardwood forest stands have developed primarily in old fields after agricultural abandonment in areas that are protected from fire or where fire has been suppressed. Past forest harvesting operations such as high-grading and the invasion of non-native species, primarily microstegium and Japanese honeysuckle, have degraded the naturalness of these communities.

Tidal Cypress-Gum Swamps (photo left) occupy vast areas at the mouths of large rivers and also occur at the mouths of smaller creeks and occasionally along the sound shoreline. They are dominated by swamp black gum, water tupelo, and bald cypress. Understory trees, shrub, and herb layers are generally sparse and low in diversity. The tidal cypress-gum swamps have also been harvested and their hydrology has been significantly affected by past ditching and the construction of roads and runways.

Water purslane (*Didiplis diandra*) (photo right) is a submerged aquatic plant that has weak stems. When the leaves are submersed they are opposite, elongated, thin, and clasp the stem as well as shortened and contracted at the base. The greenish inconspicuous flowers occur in the leaf axil from April through August. Water purslane grows in shallow ponds and pools and along their margins.

Seven-angled pipewort (*Eriocaulon aquaticum*) (photo left) has grass-like leaves that are one to four inches long growing in a small clump. In July through October the plant flowers, sending up a stalk that ends with a small dark gray flower head. The stalk can be up to 1.5 feet tall and the head is approximately 0.25 inches in diameter. It is found in shallow pools or streams.

Multiflowered mud-plantain (*Heteranthera multiflora*) (photo left) occurs in shallow water or mudflats. Its leaves are heart-shaped and are up to three inches long and four inches wide and occur on a stem that can be up to eight inches tall. The flowers are pale purple or white, up to 0.5 inches long, and open June through October.

Slender Blue Iris *(Iris prismatica)* (photo right) of the Family Iridaceae generally occurs in marshes (fresh, brackish, or salt), shores, or meadows along the coast. Slender Blue Iris generally grows to 1-3 feet in height with blue-purple colored flowers 2.5 to 4 inches in size. This species flowers from May to July and looks similar to the larger blueflag; however, they can be distinguished by the width of the leaves. Slender blueflag leaves look almost like grass (they are less than 1/4 inch wide) while larger blueflag leaves are a half to one inch wide.

Carolina grasswort (*Lilaeopsis carolinensis*) (photo left) is a creeping or floating aquatic plant that forms dense, tangled mats in shallow fresh water pools and ponds. The plant has leaf-like appendages, phyllodia, that are fleshy, cylindrical, linear to spatulate, and at most eight inches long. The plant flowers in April and May with its small white flowers arranged in an umbel (formation like Queen Anne's lace or dill) that is shorter than the leaves. It is vulnerable to alteration of salinity or seasonal water levels.

Raven's seedbox (*Ludwigia ravenii*) (photo right) is a branched, leafy perennial herb, usually 3.5-9 cm tall, densely covered with short, somewhat coarse hairs. Numerous flowers are borne in the leaf axils. The flowers have green sepals and no petals. Flowering occurs from July through September with a fruiting period in August through October. This species is found in the coastal plain of Virginia, South Carolina, North Carolina, and northeast Florida and is restricted to open, wet, peaty places, such as ditches and the margins of swamps, ponds, and bogs.

American Pondweed (*Potamogeton nodosus*) (photo left) is a perennial pondweed which has both floating and underwater leaves. This species of long-leaf pondweed has narrower, translucent underwater leaves and long leaf stalks. The leathery, oblong floating leaves are on leaf stalks longer than the leaf blade. This species is common throughout North American waters and provide important food and cover for aquatic animals. Tubers of long-leaf pondweed are an important waterfowl food.

Water-plantain spearwort (*Ranunculus ambigens*) (photo right) is a coarse perennial that arises from a decumbent fleshy rhizome and stem that roots at the nodes. It grows to approximately three feet tall. The leaves are lanceolate to elliptic, two to five inches long, and up to 1.5 inches wide. The flowers are small and buttercup-like with yellow oblong petals that grow singly or in clusters from the leaf axils. It flowers from June to September and can be found in marshes, ditches, and swamps.

Rafinesque's big eared bat (*Corynorhinus rafinesquii*) (photo left) has ears that are more than twice the length of its head. It has mitten-shaped glandular masses on either side of the muzzle between the nostrils and eyes and has elongate nostril openings. Its fur is long, somewhat shaggy, and is yellowish brown to reddish brown on the dorsum and white or whitish on the under parts, with sharply defined blackish hair bases throughout. This bat may be found in dense, old growth forests in undeveloped areas that are usually located along rivers or other permanent bodies of water.

Like other members of the pit-viper family, the timber rattlesnake (*Crotalus horridus*) (photo right) has a temperature- sensitive opening, or pit, on either side of the face between and a little below the eye and nostril. This sensory organ is used to detect prey and potential predators. Another feature distinctive of rattlesnakes is the rattle itself. This structure is made of loosely attached horny segments. A new segment is added each time the snake sheds. When vibrated, the rattle makes a buzzing sound characteristic of a disturbed rattlesnake. Measuring from 3-4.5 feet (91-137 cm) or more in length, the timber rattlesnake impress one as being very stocky; they are large snakes. Despite their size, cryptic coloration allows them to be easily concealed. Two color patterns are commonly found: a yellow phase, which has black or dark brown cross bands on a lighter background color of yellow, brown or gray, and a black phase, which has dark cross bands on a dark background. Black or dark brown stippling also occurs to varying degrees, to the

extent that some individuals appear all black. Scales are ridged, giving this rattlesnake a rough-skinned appearance. The timber rattler has a broadly triangular head with many small scales on the crown of the head bordered by a few large scales. The range of the timber rattler extends from southern New Hampshire south through the Appalachian Mountains to northern Georgia and west to southwestern Wisconsin and northeastern Texas and are generally found in deciduous forests in rugged terrain.

The bald eagle (*Haliaeetus leucocephalus*) (photo left) is a large (30 to 43 inches tall) raptor with an approximate seven foot wingspan. Adults are light to chocolate brown, with a white head and tail. Juvenile and sub-adult plumage is highly variable, ranging from brownish-black to a light mottled tan, with white spotting and marbling on wing linings and flight feathers. In general, the body becomes lighter each year until the third or fourth year when adult plumage is attained. The nests are usually constructed on super canopy trees where the eagle has an unimpeded view in all directions. The bald eagle is an opportunistic predator that primarily feeds on fish but will eat various birds, mammals, and turtles as either live prey or as carrion when fish are not available. In the late 20th century the Bald Eagle was on the brink of extirpation in the continental United States, while flourishing in much of Alaska and Canada. Populations recovered and stabilized, so the species was removed from the U.S. Federal government's list of endangered species and transferred to the list of threatened species on July 12, 1995, and it was removed from the List of Endangered and Threatened Wildlife in the Lower 48 States on July 9, 2007. One bald eagle nest was identified on HPDTA in March 2012 with location coordinates obtained and submitted to the North Carolina Wildlife Resources Commission and the U.S. Fish and Wildlife Service (USFWS)(Figure 2-8). HPDTA follows all management guidelines contained in the National Bald Eagle Management Guidelines as determined by the USFWS (May 2007) (Appendix G).

A list of fin fish and shellfish species occurring in the Perquimans River and Albemarle Sound (Appendix F) was generated from North Carolina Division of Marine Fisheries information. Four species on the above list have special considerations: the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrhynchus*) are Federally listed as an endangered species; the Blueback herring (*Alosa aestivalis*) is listed as a Species of Concern beginning in 2006, and the Alewife (*Alosa pseudoharengus*) is listed as a Species of Concern beginning in 2006.

The shortnose sturgeon (*Acipenser brevirostrum)* (photo left) grows to three feet in length. Like other species in the Acipenseridae (Sturgeon Family) they are characterized by a head covered in bony plates and the presence of five rows of bony scutes on the body. All sturgeons have downward facing mouths, an adaptation for bottom feeding. There are four small barbels anterior to all sturgeon's mouths. The shortnose sturgeon is distinguished from other sturgeons by a short, down-turned snout. The fish is blackish olive from above, with alternate black and pale bands on the sides, and reddish from below. The shortnose sturgeon ranges from Florida to Cape Cod in river mouths, tidal rivers, estuaries, and bays. The shortnose sturgeon is listed as endangered by both the Federal and state agencies.

The Atlantic sturgeon (*Acipenser oxyrhynchus*) (photo left) resembles the shortnose sturgeon but grows to 12 feet in length. It also has a long, upturned snout, and long barbels. The fish is olive-grey or brown in color. It occurs from Nova Scotia to North Carolina where it lives in the shallow waters of the continental shelf. It enters larger rivers to spawn.

Blueback herring (*Alosa aestivalis*) (photo left) have a more southerly distribution than alewives and are distributed from Cape Breton, Nova Scotia to the St. John's River in Florida (Collette and Klein-MacPhee 2002). They reach a maximum size of approximately 40 cm and are believed to live up to eight years (Virginia Institute of Marine Sciences, 2003). Blueback herring form schools and are believed to migrate offshore to overwinter near the bottom. Like alewives, they are also anadromous, and in the late spring, adults return to shore. Blueback herring spawn from late March through mid-May, depending on latitude. Blueback herring use a greater variety of habitats in areas where they co-occur with *A. pseudoharengus*, and spawning sites include areas with submerged aquatic vegetation, rice fields, swampy areas, and small tributaries upstream from the tidal zone (Virginia Institute of Marine Sciences, 2003). Females usually reach maturity by age five and produce between 60,000 - 103,000 eggs. Males generally mature earlier at between three and four years of age and at a smaller size than the females. According to Collette and Klein-MacPhee (2002), eggs are pelagic or semi-demersal. Blueback herring are similar in appearance to alewives. However, they can be distinguished by differences in eye diameter, body depth, and the color of the peritoneum (Collette and Klein- MacPhee, 2002).

To date, no one has identified a single factor that is responsible for the decrease in abundance of river herring throughout their range. However, there are several threats to both species that have most likely contributed to their decline including: loss of habitat; degradation of habitat; over fishing; and increased predation due to recovering striped bass populations.

Alewives (*Alosa pseudoharengus*) (photo left) are currently distributed from Newfoundland through North Carolina. Historically, they were found as far south as South Carolina, but they have not been documented this far south in recent years (ASMFC, 2005). They may live up to 10 years and reach lengths of between 36–38 cm (Collette and Klein-MacPhee, 2002). Alewives are an anadromous species that ascend coastal rivers in the spring to spawn. Spawning migrations begin in the southern portion of the range and move progressively northward and are initiated when water temperatures reach approximately 5-10ºC (Collette and Klein-MacPhee, 2002). Alewife spawn over a wide range of substrates such as gravel, sand, detritus, and submerged aquatic vegetation, which are found in large rivers, small streams, ponds, and large lakes. Most adults reach sexual maturity by age four, and females are capable of producing between 60,000 to 300,000 eggs annually throughout their range. This is a relatively deep bodied and laterally compressed fish that is grayish green above, darkest on the dorsal surface and silvery on the ventral surface and sides (Collette and Klein-MacPhee, 2002). There is often a dusky spot on adult fish that is located at eye level on either side behind the margin of the gill cover (Collette and Klein-MacPhee, 2002). Alewives are distinguished from Atlantic herring by differences in body depth, origin of the dorsal fin, coloration patterns, and serrations on the midline of the ventral surface (Collette and Klein-MacPhee, 2002). They also appear similar to young American shad although there are differences in jaw length and projection, body shape, and numbers of gill rakers (Collette and Klein-MacPhee, 2002).

Figure 2-8. Location of Identified Bald Eagle Nest on HPDTA

III. NATURAL RESOURCES MANAGEMENT ISSUES

3.1 Management Units and Primary Management Issues

In the 2001 HPDTA INRMP, HPDTA was treated as two separate natural resources management units for the purpose of integrating natural resources management with existing land uses. The western natural resources management unit comprises the larger portion of the installation, about 1,334 acres, and is equivalent to the forest inventory compartment one. Several mission activities including the administrative area, airfield, small arms range as well as other training facilities and an abandoned agricultural field are located in this management unit. Due to the acquisition of additional land and construction activities that have been completed on the installation since that time, in the 2007 – 2011 HPDTA INRMP, the base wide land uses have been characterized by the following categories (Figure 3-1):

- Agricultural Areas
- Building and Maintained Lawn Areas
- Hazardous Waste Areas
- Operational Areas (i.e. ranges and bunker areas)
- Undevelopable Areas
- Dredges Spoil Area

Other areas of the installation not classified into one of the categories listed above are maintained as forested areas. Ecosystem management is an interdisciplinary planning and management process that focuses on identifying, restoring, and maintaining natural communities in support of the military mission and other sustainable activities. Natural resources management in many areas of the installation is somewhat restricted by mission constraints with much of the area serving as building and operations, explosive ordnance training areas in which access is frequently limited. The primary management issues listed below will be discussed in the context of the whole installation.

- **Wetlands/Water Quality Protection** – including issues related to Erosion/Sediment control plans for construction site.

- **Shoreline Erosion Control** – including recommendations for improvements.

- **Bird Aircraft Strike Hazard (BASH) Reduction** – including recommendations on how to reduce BASH.

- **Forestry Management** – including finalizing a Forest Management Plan and recommendations for vegetation screening.

- **Prescribed Burning –** including discussion on prescribe burning in relation to wildlife habitat improvement, stand regeneration, and invasive species and wildfire impacts.

- **Fish and Wildlife Management –** including updated plant and animal inventories and analyze the white-tailed deer hunting program and use of food plots; and education of the public regarding pet spay/neuter programs and feral cats.

- **Grounds Maintenance–** including control of invasive species (i.e. kudzu (*Pueraria Montana*), common reed (*Phragmites australis*), Johnson grass (*Sorghum halepense*), and Nepalese browntop (*Microstegium vimineum*)).

- **Environmental Restoration Sites.** The Navy ERP is responsible for identifying CERCLA releases, considering risks and assessing impacts to human health and the environment (including impacts to endangered species, migratory birds and biotic communities), as well as developing and selecting response actions when it is likely that a release could result in an unacceptable risk to human health and the environment. When appropriate, the EM identifies potential impacts to natural resources caused by the release of these contaminants.

3.2 Wetlands/Water Quality Protection

Federal Regulations

The Clean Water Act of 1972 prohibits the dredging and filling of any Waters of the U.S. including territorial seas; tidal and non-tidal waters, and their adjacent wetlands; isolated wetlands, lakes, streams, and prairie potholes. Mechanized land clearing, ditching, channelization, or other excavation activities are specifically identified as discharge of dredged materials. Prior converted cropland is specifically excluded from Waters of the U.S. as long as it has been farmed within the past five years.

Section 404 of the CWA regulates the discharge of dredged and fill material into waters of the U.S, including wetlands. Under Section 404 of the CWA, the Secretary of the Army, acting through the USACE, may issue permits for the discharge of dredged or fill material into the Waters of the U.S. Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for most discharges that will have only minimal adverse effects, the USACE often grants up-front general permits. These may be issued on a nationwide, regional, or state basis for particular categories of activities. General permits are not valid for more than five years. Regional and nationwide permits (NWP) are types of general permits. Regional permits may be issued to cover individual activities that are substantially similar in nature. NWP are issued for certain activities in wetlands nationwide; however, the maximum acreage impact limits should be evaluated for each project specifically and the appropriate NWP obtained. If project impacts are expected to exceed those criteria established for NWP, then an Individual Permit (IP) must be sought from the USACOE.

Executive Order (EO) 11990, Protection of Wetlands, affords further protection to wetlands on Federal properties by requiring that any plans or proposals for projects that would impact wetlands provide for early public review and that any requests for appropriations from the Office of Management and Budget indicate if a proposed action is located in wetlands.

The Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq.) created a common statutory regime to assist states in comprehensively managing competing uses of and impacts to coastal uses and resources. States submit a CMP to NOAA, which if approved, becomes the basis for Federal agency consistency determinations.

In addition to eligibility for annual operating funds, Federal approval of state CMP triggers the CZMA Section 307 Federal consistency requirement. Section 307 mandates that Federal actions within or outside the coastal zone that affects any land or water use or natural resource in a state's coastal zone be consistent to the maximum extent practicable with the enforceable policies of the state's Federally approved coastal zone management program. Federal agency actions include direct and indirect Federal agency activities, Federal approval activities, and Federal financial assistance activities. Accordingly, Federal agency activities (direct, indirect or cumulative) reasonably affecting the state's coastal zone must be fully consistent with the enforceable policies of the state's CMP unless compliance is prohibited based upon the requirements of existing laws applicable to the facility. There are no categorical exemptions or exclusions to the Section 307 Federal consistency requirement.

State Regulations

Under Section 401 of the CWA, States can review and approve, condition, or deny all Federal permits or licenses that might result in a discharge to State waters, including wetlands. The North Carolina

Department of Environment and Natural Resources (NCDENR) are responsible for administering the state's 401 Water Quality Certification program. Certifications for use in North Carolina also fall under two categories, general and individual. General certifications are issued for activities that have been determined to have minimal impact on waters of the state. Projects that the NCDENR has determined are likely to have a significant adverse effect upon water quality or projects that result in the loss of existing uses of the wetland or downstream waters must obtain an individual Water Quality Certification.

All significant and non-incidental existing uses of waters, including those of wetlands, are protected under a water quality rule known as the "Antidegradation Policy" (15A NCAC 2B.0201), even if the waters have not been formally classified or their uses designated. "Existing use" is defined as any use that is actually attained in the waters on or after November 28, 1975 (15A NCAC 2B.0202 [17]).

One or more of the following beneficial uses, as well as others not listed here, may exist in a given wetland: conveyance and storage of floodwaters; abatement of water pollution; augmentation of surface water flow during drought; groundwater recharge; shoreline stabilization; timber production; and habitat for fish, wildlife, and plants including rare, threatened, and endangered species. The State may not grant a 401 Water Quality Certification for a Section 404 permit application in a wetland if significant existing uses will be removed by the project unless no practicable alternative exists.

The Federally approved North Carolina Management Act of 1974 incorporates a legislative framework that provides a cooperative program for coastal area management between local and state governments. The CAMA classifies areas of environmental concern to protect them from uncontrolled development, which may cause irreversible damage to property, public health or the environment. After designation of these areas, the CRC is responsible for issuing all permits, providing input in planning decisions in AEC, and involved in policy direction undertaken by local governments. The property proposed for acquisition is located within the North Carolina coastal zone and is subject to laws and regulations that govern development and changes in land use within Perquimans County. The Perquimans County, North Carolina 1998 Land Use Plan Update was prepared in response to CAMA and ratified by the North Carolina Coastal Resources Commission. This plan establishes land use policies and permitting processes for the:

- Protection of areas of environmental concern (such as wetlands and prime farmland),
- Protection of significant cultural and historic resources, and
- Adoption of planning policies along estuary shorelines, near population centers and along major transportation routes.

CAMA regulations require notification of any construction with 75 feet of estuarine shoreline (Figure 3-2). As HPDTA is a Federal agency, building in this area (including breakwaters etc.) requires a CAMA Consistency Review rather than a permit. There are no outstanding resource waters or primary nursery areas on either the Perquimans River or Albemarle Sound in the vicinity of HPDTA (pers. comm. Dennis Hawthorne, North Carolina Division of Coastal Management 1999).

Erosion/Sediment control plans for construction sites

The 1973 legislation (General Statutes 113A50 to 113A-70) created the Sedimentation Control Commission to create and administer a program to reduce sedimentation resulting from erosion when people disturb the land. The legislation authorizes the North Carolina Department of Environment and Natural Resources to staff and manage this statewide program (Title 15A, North Carolina Administrative Code Chapter 4). The law is performance oriented. It prohibits visible off-site sedimentation from construction sites but permits the land disturber to determine the most economical, effective methods for controlling erosion and sedimentation. This flexibility requires the builder to carefully plan construction activities and consider the erosion potential at each site. Construction plans must include measures to reduce erosion at the construction site as well as prevent off-site sedimentation (http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-32/).

The law governs all land-disturbing activities except those of agriculture, mining (which is regulated by the Mining Act of 1971), and forestry (if operations follow best management practices). Regardless of the size of the disturbed area, land developers and builders must plan and implement effective short-term and long-term measures to control accelerated erosion and prevent off-site sedimentation.

During construction, maintenance of the erosion and sedimentation control practices is shared by the landowner and the person financially responsible for site development. After construction is complete and the soil surface stabilized, responsibility passes to the landowner or the person managing the land. The Act contains the following basic standards that provide the framework for erosion and sedimentation control practices.

- The law requires submission and approval of an erosion control plan before a land-disturbing activity begins that would uncover the soil by removing or disturbing the vegetation on more than an acre. The plan must be submitted 30 days before beginning the land disturbance.
- A buffer zone is necessary along any natural watercourse or lake. The buffer strip must be wide enough to retain all visible sediment within the first 25 percent of the buffer zone nearest the disturbed area. Along trout streams, the buffer zone must be a minimum of 25 feet wide.
- All disturbed areas must be able to be stabilized by vegetation or other suitable erosion control methods. Cut or fill slopes are of special concern. A disturbed soil area must be stabilized within 30 working days after completing any phase of land grading.
- Off-site sedimentation must be prevented. A ground cover that prevents erosion must be established within 30 working days or 120 calendar days following completion of the construction phase, whichever is shorter.

The Act does not specify erosion control practices, devices, or techniques. Rather, a performance-based approach allows for innovation and site flexibility. The primary standard is that erosion and sedimentation control measures must provide protection from a rainfall event equivalent to the 10-year peak runoff. In areas with High Quality Waters, the design requirement is the 25-year storm. Control of run-off velocities is necessary. The peak runoff from a 10-year frequency storm occurring during or after construction must not damage the receiving stream channel at the discharge point. The law requires protection of the receiving channel if storm water run-off velocities are excessive.

3.3 Shoreline Erosion Control

Exposed, naturally eroding shorelines are common features in the estuaries of coastal North Carolina. North Carolina first evaluated long-term average erosion rates for the state's 300-mile ocean coastline in 1979. The Division of Coastal Management evaluates these erosion rates about every five years. In 1998, the average erosion rate (http://dcm2.enr.state.nc.us/CAMAgram/Spring03/rates.htm) was determined to be 4.3 feet a year. The primary causes of shoreline erosion are the dramatic storms such as nor'easters or hurricanes or the more gradual forces caused by the daily forces of winds, waves and tides.

On the northern side of HPDTA, the fetch across the Perquimans River is less than two miles. On the southern side; however, the fetch across the Albemarle Sound is nearly nine miles. Preventing further erosion along the nearly three miles of shoreline on each, the Perquimans River and the Albemarle Sound, is a concern in natural resources management. Today, most of the shoreline is bulkheaded either by marine timbers or concrete. Areas of palustrine wetlands along the shoreline have not been bulkheaded, as such an action would disturb important wetland habitat and disrupt upland drainage. A large portion of the 7.3 miles of shoreline surrounding HPDTA has been bulk headed to prevent erosion from wind and wave action. During a baseline assessment of shoreline erosion at HPDTA, three areas that need attention at this time were identified: Pirates Cove, the Recreational Beach, and the Cypress Cove (Figure 3-3).

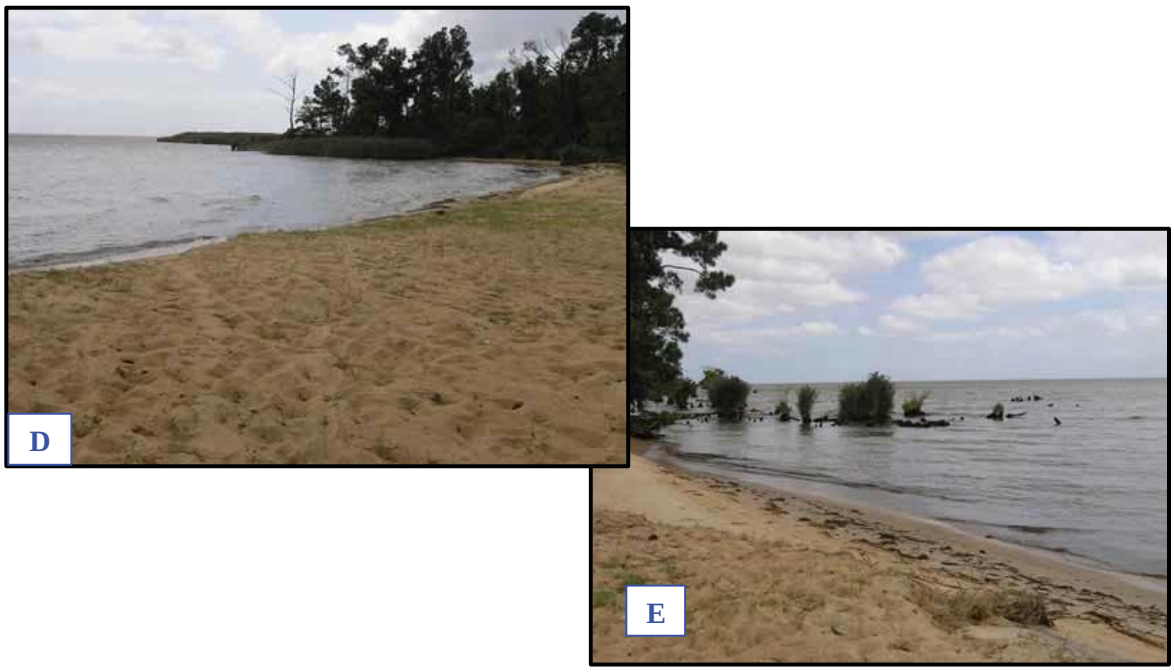
Figure 3.1. Land Management Units at HPDTA

Figure 3-2. CAMA Protection Buffer (75 foot shoreline buffer) at HPDTA

Figure 3-3. The Locations of the Three Erosion Sites at HPDTA

Pirates Cove. (Photos A, B, and C) *This erosion area is located on the Perquimans River in the northeastern corner of the installation near the existing bulkhead.*

Recreation Beach. (Photos D and E) *This erosion area is located on the Albemarle Sound in the southeastern corner of the installation east of the disposal area.*



Cypress Cove. (Photo F) *This erosion area is located on the Albemarle Sound in the southeastern corner of the installation north of the Recreation Beach and south of an existing bullheaded area.*

Erosion at all three sites are primarily caused by wave action caused by storm activity on both the Albemarle Sound and the Perquimans River. In the erosion areas of Pirates Cove and Cypress Cove, wave energy concentrating at the end of the existing constructed bulkhead caused increased erosion energy in these areas, thus exposing areas of bare soil. These eroding areas are contributing to sedimentation of the Perquimans River and Albemarle Sound. Recreation Beach is a valuable recreation site for HPDTA. Considerable beach erosion has occurred at this site during storms over the past 15 years. Hurricane Bonnie of 1998 and Hurricane Isabel of 2003 were particularly destructive to the beach as the storm came across the Albemarle Sound from the south.

A general site analysis including wave climate analysis was conducted during the development of HPDTA's published 2001 INRMP. A framework for shoreline management was developed to establish clear objectives toward which erosion control strategies would be most optimal. In developing these strategies, the following objectives were given consideration:

- Prevent loss of land and protect upland improvement.
- Protect, maintain, enhance and/or create wetlands habitat; both vegetated and non-vegetated.
- Address water quality issues by managing upland runoff and groundwater flow through the maintenance of vegetated wetland fringes.
- For a proposed shoreline strategy, address potential secondary impacts within the reach. These may include potential impacts to down drift shores through a reduction in the sand supply in addition to encroachment into subaqueous land and wetlands.
- Provide access and/or create recreational opportunities such as beach areas.

General Physical Setting

The shorelines around Harvey Neck are generally low upland banks with intermittent fringing marshes and cypress tree headlands. In some cases, particularly along the Perquimans River the cypress tree headlands are significant geomorphic features. The areas of erosion in Pirates Cove and Cypress Cove are characterized as embayments formed between adjacent headland features and are depicted by low eroding banks with fallen trees alongshore. These sites are located adjacent to existing bulkheads which can concentrate wave energy and cause increased erosion in exposed areas. The Recreation Beach is a 600-foot recreational beach area that lies between two headland features and is exposed to the Albemarle Sound and increased wave action caused by storm events.

The wave climate is the overall wave energy that impacts the project shoreline averaged through time. The wave climate along any given shoreline is a function of fetch exposure, direction of fetch exposure and nearshore bathymetry. Fetch is defined as the distance over water that wind can blow and generate waves. The natural processes which drive sediment along the shoreline can vary considerable due to the wave climate. The wave climate also varies along shore as deep water waves are affected by the complex

nearshore bathymetry they travel across altering their height and direction. Modifications to the wave occur through the processes of shoaling refraction, diffraction, and loss of wave energy by frictional dissipation caused by interaction with the bottom.

There is virtually no lunar tide in this region of Albemarle Sound. Under normal conditions, the Albemarle Sound is somewhat protected from direct influence of tidal fluctuations of the Atlantic Ocean by the Outer Banks and astronomical tide variation is expected to be less than 0.5 ft. The winds dominate water levels along the shorelines. The shorelines along Perquimans River are exposed to wind/wave action from the northwest (NW), north (N) and northeast (NE) directions with linear fetch exposures of about 2.4 nautical miles (nm), 1.6 nm and 1.9 nm respectively. No detailed wave climate analysis was done along the Perquimans River shoreline sites as part of the published 2001 INRMP. Climatological data for the area shows that the north wind direction dominates the area. However, northeast storm events are known to produce high winds and water levels. Also, the NW wind condition can have the opposite effect by driving water out of the sounds and thus lowering the water levels.

The Albemarle Sound shorelines have long fetch exposures to the southwest (SW), south (S), southeast (SE), and east-southeast (ESE) of 9.8 nm, 7.5 nm, 7.6 nm and 32.6 nm respectively. Wind/wave action from these southerly directions are dominated by the SW and S. However, wind driven wave action from the SE and ESE can occur during hurricanes along with associated storm surge. Detailed wave assessment model results are referenced in the published 2001 INRMP for HPDTA. Since climate and wave conditions are generally the same for the period of this study as evaluated in 2001, an additional wave assessment model was not conducted. However, the trends developed during the modeling process were considered in developing the recommended shoreline management strategies for the identified erosion areas.

Conceptual Shoreline Erosion Management Plans

Several types of coastal structures were evaluated in developing shoreline erosion management strategies for these three identified areas including:

- *Upland revetments* are shoreline armoring systems that protect the base of eroding upland banks and are usually built across a graded slope. The dimensions of the revetment are dependent on bank conditions and design parameters such as storm surge and wave height. These parameters also determine the size of the rock required for long-term structural integrity.

- *Breakwaters/sills* are free standing structures designed to reduce wave action by attenuation, refraction and diffraction before it gets to the upland region. A sill has a lower crest, is closer to shore, and usually is more continuous than larger breakwater units. Sills are installed with beach fill to create a substrate for establishing a marsh fringe. Attached or headland breakwaters usually require beach fill to acquire long-term shoreline erosion control. Headland breakwaters can be used to accentuate existing shore features and can be a primary component for Headland Control. The dimensions of a breakwater system are dependent on the desired degree of protection and potential impacts on littoral processes.

- *Marsh toe revetments* are low rock structures designed to be placed along low eroding upland banks or eroding marsh shoreline. During storm events these structures are usually submerged and waves break directly on, or shoreward of, their crests.

- *Spurs* are similar to breakwaters and sills in that they are free standing structures. The distinction is that spurs are attached to the shoreline or another structure; the unattached end of the spur acts as a breakwater by diffracting incoming waves.

- *Headland Control* can be accomplished with the aforementioned structures and usually involves protecting a point or shore headland. This strategy partially protects long reaches of shoreline since littoral sands are encapsulated to create a beach and impinging waves are redirected so that they have

less impact alongshore. By providing a strategic hard point, adjacent shorelines are allowed to eventually erode into equilibrium platforms. Predicted, stable shore platforms between proposed headland structures are provided for recommended shoreline strategies of each reach. These platforms are estimates based on general wave climatology and shoreline composition (*i.e*. marsh, upland).

Conceptual shoreline erosion management strategies are being developed for the three areas of erosion identified on the base. Additionally, the Environmental Manager at HPDTA will be required to ensure that all of the appropriate state and Federal permits prior to implementing any of the erosion control measures specified below. The shoreline protection strategies for Pirates Cove and the Recreation Beach are considered high priority projects to protect HPDTA property and infrastructure. The shoreline protection strategy for Cypress Cove is considered a low priority project.

Pirates Cove

The conceptual shoreline erosion management strategy identified for Pirates Cove is the development of a Bulkhead structure. The new bulkhead structure will be placed along approximately 900 linear feet of shoreline and will interface with the existing wood bulkheads in the Pirates Cove area to prevent flanking. Bulkheads are rigid shoreline protection retaining wall structures designed to withstand wave action and control erosion of the shoreline. They are generally the most positive shoreline protection measure when designed properly, and have relatively long and maintenance-free service life. Bulkheads, specifically, wooden bulkheads, may be constructed in phases, a relatively small working crew may be utilized and relatively small construction equipment can be used. In addition, land adjacent to the shoreline will be subjected to relatively minor disturbance from the construction operations. The estimated service life of wooden bulkheads is estimated to be about 25 years. Maintenance costs for this type of structure are expected to be relatively low. Based on project costs for similar type projects, a cost of $200,000 is a conservative planning estimate. The exact location, dimensions, material quantities and final costs of the proposed systems will depend on a site survey and an assessment of bottom conditions.

Recreation Beach

The conceptual shoreline erosion management strategy identified for Recreation Beach is the development of a Breakwater structure. This site is unique among the other identified erosion sites for since it serves as a recreational beach that also offers protection to upland infrastructure at the site. Although the beach lies between two natural headland features, it is vulnerable to storm waves from the SE and ESE. To stabilize and enhance this sand movement, a series of breakwater structures are proposed with additional beach nourishment. This project is currently in the conceptual stage and to date no final design plans have been completed. Therefore, the specific plan and profile of the structures and quantity of required beach nourishment will be determined as planning information such as bathymetric surveys for the area are completed. Based on project costs for similar type projects, a cost of $1,000 per linear foot of structure is a useful planning estimate. The exact location, dimensions, material quantities and final costs of the proposed systems will depend on a site survey and an assessment of bottom conditions.

Cypress Cove

A conceptual shoreline erosion management strategy for Cypress Cove has not yet been developed. This area is an extensive cypress swamp area which is part of the major drainage system which bisects the installation. A structure in this location may alter the drainage of the installation; therefore additional studies need to be completed to determine the most ecologically beneficial shoreline erosion management strategy at this location. The exact type of structure, location, dimensions, material quantities and planning cost estimate will depend on additional site surveys and an assessment of existing drainage and ecosystem conditions.

3.4 Bird Aircraft Strike Hazard (BASH) Reduction

The Department of Navy Environmental and Natural Resources Program Manual (OPNAVINST 5090.1C) outlines the responsibilities of the natural resource manager to prepare and implement Bird Aircraft Strike Hazard (BASH) Reduction plans for the installation with a flying mission as an integral part of the Integrated Natural Resources Management Plan in coordination with the DON Air Operations. The NAVFAC P-73 Manual and the DOD Coordinated Bird Monitoring Plan provides guidance for developing a BASH program. In general the DOD Coordinated Bird Monitoring Plan contains the following recommendations:

1. The design of monitoring and assessment programs for birds should include a statement of goals and objectives, selection of field methods using an "expert system" developed for the CBM Plan, preparation of metadata, and storage of the data in a long-term repository.
2. The DOD Legacy Resource Management Program, Environmental Security Technology Certification Program, and Strategic Environmental Research and Development Program should be encouraged to continue their significant contributions to the foundations of bird monitoring.
3. Appropriate monitoring should be conducted to identify species of concern on installations.
4. Participation in well-designed, large-scale surveys on land that DOD manages will provide DOD with information important to bird conservation.

Within the operational area of HPDTA, bird aircraft strike hazards exist due to its geographic location and proximity to major water courses and coastal marine waters. Daily and seasonal bird movements create varying degrees of hazardous conditions. HPDTA's BASH program should be designed to identify and communicate hazardous conditions; establish operating procedures to avoid high hazard situations; and establish guidelines to eliminate, control, or reduce environmental factors that attract birds to the airfield.

Currently there is approximately 50 acres of clear zone (maintained grass lawn) surrounding the airfield in order to minimize obstructions to flight approaches and runways. The following recommendations are suggested to minimize the risk of a wildlife strike:

On the airfield

1. A BASH program should begin with the removal of perches from the airfield. Derelict equipment, unnecessary gear, and everything that could be perched on should be removed from flight areas.
2. Anything that couldn't be removed should be covered with spikes, wire octopuses, and other perch-deterring devices.
3. Trees and shrubs used by wildlife to perch on or hide in should be removed along the airfield.
4. Operate a Bird Deterrent Dispersal Team, or BASH team, which responds to wildlife-problem situations on the airfield. They should be trained in using random deterrent devices, such as noisy propane cannons, to remove wildlife from the airfield.

In the area surrounding the airfield

1. Hangars are a prime place for birds to perch and nest. A goal of a BASH program should also be to participate in ongoing studies to deter nesting birds from flight line facilities.
2. A BASH orientation should be part of the installation brief for everyone working on the base. BASH should be promoted at every level as everyone's responsibility; it's not just the pilots' or the facilities crews' responsibility.
3. BASH program updates should be presented at the base update meetings. Additionally, current wildlife trends should be discussed, past wildlife trends reviewed, and BASH warnings should be issued, based on those trends. If shorebirds tend to be a recurring problem in January, then the BASH team should brief the Environmental Manager of the high bird-strike probability for that period. BASH personnel would outline their abatement plans accordingly.

Administratively

1. The Director could sign a BASH instruction, detailing the standard-operating procedure for the use of pyrotechnics, live ammo, and other random deterrent devices.
2. Airfield operators should be encouraged to keep detailed strike or near strike records. The BASH team can use these records to determine what species are recurring problems and take steps to remove or eliminate them.

3.5 Forestry Management

Forestry practices on HPDTA are designed to promote forest health, biodiversity, and vegetative screening for added installation security. Goals for managing the forest resources on HPDTA are broadly defined in terms of sustaining forested environments for social, economic, and ecological benefits. Harvest and regeneration of timber; maintenance of biodiversity; soil and water conservation; watershed protection; fish and wildlife management; installation security; and outdoor recreation are all valid objectives for forest management on HPDTA. All forest management operations are coordinated with installation officials to ensure compatibility with the installation's mission. The *Best Management Practices for Forestry in the Wetlands of North Carolina* manual should be consulted and closely followed, particularly whenever any forestry activity occurs on hydric soils on the installation.

Silvicultural Practices

Silvicultural systems that produce diverse stand structures are recommended for use at HPDTA. Key elements in developing forest diversity include long rotations; retention of snags and cavity trees; use of prescribed fire; and protection from wildfire, insect outbreaks, and disease. Long rotations facilitate structurally complex forests that include large-diameter trees and old-growth characteristics. Retention and recruitment of living and dead trees of various species, sizes, and ages in timber stands are also necessary to maintain diverse forest structure. Individual snags evenly distributed over a harvested unit and/or aggregated clumps of snags left after a clearcut benefit many avian species. Forest stands that are aggregated whenever possible for the purpose of creating larger core areas minimize fragmentation effects. Silvicultural systems chosen for HPDTA should optimize the ecological sustainability of forest resources while remaining consistent with the mission.

Silvicultural practices for Loblolly Pine. Existing loblolly pine stands can be regenerated by natural seeding or planting of one-year old nursery grown bare root seedlings. Seedbed preparation, either by mechanical scarification or burning, is necessary for successful seed germination and seedling survival. Wind dispersal of seeds from seedtrees is about 250 feet downwind and 100 feet in other directions. Pre-commercial thinning is usually required to reduce dense (>2,000 seedlings/acre) natural regeneration. Prescribed burning is less expensive than mechanical thinning and can be used when the root collar diameters of young loblolly stands average 1.5 inches (Wade, 1993). About 400 to 600 trees per acre is the conventional target density for planting seedlings, with an expected survival of 300 trees per acre after the first year.

Loblolly pine does not tolerate shade. Hardwoods that are more shade tolerant will eventually dominate the stand unless they are controlled by prescribed burning, chemical treatment, or other methods. Additionally, poor growth characteristics can be expected to occur when loblolly pine is planted on deep dry sands, shallow soils, or extremely wet sites.

Crown closure in loblolly pine plantations occurs at about eight to ten years of age. Early thinning and subsequent thinning at five- to ten-year intervals should occur during the rotation. Intermediate thinnings increase growth and yield of residual trees, thus maximizing sawlog volume and revenue, as well as improving plant diversity and wildlife habitat in the understory. Pine stands should be thinned as soon as economically feasible to maintain 40 percent live crown ratio. A residual density of 60 to 70 square feet of basal area per acre after thinning is suggested up to age 30; while a minimum basal area of 80 to 90 square feet per acre for the remainder of the rotation is recommended.

An even-aged management system (seedtree, shelterwood, or clearcutting) is recommended for loblolly pine. Using a seedtree system, eight to ten well-formed and appropriately spaced seedtrees (12 inches diameter at breast height (DBH) or greater) per acre are needed to establish adequate regeneration.

In a three-stage shelterwood system, a preparatory cut should reduce the basal area of the stand to 60 or 70 square feet per acre to encourage vigorous seedbearers. The second stage of a shelterwood system, approximately five years later, should leave a basal area of 30 square feet per acre, or about 14 to 30 trees per acre (14-16 inches average DBH; fewer trees are required as the DBH increases). The final cut should remove the seedbearers about three years after reproduction has become well established. If natural regeneration from seedbearing trees in adjacent stands is going to be relied on, clearcuts should not exceed 600 feet in width to ensure adequate seed dispersal over the entire area.
Silvicultural practices for Loblolly Pine-Hardwood. Attempting to manage mixed stands of loblolly pine and hardwoods at HPDTA could prove to be complex because: (1) reproduction of the shade intolerant pine is difficult to establish and develop among competing hardwoods; (2) the different growth rates of the pines and hardwoods complicate management; and (3) fewer options exist for applying broadcast treatments such as herbicides or fire. A better strategy for maintaining a pine component among hardwoods would be to leave hardwoods in certain parts of the stand (e.g., drainages or wet areas) or in clumps or clusters as they occur within the existing stand. This approach also benefits wildlife by providing cover and migration corridors and concentrating mast (fleshy fruit, nut, and acorn) producing trees. This strategy tends to optimize the species with the site. Group selection harvesting (openings at two to three times the total height of the bordering trees) will produce stands consisting of small, even-aged groups of hardwoods and pines. Using five- to ten-year cutting cycles and limiting the volume removed to an amount equal to the growth during that five- to ten-year interval is recommended for group selection harvesting.

Clearcutting may be used to regenerate oak areas if stump sprouts and advanced reproduction are adequate; however, reproduction from stump sprouts should not be relied upon if stumps are greater than 12 inches. If advanced regeneration is inadequate, 30 to 40 percent of the stocking should be removed in a shelterwood cut. After approximately 400 oak-pine seedlings per acre become established, the remaining overstory may be harvested to release the regeneration. Without some disturbance from harvesting or other means (fire, windstorm, etc.), the successional trend shifts toward a shade tolerant species. Thinning at 10 to 20 year intervals is an integral part of maintaining oak-pine stands.

Silvicultural practices for Sweetgum-Yellow Poplar. Sweetgum and yellow poplar are shade intolerant species that are suited to even-aged management (seedtree or clearcut harvesting) systems. Natural regeneration from seed and stump sprouts is usually adequate to maintain even-aged stands. Scarification and fire are recommended for seedbed preparation on sites with deep litter layers. Group selection in two-acre harvest units can be used to regenerate uneven aged stands. Intermediate thinnings are not necessary to produce high quality timber because dense stands tend to be better at self-pruning. Epicormic branching is a common problem with these species and can be expected, particularly on poorer sites, on residual trees after heavy thinnings or seedtree harvests. Browsing by mice, deer, and other mammals can cause heavy loss of seedlings in this stand type.

Silvicultural practices for Willow Oak-Water Oak-Laurel Oak. Even-aged management is recommended for these flood tolerant bottomland hardwood species. Before harvesting occurs, steps should be taken to promote advanced reproduction by increasing light to the forest floor through understory removals (tree injection or basal stem spraying with Garlon 4A and/or partial overstory cuttings. A stocking level of at least 150 free-to-grow oaks per acre is desirable three years after treatment. Supplemental planting or direct seeding can be used to bolster stocking levels. If direct seeding is used, openings greater than 100 feet on each side should be created in order to minimize rodent damage. Clearcutting or group selection in two-acre harvest units are recognized silvicultural systems that are used to release advanced regeneration and/or stump sprouts. Intermediate thinning may be conducted to favor the oak component.

Silvicultural practices for Bald cypress-Tupelo and Water Tupelo-Swamp Tupelo. These stand cover types form a valuable wetland ecosystem at HPDTA that improves wildlife habitat, biodiversity, and water quality in the region. Stand composition is strongly influenced by site conditions and by harvesting. After heavy cutting, a stand usually reverts to swamp tupelo because of their prolific seed production and ability to sprout from stumps. As bald cypress is more tolerant of deeper water, maintaining an area's hydrology will help ensure their survival.

Nutria and swamp rabbits are a problem for seedling survival for bald cypress in particular. Nutria uproot the seedlings, eating the succulent bark from the tap roots and consuming small roots. Rabbits clip off the seedlings above ground and eat the tender stems and branches. Nutria prefers to feed on seedlings in shallow water while rabbits usually eat non-flooded seedlings. Damage by rabbits is offset somewhat by the sprouting of the seedlings.

Silvicultural practices for Red Cedar Seeds. Eastern red cedar is a conifer and species of juniper native to the eastern North America. The red cedar range extends from southeastern Canada down to the Gulf of Mexico. To the west, native red cedar tree range only occurs east of the Great Plains but has been successfully spread toward the west by natural regeneration from planted trees. Red cedars are difficult to transplant due to a coarse root system except when quite small. The North Carolina Forestry Service has been picking Red Cedar seed at HPDTA for the past 16 years. Red Cedar seed is rarely harvested in the wild due to its small seed, and not being able to reach the seeds higher in the trees. The only way for the seed to germinate in the wild is through the digestion process of wildlife. HPDTA makes available a bucket truck each year to assist the NC Forestry Service to harvest the seeds in our trees (Figure 3-4A). The NC Forestry Service only picks Red Cedar seeds at HPDTA due to the lack of appropriate equipment needed to pick seeds at other places in the state. HPDTA provides 50% - 75% of all the red cedar seeds harvested for the Goldsboro, NC nursery. The rest of the seeds have to be bought from private growers or nurseries. When the seed reaches the nursery in Goldsboro, NC it is cleaned and put through a process in order to germinate and grow for sale to the general public.

Forest Inventory

During the winter of 1999, a forest inventory was conducted on 1,227 forested acres at HPDTA. Due to the purchase of new land and the construction activities at the installation, the 1999 forest inventory data will need to be updated with the land currently in the acquisition process as part of developing a new Forestry Management Plan for the installation. The inventory was conducted using the point sampling method with a 20 basal area factor (BAF) prism. Cruising intensity was approximately 5 percent. Cruise points were systematically distributed throughout each stand. Double sampling was conducted for the purpose of increasing sampling intensity (for parameters such as basal area by species and product) in small stands. Tree data were measured in two-inch diameter classes to an eight-inch top for sawtimber, six-inch top for chip-n-saw, and four-inch top for pulpwood. No trees smaller than six inches DBH were measured. Additional data were collected within each stand to determine species composition, age, and growth rate.

In September 2004, an additional forestry inventory was completed due to the extensive damage caused by Hurricane Isabel on HPDTA. To date, 420 acres of forest have been cleaned up as part of the forest restoration efforts due to the hurricane. Downed timber poses a threat of wildfire, source of insect and disease infestation, and a major obstacle to effective forest management. In addition, 172 acres of the installation were replanted in 2004 with loblolly pine seedlings. Forestry prescriptions are necessary to continue the salvage operations and for restoration of hurricane damaged timber stands. Forest restoration efforts (i.e. debris clean-up efforts) have been completed.

Development and implementation of forestry prescriptions require an understanding of numerous planning considerations including:

1) objectives of the proposed activity,

2) potential impacts on physical (soil and water) and natural (wetlands, riparian areas, threatened and endangered species, wildlife populations, and wildlife habitats) resources,
3) best management practices (BMP's) to reduce or prevent adverse impacts to the environment,
4) state and Federal regulatory requirements, and
5) logistics of location, timing, and type of activities required.

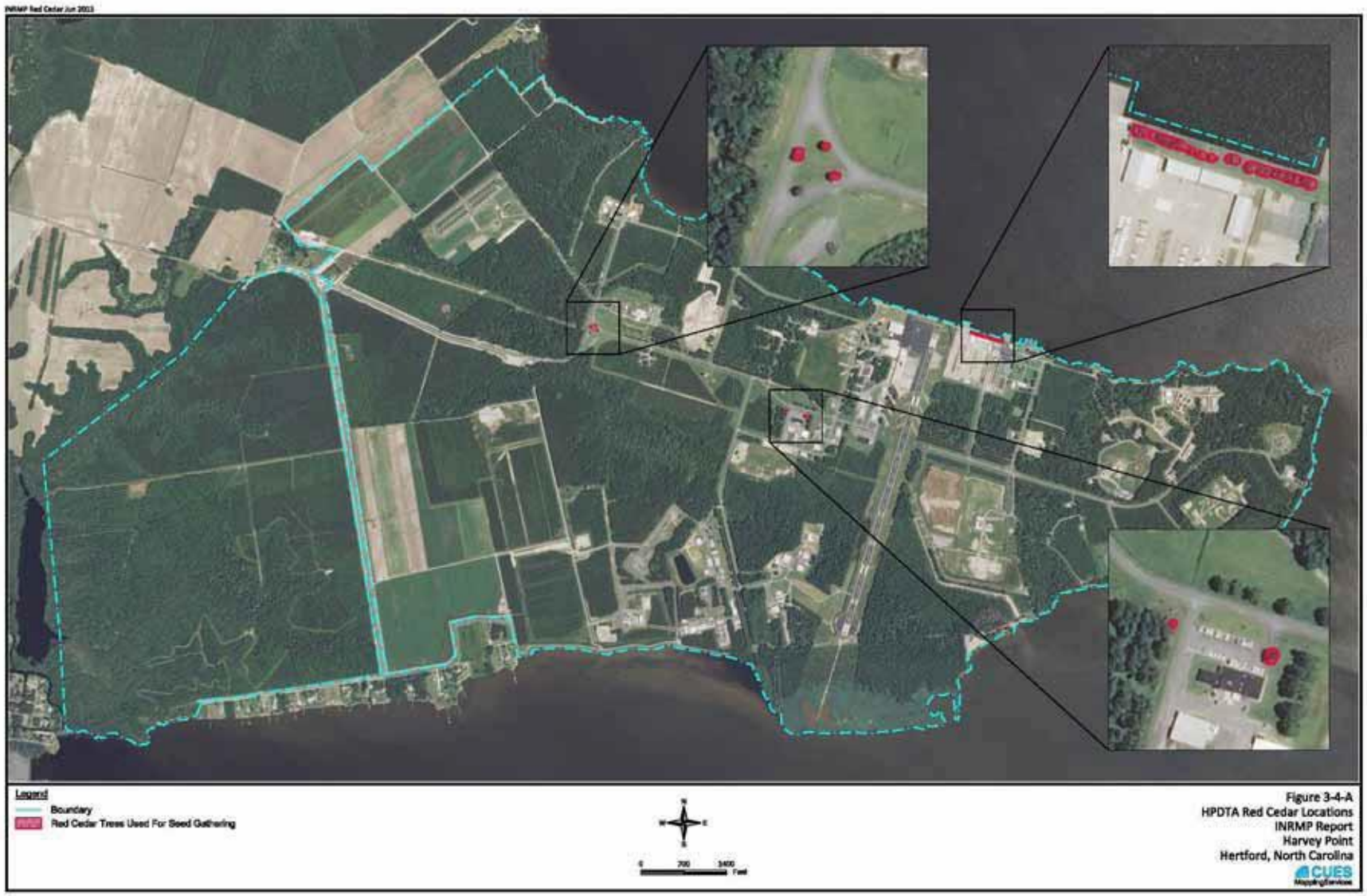


Figure 3-4A. The Locations of the Red Cedar Trees Used for Seed Gathering on HPDTA

In October 2009, the NCFS conducted a field site visit to assist HPDTA in determining what type of management needs the installation requires to create a more wildlife diverse as well as aesthetically pleasing forest stands while incorporating timber value and water quality. The NCFS explored aspects including wildlife, soil types, sensitive areas, silvicultural methods, and possible insect and disease problems. The NCFS divided the installation into management areas (Table 3-1 and Figure 3-4) and provided a site description and management recommendations for each of the identified areas.

Table 3-1. NCFS Forestry Management Area Acreages located on HPDTA (October 2009).

Forestry Management Area	*Acreage*
Area 1	***27***
Area 2	***90***
Area 3	***54***
Area 4	***184***
Area 5	***36***
Area 6	***47***
Area 7	***145***
Area 8	***36***
Area 9	***38***
Area 10	***18***
Area 11	***25***
Area 12	***18***
Area 13	***40***
Area 14	***13***
Area 15	***7***
Area 16	***21***
Area 17	***14***
Area 18	***30***
Area 19	***68***
Area 20	***80***
Area 21	***47***
Area 22	***87***
Area 23	***34***
Area 24	***5***
Area 25	***40***
Area 26	***49***
Area 27	***17***
Area 28	***129***
Area 29	***112***
Area 30	***15***
Area 31	***4***
Area 32	***13***
Area 33	***86***
Total Forest Acreage	**1,629**

Forestry Management Area Descriptions:

- *Areas 1, 18, 21, 27, 31 & 33:* These areas encompass a total of approximately 158 acres. In these areas, the NCFS identified a 6 year old cutover with a mixture of species such as white oak, red oak, sweetgum, and loblolly pine. In addition, among the sprouts, there is sea myrtle, winged

sumac, various grasses, dogfennel, blackberry, and grape vines. The sprouts range from 10 – 25 feet in height. On average, there is an average of 75 trees per acre of loblolly pine.

- *Areas 2 & 4:* These areas encompass a total of approximately 273 acres. These tracts appear to have been old field sites that were planted with loblolly pine about 6 years ago. The trees are approximately 6 – 14 feet in height and have diameters ranging from 1 – 3 inches. The understory is composed of mostly brown straw, sea myrtle, and some sweetgum sprouts. On average, there is an average of 375 trees per acre of loblolly pine.

- *Areas 3 & 22:* These areas encompass a total of approximately 141 acres. It appears that these areas were clearcut about 29 years ago and then were planted with loblolly pine seedlings. Since that time, the loblolly pines have been continuously growing at a good rate until recent years when growth has slowed down. NCFS identified a dense loblolly pine stand with an understory of a few suppressed hardwoods such as sweetgum, red maple, and vines such as greenbrier. The diameter of the trees within these tracts range from approximately 8 – 12 inches. The loblolly pines in these stands have a basal area of approximately 150 square feet per acre. Basal area is a measurement of tree density that is determined by measuring the cross-sectional area of all the trees. With these stands, when considering the existing soil type and the age of the trees, a more optimal basal area for these stands is approximately 80 square feet per acre, in order for these trees to grow at their full potential.

- *Areas 5, 6, 7, 14, 19, & 20:* These areas encompass a total of approximately 389 acres. The trees in these areas on the installation are about 60 years old. NCFS characterized these areas of a good quality, mid-aged, mixed loblolly pine stand with a few scattered hardwoods such as red maple, with an understory of a few suppressed hardwoods such as sweetgum, white oak, red oak, and red maple. This area also included vines such as greenbrier. The dominant loblolly pines have an average height of approximately 90 feet and diameters that range from 14 – 24 inches. The dominant trees in these stands have a basal area of approximately 110 square feet per acre.

- *Areas 8 & 23:* These areas encompass a total of approximately 70 acres. In these areas, the NCFS identified that this area was clearcut harvested about 6 years ago and planted with loblolly pines. NCFS characterized these areas as a loblolly pine stand with an understory of a few suppressed hardwoods such as sweetgum and red maple, and vines such as greenbrier and honeysuckle. The average diameters of the trees on this tract range from 1- 4 inches and an average of 450 trees per acre, which is adequate for a productive loblolly stand.

- *Areas 9, 25, & 30:* These areas encompass a total of approximately 93 acres. The trees in these areas are about 30 years old and have been thinned. NCFS characterized these areas of a good quality, mid-aged, mixed loblolly pine stand with an understory of a few suppressed hardwoods such as sweetgum, red oak, and red maple, and vines such as greenbrier. The dominant loblolly pines have an average height of approximately 70 feet and diameters that range from 8 - 15 inches. The dominant loblolly pines in these stands have a basal area of approximately 90 - 100 square feet per acre with a moderate growth rate.

- *Areas 10, 12, 13, 17 & 28:* These areas encompass a total of approximately 219 acres. In these areas, the NCFS identified that the loblolly pine in these areas was clearcut about 6 years ago and left for natural pine regeneration. These areas currently have approximately 250 – 300 trees per acre of loblolly pine which is a good density for a productive stand. The dominant trees have an average height of approximately 6 - 14 feet and diameters that range from 1 - 3 inches. The area is characterized by an abundance of hardwood sprouts such as sweetgum, red maple, yellow poplar, locust, and black cherry competing with loblolly pines on the tract. There is also an abundance of grasses, vines, and weeds.

- *Areas 11, 15, 16, 24 & 26:* These areas encompass a total of approximately 107 acres. NCFS identified that the trees in these areas were harvested about 6 years ago and naturally regenerated as a dense stand of loblolly pine. There are currently 800 – 2,500 trees per acre. In order for the trees to grow to their full potential, a more optimal density would be around 400 trees per acre. The dominant trees have an average height of approximately 5 - 13 feet and diameters that range from 1 - 4 inches. The understory is composed primarily of greenbrier and sweetgum.

- *Areas 29:* These areas encompass a total of approximately 112 acres. NCFS identified that the trees in these areas were of various ages that appear to have been high graded in the last 3 – 4 years. High grading is a term used when the trees of high value are harvested and the trees of low value left. This is not a beneficial practice for the future of the stand since most trees left will not ever yield high value. The remaining trees are dominantly sweetgum, which is a low quality tree with little potential for profit or wildlife value. The trees have diameters ranging from 8 – 12 inches and the stand has a basal area of approximately 60 square feet per acre. Based on this stands soil type, this area is currently understocked for tree density. The understory is dense with a mixture of vines such as muscadine grape, as well as many hardwoods such as holly, red maple, and sweetgum.

- *Areas 32:* These areas encompass a total of approximately 13 acres. NCFS identified this area as a low swampy site with various hardwood species such as yellow poplar, cypress, red maple, and sweetgum. There was some standing water observed throughout most of the area. The trees have diameters ranging from 6 -16 inches and they have an average height of approximately 85 feet.

Overall, HPDTA has a variety of natural resources including soils, timber, and wildlife which is typical for northeastern North Carolina coastal plain forests characterized by little slope and complex drainage systems. Five soil types occur on HPDTA (USDA, 1986):

- Hydric soils including Chowan silt loam, Roanoke silt loam, and Tomotley fine sandy loam comprise 61 percent of the soils on the installation.
- Dogue fine sandy loam is the only non-hydric soil on the installation.
- Udorthents (human altered soils) found on the installation exhibit both hydric and non-hydric characteristics based on the hydrology of the area where the soils are found. The majority of the area of Udorthent soil on the installation is historic dredge spoil.
- Roanoke silt loam is listed as a hydric soil (USDA, 1991) and occurs extensively at HPDTA. Ditches throughout areas of Roanoke silt loam have lowered the land's water table enough to remove characteristic wetland hydrology (USDA, 1986).

Site index is a measure of soil quality and allows an estimation of how tall a tree will grow in 50 years.

- The site index for loblolly pine in Roanoke soils is 86 at a base age of 50.
- Seedling mortality of loblolly pines is high in Chowan soils due to their poorly draining characteristics.
- The site index for water tupelo in Chowan soils is 80 at a base age of 50.
- The site index for green ash in Chowan soils is 98 at a base age of 50.
- The site index for loblolly pine in Dogue soils is 90 at a base age of 50.
- The site index for loblolly pine in Tomotley soils is 97 at a base age of 50

This measurement allows the installation to continually monitor the health of the tree population for insect and disease issues. Table 3-2 provides forestry management recommendation that were identified by the NCFS in October 2009.

Figure 3-4. Forest Management Areas at HPDTA

Table 3-2. NCFS Forestry Management Area Recommendations (October 2009).

Forestry Management Area	*Management Recommendation*
Area 1	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.
Area 2	Due to the amount of natural loblolly pine regeneration - – no additional planting required, no thinning required, no control burn required. No management needs to currently be performed – recommend a stand evaluation in 7 – 9 years.
Area 3	Tract should be thinned to approximately 80 square feet per acre at which time smaller diameter and poorly formed trees should be removed and more valuable trees left for future sawtimber harvest. To protect the soil, harvest should be done when the site is relatively dry and the remaining trees not be damaged. A controlled winter burn is recommended in the following growing season to control vine growth.
Area 4	Due to the amount of natural loblolly pine regeneration - – no additional planting required, no thinning required, no control burn required. No management needs to currently be performed – recommend a stand evaluation in 7 – 9 years.
Area 5	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 6	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 7	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 8	Due to the large amount of loblolly pines – recommend leaving tract to grow. No management needs to currently be performed until the trees reach larger size where they have greater value – recommend a stand evaluation in 7 – 9 years for a commercial thinning.
Area 9	Recommend leaving tract to grow and conducting a controlled winter burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 10	The hardwood sprouts and significant amounts of weeds, vines, and grasses will compete with young loblolly pines – recommend a herbicide release applied with a helicopter or skidder to the site using 12.8 ounces of Arsenal and 2 ounces of Escort. This application needs to be completed between July 1st and October 15th of 2010 or 2011 to help eliminate competitive species growth. (General cost $60 85 per acre).
Area 11	Recommend pre-commercial thinning from 800 – 2500 trees per acre to 300 – 600 trees per acre utilizing a tractor with a V-shaped blade and drum chopper in order to cut streaks through the stands to reduce the number of trees per acre. This will rapidly speed up the diameter growth of the loblolly pines.

Forestry Management Area	***Management Recommendation***
Area 12	The hardwood sprouts and significant amounts of weeds, vines, and grasses will compete with young loblolly pines – recommend a herbicide release applied with a helicopter or skidder to the site using 12.8 ounces of Arsenal and 2 ounces of Escort. This application needs to be completed between July 1st and October 15th of 2010 or 2011 to help eliminate competitive species growth. (General cost $60 85 per acre).
Area 13	The hardwood sprouts and significant amounts of weeds, vines, and grasses will compete with young loblolly pines – recommend a herbicide release applied with a helicopter or skidder to the site using 12.8 ounces of Arsenal and 2 ounces of Escort. This application needs to be completed between July 1st and October 15th of 2010 or 2011 to help eliminate competitive species growth. (General cost $60 85 per acre).
Area 14	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 15	Recommend pre-commercial thinning from 800 – 2,500 trees per acre to 300 – 600 trees per acre utilizing a tractor with a V-shaped blade and drum chopper in order to cut streaks through the stands to reduce the number of trees per acre. This will rapidly speed up the diameter growth of the loblolly pines.
Area 16	Recommend pre-commercial thinning from 800 – 2,500 trees per acre to 300 – 600 trees per acre utilizing a tractor with a V-shaped blade and drum chopper in order to cut streaks through the stands to reduce the number of trees per acre. This will rapidly speed up the diameter growth of the loblolly pines.
Area 17	The hardwood sprouts and significant amounts of weeds, vines, and grasses will compete with young loblolly pines – recommend a herbicide release applied with a helicopter or skidder to the site using 12.8 ounces of Arsenal and 2 ounces of Escort. This application needs to be completed between July 1st and October 15th of 2010 or 2011 to help eliminate competitive species growth. (General cost $60 85 per acre).
Area 18	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.
Area 19	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 20	Recommend leaving tract to grow and conducting a controlled burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 21	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.
Area 22	Tract should be thinned to approximately 80 square feet per acre at which time smaller diameter and poorly formed trees should be removed and more valuable trees left for future sawtimber harvest. To protect the soil, harvest should be done when the site is relatively dry and the remaining trees not be damaged. A controlled winter burn is recommended in the following growing season to control vine growth.

Forestry Management Area	***Management Recommendation***
Area 23	Due to the large amount of loblolly pines – recommend leaving tract to grow. No management needs to currently be performed until the trees reach larger size where they have greater value – recommend a stand evaluation in 7 – 9 years for a commercial thinning.
Area 24	Recommend pre-commercial thinning from 800 – 2500 trees per acre to 300 – 600 trees per acre utilizing a tractor with a V-shaped blade and drum chopper in order to cut streaks through the stands to reduce the number of trees per acre. This will rapidly speed up the diameter growth of the loblolly pines.
Area 25	Recommend leaving tract to grow and conducting a controlled winter burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 26	Recommend pre-commercial thinning from 800 – 2500 trees per acre to 300 – 600 trees per acre utilizing a tractor with a V-shaped blade and drum chopper in order to cut streaks through the stands to reduce the number of trees per acre. This will rapidly speed up the diameter growth of the loblolly pines.
Area 27	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.
Area 28	The hardwood sprouts and significant amounts of weeds, vines, and grasses will compete with young loblolly pines – recommend a herbicide release applied with a helicopter or skidder to the site using 12.8 ounces of Arsenal and 2 ounces of Escort. This application needs to be completed between July 1st and October 15th of 2010 or 2011 to help eliminate competitive species growth. (General cost $60 85 per acre).
Area 29	Recommend having this tract clearcut. This option is a legal choice as long as all trees are cut in order to protect potential of good quality trees of high value in the future. Do not perform clearcut when the site is wet in order to not damage the soils and cause poor quality and growth in the future.
Area 30	Recommend leaving tract to grow and conducting a controlled winter burn to kill back understory competition, improve wildlife habitat, and minimize fire risk to surrounding areas.
Area 31	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.
Area 32	Recommend leaving tract to grow for another 10 – 15 years to allow for increased size which will increase the tree value. No management needs to currently be performed. Average diameters of hardwood sawtimber are around 14 inches.
Area 33	Due to the large amount of hardwood sprouts – no additional planting required. There are hardwoods in the stands that have potential for future value; therefore, let the stand continue to grow.

Forest Protection

Implementation of a more intensive management program could improve overall vigor of forest stands and reduce the probability of disastrous and widespread forest degradation from storm events and invasive species. To date, most of the previous harvesting activity at HPDTA has been initiated because of threats or damage to the timber resource by these factors. By implementing sound forestry practices, HPDTA personnel can minimize the forest stands that are vulnerable to invasive species infestation.

Generally, pine stands on the Outer Coastal Plain are susceptible to Southern Pine Beetle (SPB) (*Dendroctonus frontalis)* when the stands exhibit the following characteristics:

- dense stocking;
- large amounts of sawtimber (trees greater than 12 inches DBH);
- slow radial growth; and
- poorly drained or poorly aerated soils.

Pines stands that exhibit these characteristics need annual monitoring and should be considered for thinning or harvesting. Thinning would result in healthier pine stands and would increase the amount of understory vegetation, which would be beneficial to wildlife. Information on stocking for pine and hardwood are readily available from the NCFS. If an outbreak of SPB is detected, there are several treatments that may be used to control the outbreak. These include:

- salvage removal,
- cut and leave,
- piling and burning, and
- chemical control.

In the past, the forestry practices have encouraged the cut and leave method of beetle control, especially where the active spots have affected less than 100 trees. This method is best used from May through October if and when SPB are actively expanding in areas with less than 100 infested trees. Green un-infested trees should also be dropped inward to make a buffer strip as wide as the height of the infested trees.

The best protection strategies against SPB infestation are sound silvicultural practices which include:

- Removing damaged or weakened trees from timber stands. These trees are more susceptible to SPB attack.
- Thinning densely stocked stands of loblolly pine. Dense stands of pine with slow individual tree growth are considered at risk for SPB infestation. Low thinning is a recommended practice, which involves removal of smaller, slower-growing pine trees under the canopy. Prescribed burning is another tool that may be used to reduce stocking and competition by killing smaller trees when the stand is less than five to seven years old.
- Mixing pine and hardwood species. SPB populations quickly spread in pure pine stands. Mixed stands can interrupt SPB infestations, support diverse wildlife populations, are aesthetically pleasing, and contribute to soil improvement.
- Minimizing logging damage to trees. SPB can invade trees injured by careless logging operations. When residual trees sustain mechanical damage to above- or below-ground parts, the trees should be removed at the completion of logging operations.

More intensive forest management could also improve the quality and diversity of forest products grown on HPDTA forestland. Additional thinnings, seedtree cuts, shelterwoods, and clearcuts would result in improved crop tree quality and an increase in forest acreage with younger age classes. Such a strategy would eventually improve forest structure and forest health as well as having the added benefit of increasing wildlife habitat diversity. Another consideration of forest management at HPDTA is the importance of creating and maintaining physical and visual buffers for installation activities. In particular, the forests around the explosive ordnance ranges must be maintained to provide a physical safety barrier to control flying shrapnel as well as a visual buffer from the surrounding water's edge. Currently, there are areas with little or no mid-story component, which detracts from the effectiveness of the buffer.

Currently, all mature forest stands are vulnerable to winds coming off the two-mile fetch of the Perquimans River to the north or the nine-mile fetch of the Albemarle Sound coming from the south. To avoid wind damage, it is recommended that harvest operations in these stands be conducted in strips with the strips oriented perpendicular (or nearly so) to the direction of the winds coming off of either body of

water. To protect the integrity of the forest edges, cutting should progress from the leeward toward the direction from which the most damaging winds are likely to come. A recommendation is made to encourage stand borders that have multiple layers of foliage extending to the ground. The creation of gaps along the edges of stands adjacent to either the river or sound should be avoided, because the force of the wind is markedly increased when air is funneled into such gaps. If the stand border is adequately maintained, thinnings can be conducted behind it with reasonable safety and can ultimately contribute to the resistance of the stand as a whole.

Riparian Forest Buffers

The riparian zone is the transition area between aquatic and terrestrial ecosystems. Because of the extensive riparian zone that occurs along the shoreline and inland streams and wetlands at HPDTA, riparian zone management is an important natural resources consideration. In their natural vegetated state, riparian zones provide many of the same benefits as wetlands including removal of excess nutrients, sediment, and other pollutants from runoff. Riparian buffers that are composed of multi-layered canopies, an undisturbed layer of leaf litter, and a dense root layer are best at improving and protecting water quality. Guidelines for forest management within riparian forest buffers are often based on management zones. Within the zone immediately adjacent to a wetland, timber harvesting is excluded except to remove disease or insect-infested trees or to cut a tree that is likely to destabilize the streambank were it to fall. Within the second zone, forests should be managed for health and diversity, creating a community with herbaceous, midstory, and overstory plants. Hardwood species should be favored over pines. A third zone, which is not necessarily forested, serves to disperse channelized flow before reaching the other zones. The USDA Forest Service recommends a minimum width of 15 feet from the top of the streambank for the first zone and 60 feet for the second zone. Zone widths may be increased according to soil types, slope, and land use (Welsch and Iivari 1998). Any forest harvesting operation that does occur within forested riparian buffers should follow state BMPs for wetlands and streamside management areas as discussed below.

Wetland Best Management Practices

Section 404 of the CWA exempts normal forestry operations including harvesting as long as state BMPs are implemented from the permitting process. Conversion of bottomland hardwoods to pine plantations and mechanical site preparation in most situations, however, do require a permit. General recommendations for timber harvesting in wetlands or on wet soils include the following:

- Road designs in wetlands should provide cross drainage of the wetland during both flooded and low water conditions.
- Road construction should be avoided during wet periods.
- Outflow from road drainage ditches should be diverted prior to entering wetlands and riparian areas.
- The width of the road surface should be kept to the minimum necessary (typically 12 feet wide for straight sections and 16 feet for curves).
- Road use should cease if ruts exceed six inches in depth for more than 300 feet.
- Any backfill around culverts in wetlands should be constructed of free drainage granular material.
- All culverts in organic soils should be 24 inches in diameter and placed with their bottom half in the upper 12 inches of the soil to handle the subsurface flow and their top half above the surface to handle aboveground flow.
- Low ground pressure equipment (flotation tires) should be used whenever possible to prevent rutting.
- The number and size of landings should be kept to the minimum necessary and, where possible, should be located outside wetlands and far from streams on well-drained areas with gentle grades.
- Harvests should be scheduled during the drier seasons of the year.
- The crossing of perennial or intermittent streams and waterways should be minimized.
- Portable bridges, pole fords, and corduroy approaches should be used to prevent channel and bank disturbances.
- Streams should be crossed at right angles.

3.6 Prescribed Burning

Prescribed burning is a widely accepted and economically sound tool for use on pine forestlands. Prescribed burning of forestlands is a management tool that is beneficial to public safety, forest and wildlife resources, environment, and economy. The following are benefits that result from prescribed burning of forestlands:

- Prescribed burning reduces the naturally occurring buildup of vegetative fuels on forestlands, thereby reducing the risk and severity of wildfires and lessening the loss of life and property.
- The use of prescribed burning in these woodland-urban interface areas substantially reduces the risk of wildfires that cause damage.
- Many of North Carolina's natural ecosystems require periodic fire for their survival. Prescribed burning is essential to the perpetuation, restoration, and management of many plant and animal communities. Prescribed burning benefits game, nongame, and endangered wildlife species by increasing the growth and yield of plants that provide forage and an area for escape and brooding and that satisfy other habitat needs.
- Forestlands are economic, biological, and aesthetic resources of statewide significance. In addition to reducing the frequency and severity of wildfires, prescribed burning of forestlands helps to prepare sites for replanting and natural seeding, to control insects and diseases, and to increase productivity.
- Prescribed burning enhances lands that are managed for wildlife refuges, nature preserves, and game lands.

Prescribed burning is often the most practical solution to reducing hazardous fuel accumulations and managing wildlife habitat. The primary applications of prescribed burning include:

- Reducing hazardous fuel accumulation,
- Preparing sites for seeding and planting,
- Controlling undesirable vegetation,
- Improving access and aesthetics,
- Encouraging oak regeneration, and
- Thinning of overstocked natural loblolly pine regeneration.

Wildfire within hardwood areas is often detrimental; however, when oaks are a major component of upland forests, properly conducted prescribed burning may be used as a regeneration tool in concert with shelterwood harvesting. Most bottomland hardwoods are not tolerant of high intensity fire, and if burning is to be conducted in such stands, a dormant season backfire is the suggested method.

Prescribed burning in loblolly pine stands for the purposes of thinning young overstocked stands and for site preparation prior to regeneration in harvested areas are two potential additional uses of controlled fire on HPDTA. Prescribed burning for thinning overstocked stands should be conducted during the winter season using backfire. For regeneration purposes, prescribed burns should be conducted during late summer or early fall. Restoring the natural fire regime of the ecosystems on the base will further contribute to a sustainable and diverse land base.

Prescribed fire can be harmful as well as beneficial and should only be conducted by trained and experienced personnel. Proper diagnosis of fire conditions and detailed planning for smoke management are needed each time a burn is conducted. Prescribed burns are occasionally conducted in winter for fuel reduction, under the direction of the installation Fire Chief. Prescribed fires should be fully coordinated with the local fire department, adjacent landowners, and the NCFS, as deemed appropriate by the Fire Chief. The impact on all resources, including air quality, wildlife, protected species and habitats, forest cover type, riparian areas, and aesthetics should be considered to maximize the beneficial effects of prescribed burning. When planning any prescribed burn activities, the procedures, guidelines, and required tools and equipment detailed by the Fire Chief and burn permit authorizations should be strictly

followed. Prescribed burn plans and smoke management plans should be carefully developed for each event. HPDTA does not have a written Memorandum of Understanding (MOU) or cooperative agreement with the NCFS, however, and such issues as compensation for assistance by the state on wildfire are unclear. It is recommended that HPDTA establish a cooperative agreement with NCFS to ensure that there are no misunderstandings in the future regarding state suppression assistance on HPDTA.

HPDTA strives to use prescribed burning to reduce hazardous fuel accumulations, manage wildlife habitat, prepare sites for seeding and planting, control undesirable vegetation, improve access and aesthetics, encourage oak regeneration, and thin overstocked natural loblolly pine regeneration. In 2010, HPDTA utilized the NCFS to complete prescribed burning for 57 acres of the installation in areas to reduce the naturally occurring buildup of vegetative fuels on the forestlands to reduce the risk and severity of wildfires and lessen the loss of life and property. The prescribed burn was completed in compliance with all known regulations and established guidelines (Figure 3-4-B).

Smoke Management

The EPA has issued an Interim Air Quality Policy on Wildland and Prescribed Fires that contains important guidance for conducting prescribed burns. The policy encourages managers to (1) notify air quality agencies of plans to significantly increase the use of fire; (2) take air quality impacts of fire into consideration and take appropriate steps to mitigate the impacts; (3) consider alternatives to fire that will meet land management objectives, and (4) participate in the development of smoke management plans. EPA does not plan to restrict burning activities, but rather will ask that the adequacy of the smoke management plan be expeditiously reviewed. If a smoke management plan is not developed and burning activities are found to contribute to particulate concentrations above the National Ambient Air Quality Standards for particulate matter of 2.5 microns or smaller, EPA will force development and implementation of a mandatory smoke management plan and may redesignate these areas as nonattainment, which then imposes requirements for emission reductions.

In January 2000, the North Carolina state law (North Carolina Prescribed Burning Act) relating to prescribed burning in forest provided limited immunity from liability from smoke resulting from a prescribed burn when the burn is conducted by a certified burner or when the landowner is following a written plan prepared by a certified burner. By limiting liability, the state hopes to encourage prescribed burning in forestlands to reduce the occurrence of wildfires.

Occasionally weather conditions are within allowable prescription guidelines for prescribed burning but smoke will not dissipate. These conditions often result from thermal inversion in which warm air aloft traps air close to the earth's surface. In this situation, smoke will lay close to the ground and cause poor air quality and visibility. It is possible to "smoke in" a town for several days. In addition, if smoke crosses a road, a serious problem could exist for motor vehicles and could result in liability claims. State Route 1336, which runs northwesterly from HPDTA, could be smoked in and become a safety or health hazard. Holiday Island, which is approximately 1.5 miles to the west, could also fall within the critical impact area, given an easterly wind and less than a category day ranking of four. A category day is determined by the ventilation rate, which is the afternoon mixing height in meters, multiplied by the transport wind speed in meters per second. The town of Hertford, which is approximately nine miles to the northwest, is outside of the critical smoke sensitive area.

HPDTA should ensure that all prescribed burning is conducted in accordance with state and Federal guidelines on future burns. A Sample Prescribed Burn Plan is presented in Appendix B.

Figure 3-4B. Prescribed Burns Completed at HPDTA in 2010

3.7 Fish and Wildlife Management

Users of this INRMP are directed to the following wildlife management related references for further information:

- *Wildlife Management Techniques*, 5th Edition, The Wildlife Society (Bookhout 1994),
- *Prevention and Control of Wildlife Damage*, Vol. 1 & 2, University of Nebraska (Hygnstrom et al. 1994),
- *Conserving Biodiversity on Military Lands*, DOD, The Nature Conservancy (Leslie et al. 1996).

The basic objectives for wildlife management at HPDTA are to protect and enhance wildlife resources insofar as the mission allows; provide recreational hunting for assigned base employees, their dependents, and special hunters as authorized by the director of HPDTA; and maintain wildlife populations within the carrying capacity of the land. The diversity of habitats on HPDTA supports a wide variety of game and non-game wildlife. State-regulated game harvests are used to manage and avoid overexploitation of game animals. White-tailed deer is the primary game species hunted at HPDTA; however, small game hunting for waterfowl, squirrels, doves, and rabbits is also permitted. Deer management is the primary focus of wildlife management at HPDTA. Crossbow, shotgun, muzzleloader rifle, and bowhunting are permitted on the installation. Non-game wildlife are governed by the Federal Migratory Bird Treaty Act, The Lacey Act, and The Endangered Species Act. Management of non-game wildlife is primarily through the maintenance of natural vegetative communities such as the bottomland hardwood and cypress-tupelo swamp forests.

Wildlife law enforcement is provided by installation personnel and follows North Carolina game and non-game laws and Federal wildlife laws dealing with migratory animals. Appendix C contains HPDTA base hunting rules and regulations. The state and Federal agencies with responsibility for game and non-game laws within the state are the North Carolina Wildlife Resources Commission (NCWRC) and the USFWS. Protection of wildlife resources is considered for all mission activities requiring an environmental assessment or other NEPA documentation. Mission activities do not significantly constrain wildlife populations or habitats.

Habitat Management - Forests

Wildlife habitat on HPDTA is largely dependent on forest management practices because the extensive forested acreage on the installation. Ecosystem management guidelines specify that management of the installation should not necessarily optimize the habitat for any one species, but provide a diversity of habitat types and components for a wide variety of species. A number of actions can be taken to effectively manage the forestland for a diversity of forest resources. For example, snag retention in harvested units provides habitat for cavity-nesting birds and mammals. Leaving dead and downed woody debris mimics old-growth characteristics and provides important habitat for small mammals and herpetofauna. Minimizing forest fragmentation benefits forest interior species such as neotropical migrant birds and also contributes to more efficient timber operations. All of these characteristics are present to varying degrees and have contributed to species diversity on HPDTA.

Forest stand characteristics such as size, shape, age, age class distribution, species composition, and density affect wildlife habitat; as do forest management practices such as rotation length, regeneration, controlled burning, and thinning. Habitat variety or diversity is central to the theme of optimum wildlife habitat and is generally associated with wildlife diversity and abundance. Integrating these concepts with other land management practices on the installation permits sound planning that benefits wildlife.
Stand size and shape are primary habitat components for most wildlife. Smaller stands generally have more between-stand diversity and more value for certain wildlife than large contiguous stands; however, unless stands are connected by corridors and streamside management zones, they may become fragmented into scattered islands too small to support breeding populations. A mosaic of natural and intensively managed stands provides a large amount of habitat variety. Irregularly shaped stands provide

more diversity than square blocks because food and cover areas are more likely to be intermixed over a large area.

Many wildlife species are tolerant of a wide range of habitat conditions produced in various stand ages. Young timber stands (less than seven years) typically produce an abundance of food and cover for wildlife, but as the trees grow and develop a canopy, understory shading increases and production declines for most wildlife. Distribution of various stand age-classes throughout a forest contributes to habitat diversity for wildlife. Adjacent stands should be different in age by at least seven years. As stands mature, timber density decreases from thinning or natural succession, understory development increases from sunlight penetrating the canopy, and hardwood trees (if allowed to persist) begin to produce mast that is edible by wildlife.

Timber harvest and stand regeneration may have the most profound effect on wildlife habitat of all forest management activities. Long rotations (about 80 years between timber harvests for pine and 120 years for hardwoods) will generally produce better habitat for wildlife than short-rotation management. Longer rotations allow for greater flexibility in the use of management techniques for producing adequate supplies of forage over a longer period by maintaining mast production, plant species diversity, and habitat variety. Even-aged (clear-cutting) and uneven-aged (selective harvest) timber management can accommodate wildlife when conducted with due consideration for wildlife values. Natural stand regeneration benefits wildlife more than intensive site preparation and planting. A greater variety of woody and herbaceous vegetation generally occurs in naturally regenerated stands.

Prescribed burning can be used to improve wildlife habitat by maintaining a subclimax stage of succession that is important to many wildlife species. Usually a three-year winter burning rotation is recommended to improve and maintain the quantity and quality of understory vegetation for wildlife. Nutrient content of browse plants is higher on burned areas than on unburned areas. However, burning in hardwoods is often detrimental; therefore, burning frequently enough to eliminate hardwoods should be avoided.

Habitat Management – Forest Edges

Edge is a term used to describe interfaces between different vegetative communities and/or different successional stages. These interfaces can be abrupt or transitional. Abrupt edges generally attract animals with low cruising radius, such as small mammals or birds with small territories. Transitional edges attract more species of wildlife than do abrupt edges. Most edges at HPDTA are very abrupt, with closely mowed grassland along roadways often interfacing with mature timber. One way to improve the edges along roadways in order to attract more species diversity is to allow for a 20 to 30 foot zone of native grasses and forbs to mature, with mowing occurring only once a year. It would be preferable to mow in early to mid July after initial nesting is over, but in time to allow regrowth for cover for the upcoming winter and the next season's nesting. Following this pattern will provide cover for animals as they traverse from woods to the mowed grassy areas in which they forage. Reduced mowing would have the additional benefit of saving revenue on mowing contracts. Interpretive signs can be posted to explain that the change in appearance is due to wildlife habitat enhancement efforts.

Abandoned Agricultural Fields

Because grassland habitat is a not abundant on HPDTA, retaining the abandoned agriculture fields (approximately 150 acres) in the western central portion of the installation will help maintain a higher level of diversity on the installation. Currently, tall fescue (*Festuca elatior*), broomsedge (*Andropogon virginicus*), little bluestem (*Schizachyrium scoparium*), quackgrass (*Agropyron repens*), sedges, and rushes dominate this area.

Strategies for increasing wildlife value of this area may include the creation of food plots or conversion to a native warm season grass meadow. Planting food plots of grain sorghum, corn, sunflowers, alfalfa, and ladino clover would create high energy and protein sources for wildlife that are not currently found on

HPDTA. Areas not converted to food plots would be well suited for establishment of warm season grasses such as eastern gama grass (*Tripsacum dactyloides*), switchgrass (*Panicum virgatum*), and prairie cordgrass (*Spartina pectinata*) in wetter areas. Generally dense stands of fescue must be eradicated prior to the establishment of native warm season grasses.

Any habitat improvement strategy considered for use on the abandoned agricultural fields, where hydric soils exist, should rely on no-till cultivation methods. If plowing or disking of the soil is conducted, a wetland determination should be undertaken before breaking the soil.

A combination of spring burning and the application of a glyphosate herbicide has been proven to be an effective no-till method of reducing or eliminating tall fescue (Washburn et al. 1999). Volunteer fescue should be herbicide sprayed in late spring of the second year prior to seed formation. Permanent warm season grasses should be planted in the treated field.

Another consideration for establishing food plots at HPDTA is that predators of small game are quick to learn where their prey routinely feed and will typically intensify their predation efforts at these locations. If food plots are either disked or planted for quail, rabbits, or as brooding grounds for turkey, the plots should not be less than five acres and should be surrounded by adequate transitional soft edge that can be utilized as escape cover. Otherwise, an ecological trap for small game may have inadvertently been created.

Habitat Management

Deer utilize every cover type on HPDTA including open fields, landscaped areas, pine forests, and bottomland hardwood forests. The interspersion of cover types on HPDTA provides ideal habitat for survival and population growth of deer. Food resources primarily determine habitat quality, and throughout the southeastern United States, deer forage is frequently deficient in protein and essential minerals except during spring. The most distinctive characteristics of habitat quality are abundance, variety, and nutritive quality of forages available to satisfy the seasonally changing dietary requirements of deer. Water and cover at HPDTA are not limiting factors for deer. In the southeastern United States, good habitat may support a density of one deer per 20 acres, whereas poor quality habitat may only support one deer per 100 acres. Habitat at HPDTA is generally considered quite good and is expected to support one deer per 20 acres.

The principal foods deer eat include leaves and twigs of woody plants, soft and hard mast, herbs (including grasses and sedges), mushrooms, and agricultural crops (including plants grown in supplemental food plots). Their diet includes a great variety of species depending on the season and availability of the foods. Japanese honeysuckle (*Lonicera japonica*) is reported to be one of the most important deer foods during every season in the southeastern United States. When acorns are available, deer often feed on them to the exclusion of most forages. Deer diet is generally limited to those foods available within their normal travel range, about one mile.

Maintained open land along roadsides, the airfield, administrative facilities, and military training areas provides important deer foraging grounds. Forest openings and small clear-cut areas (less than 20 acres) also provide food and cover requirements for deer. Openings include forested areas maintained in shrub and herbaceous plant cover, uncultivated natural openings, old fields, and places where the timber canopy has been reduced or removed for means other than commercial harvest of timber (e.g., SPB spots). Prescribed burning and commercial thinning of timber stands provide open understory conditions and improve the deer habitat. Maintenance of openings should be considered one part of a habitat improvement program.

Planning and implementation of timber harvests, thinning stands that have reached canopy closure, and controlled burning in pine stands are forest management practices that would improve deer food

production during spring and summer. Controlled burning in pine stands should use a three- to five-year winter rotation.

Maintaining extensive tracts of bottomland and upland hardwood areas provides fall and winter habitat. Habitat value increases with the proportion of mast-producing species in the stands and their degree of maturity. Also maintaining clumps of hardwoods within pine stands enhances their wildlife value. Management practices in key hardwood areas should retain mast productivity, including soft mast-producing shrubs and vines.

Food plots can be helpful in white-tailed deer management when there is a shortage of acorns and other hard mast or when soft mast is insufficient to support the population. HPDTA has implemented a food plot program in which annual plantings of corn, sorghum, or sunflowers are particularly beneficial in anticipation of years when acorns will not be produced in abundance (Bromley et al., 1990). Perennial crops are most beneficial when they include high protein crops such as alfalfa or ladino clover. It must be recognized, however, that HPDTA may already have an overpopulated deer situation, and planting food plots without simultaneously increasing harvest intensity would most likely lead to the dependency of deer on supplemental food. There is also the potential to degrade plant diversity and nesting, brooding, and feeding cover for other species that are provided by more natural plant communities. Figure 3-5 depicts the food plots locations currently in place on the installation.

White-tailed Deer - Population Assessments

Collecting and comparing spotlight survey data consistently during August and September of each year provides the most accurate data for population analysis. Data collected during these late summer months, before hard mast crops have fallen, most accurately reflect the male to female ratio, doe to fawn ratio, and relative herd size. Continuing to monitor the deer population using the spotlight census technique would help in developing deer harvest guidelines and could be used to judge the success of population control efforts.

In August and September of 1998, three spotlight censuses were conducted using the USACE deer spotlight census methodology (Mitchell, 1986) to obtain estimates of the deer density on HPDTA. A 6.7-mile route, in which the major habitat types at HPDTA were represented, was selected and the average visible area for making observations during the three census nights was 278 acres. An average of 57 deer per night was recorded on the spotlight route, which equals an average deer density of 20.3 deer per 100 acres of habitat or approximately one deer per five acres. Although only one year of spotlight data is available, the estimated deer density indicates that the carrying capacity for deer has been greatly exceeded. The buck to doe ratio was 1:4.8, which is heavily skewed toward does and indicates an over harvest of the buck segment of the population. The fawn to doe ratio was 1:3.4, which indicates a low reproductive rate for the deer population. These ratios, however, are based on limited data as the sex and age of nearly half of the deer observed on the spotlight routes were not positively identified.

In July 2002, HPDTA conducted an assessment of white-tailed deer on the installation to assess herd health and population (Tripp et al., 2002). Initial assessments identified a serious deer overpopulation problem at HPDTA due to a captive deer population (a high fence on one side with water on the remaining three sides). Throughout the installation, a well-defined browse line was detected in which vegetation has been removed from the ground up to a height that the species can reach for foraging. A population density of 185 deer per square mile was determined which is 6.1 times greater than the surrounding area. NC Wildlife Commission estimates the deer density of Perquimans County to be 15 to 30 deer per square mile. Recommendations from the study included:

- An individual or office within the base administration should be designated to be responsible for collecting and maintaining accurate deer harvest records.
- A reduction in the mature doe population should be instituted so as to stabilize the doe population.
- Place a moratorium on mature buck harvest in an effort to improve the age structure of the bucks especially in the older age groups.

- Develop a systematic approach to create and manage food plots on the installation.
- Develop and institute a comprehensive Deer Management Plan for the installation.

Since the 2002 assessment of white-tailed deer on the installation to assess herd health and population, HPDTA has followed all the management recommendations identified in the study as well as continued to utilize spotlight censuses data (Figure 3-6). There is no available spotlight census data from 2007 through 2012. HPDTA plans to continue with the spotlight census beginning in 2013.

In an effort to continue to assess and evaluate the deer population on HPDTA, a deer herd health assessment study was conducted in December 2006 (Southeastern Cooperative Wildlife Disease Study, 2006). The health evaluation involved the examination of five adult deer (4 females and one male) collected at random from the population. The evaluation disclosed concerns for the health status of the population due to density dependent processes and pathogens. Specific body assessments and physical conditions ratings indicated that the herd is in excess of nutritional carrying capacity and recommended that consideration be given to population management strategies to reduce the deer density on HPDTA.

Population Management

HPDTA participates in the Deer Management Assistance Program (DMAP) sponsored by the NCWRC for technical guidance and issuance of antlerless deer harvest permits. There are numerous hunting stands (Figure 3-7) distributed throughout the area to facilitate the deer harvest. Sex and age of harvest, weight, and antler development are basic deer harvest data obtained annually from a hunter check station at HPDTA. As deer harvest data provides key information for determining population health and structure, more consistent recording of detailed harvest information is recommended. Age, weight (dressed), and antler development (total number of points, inside spread, main beam length, and basal circumference) should be recorded to obtain an estimate of deer body and antler quality by age-class. The jaw bone is removed from each deer to check tooth wear to determine age. These data are used to determine if there are more deer on the area than the habitat can support (below average body size and antler development) or if the deer population is within the carrying capacity of the habitat (average or above average conditions). The age of harvested deer also gives some indication of the age structure of the herd. A predominance of young bucks (1.5 years) in the harvest may indicate an overexploitation of the buck segment as compared to an older age class for harvested does. Data collected on the lactation rate of does provides an estimate of fawn production. The proportion of bucks harvested that are spiked and the average age of bucks and do also provide useful measures of population status. Hunter success rate (total number of deer harvested/total number of hunters) is used to develop trend data as it is often closely correlated with population size.

Limited deer harvest data from the installation are available for analysis of hunter density, hunter success, condition of harvested deer, and population dynamics of the deer population at HPDTA. The large amount of missing data in the deer harvest records indicates that a greater emphasis on data collection is needed. Deer harvest data (Table 3-3) were analyzed for a period from 1991 to the 2011 hunting season. During the hunting seasons, shooting with guns is consistently the greater utilized method of hunting. In general, does account for approximate 72 percent of the total deer harvest in the hunting seasons analyzed. This large proportion of does in the harvest would be expected to eventually decrease deer numbers if the total harvest represented about 40 percent of the population. However, the high deer density from the recent spotlight censuses (529 deer per 1,800 acres (Tripp et al., 2002)) indicates that the past harvests have been a much lower percentage of the population. The average known age of bucks harvested during the 2006 - 2010 hunting season was generally below 3.5 years while the average known age of does harvested during the 2006 - 2010 hunting season was generally below 2.5 years (Table 3-4).

Figure 3-5. Food Plot Locations at HPDTA

Table 3-3. HPDTA Deer Harvest Data (1991 – 2011).

Hunting Season	*Deer Harvest*			*Average Weight (lbs)*	*% Does of Harvest*
	Does	*Bucks*	*Total*		
1991 – 1992	11	13	24	No Data	45.8
1992 - 1993	No Data				
1993 - 1994	No Data				
1994 - 1995	29	10	39	94.2	74.3
1995 -1996	No Data				
1996 - 1997	9	7	16	No Data	56.3
1997 - 1998	7	7	14	No Data	50.0
1998 - 1999	10	0	10	No Data	100
1999 - 2000	No Data				
2000 - 2001	13	3	16	No Data	81.3
2001 - 2002	No Data				
2002 - 2003	15	2	17	No Data	88.2
2003 - 2004	No Data				
2004 - 2005	15	4	19	98	78.9
2005 - 2006	16	5	21	104	76.2
2006 - 2007	43	9	52	95	82.7
2007 - 2008	48	15	63	97.6	76.2
2008 - 2009	32	19	51	100.1	62.7
2009 - 2010	33	18	51	97.0	64.7
2010 - 2011	31	13	44	103.1	70.5

Table 3-4. HPDTA Deer Harvest Age Data (2006 - 2010).

Year	**Number of Known Age Bucks**						**Number of Known Age Does**					
	0.5	**1.5**	**2.5**	**3.5**	**4.5**	**5.5+**	**0.5**	**1.5**	**2.5**	**3.5**	**4.5**	**5.5+**
2006	0	0	3	4	1	1	9	11	6	1	5	11
2007	7	2	3	2	0	0	6	13	3	10	2	10
2008	5	2	5	2	1	0	4	5	9	6	4	2
2009	5	4	3	2	3	0	12	6	6	1	2	4
2010	3	2	0	2	3	0	4	10	3	3	1	6

Either-sex harvest of deer is used to regulate populations. Antlerless deer harvest at HPDTA is critical to maintaining a stable population. Where deer ranges are at carrying capacity and the objective is to maintain a stable population, either-sex harvest regulations should allow the take of 30 to 40 percent of does in the total harvest. Where deer exceed the carrying capacity and the objective is to reduce deer numbers, the harvest of does should be increased to 40 to 50 percent. Controlling deer populations is a key component in protecting the health of the environment and the herd. As deer populations become increasingly large and competition for food increases, does respond by lowered reproductive rates and habitat may be degraded, adversely affecting the health of individual deer. Harvest of both sexes can avoid dramatic fluctuations of deer numbers. Antlerless deer harvest should be consistent with statewide deer harvest regulations. It is generally accepted that buck-only harvests will invariably result in a high residual population of does, low overall recruitment rates, and less than ten percent of antlered bucks in the population. Increasing annual deer harvest rates since 1991 at HPDTA have helped reduce the population to within the land's carrying capacity.

Eastern Wild Turkey

Eastern wild turkeys are ground nesters that typically lay nine to 12 light buff to pale brown or purple eggs with brown spots. The incubation period is approximately 26 days. Poults are ready to follow the hen 12 to 24 hours after leaving the egg. Broods spend most of their early days searching for and eating a variety of small insects. An optimal turkey range consists of large tracts of mature forestland with scattered patches of early successional stages interspersed throughout. Past telemetry studies indicate that a minimum area of 1,000 acres is needed for a viable flock. A population that could support 100 hunter days per year would require 5,000 acres of suitable range.

Open areas for insect foraging are important for wild turkeys and should comprise approximately one-third of the bird's home range. Within the forested areas of HPDTA, open areas comprise far less than this optimal level of interspersion. Open areas are also important for courtship and nesting. The highest turkey densities in North Carolina are found in areas where wet hardwood bottoms abut thinned pine plantations, young clearcuts, and agriculture fields. Nesting habitat includes a variety of habitat types such as wood's edge, old fields, rights-of-way, and young (less than five years old) pine plantations. Thinned pine plantations have also proven to be desired nesting sites and offer good nesting cover if abundant ground vegetation is present. Thinning the considerable acreage of overstocked pine at HPDTA would increase the amount and quality habitat for turkeys.

Tall fescue plantings should be avoided if an increase in turkey population numbers is a goal. Instead, native grass plantings should be encouraged. A dense herbaceous layer with forb, grass, vine, and brush components is excellent nesting habitat. Late winter burning, mowing, or bush-hogging at intervals of two to three years, can be used to achieve this end. Springtime field activities should take into account the potential for disruption of nesting activities from mid-May to mid-July. Preferred turkey foods are acorns, wild grapes, flowering dogwood, American beautyberry, blackberry fruits, soybeans, and clovers. Other fleshy fruit and nuts, as well as sedges and ferns, are important during the fall and winter. Insects with their high protein content are a critical food source to broods during the spring for survival and growth.

Seasonal trapping of mammalian nest predators, i.e., raccoons, skunks, cotton rats, and opossum, prior to and during turkey nesting season (February through June) might increase wild turkey nesting success. However, this strategy is experimental and would be just one component of a comprehensive, habitat-enhancing management approach. Other ground-nesting species such as bobwhite quail and whip-poor-wills might benefit from this approach as well.

Cottontail Rabbits

Cottontail rabbits typically breed from March through September. Two or three litters are commonly born in one season, but as many as five have been produced in certain areas. The period of gestation varies from 25 to 32 days, and the litter varies in size from three to eight rabbits. The young are blind at birth and remain in the nest for about two weeks. The cottontail population is limited by suitable habitat at HPDTA as there is relatively little early successional habitat available; and possibly by a healthy population of gray fox.

Eastern cottontails are a generalist species associated with early successional stages of habitat. Herbaceous vegetation of almost any kind, buds, and twigs are typical foods throughout the year. Escape cover comprised of thickets, brush piles, and unmowed grasses are important for daytime foraging, and open areas are important for nocturnal feeding. Home range size varies between two and ten acres depending on habitat quality. A variety of habitat types present within a ten-acre area is optimal. Reducing mowing in the agricultural field to every two to three years and allowing hedgerows to grow in around existing roads, fence lines, and drainage ditches would improve habitat for cottontail rabbits. In dense pine stands, prescribed burning at three- to five-year intervals would also improve habitat for rabbits.

In areas where there is little natural cover, constructed brush piles can provide escape cover for rabbits. Brush piles can be constructed by using logs, pallets, concrete blocks, pipes, or other materials to serve as a base. If using logs, layers of six-inch diameter logs should be stacked at right angles to each other to make a base for the pile. Logs within each layer should be six to ten inches apart. Tree tops, limbs, and stumps should be placed on top of the base to complete the pile. The best size for a brush pile is four to eight feet high and 10 to 20 feet in diameter. Well-constructed brush piles can last 10 to 15 years. At the edges of wooded areas, one brush pile every 200 to 300 feet will provide adequate cover and travel lanes. Piles should be placed along forest edges, in openings and field corners, or along streams and marshes. They should be placed in close proximity to food sources and natural cover, because isolated piles will receive little use. Because cottontails attract large raptors such as Red-tailed Hawks, improving habitat and placing brush piles near the runway clear zone would not be appropriate.

Bobwhite Quail

The bobwhite is primarily a species of early successional plant communities. Home range sizes vary between 20 and 40 acres and seldom exceed 80 acres (Bidwell et al. 1992). An average density on intensely managed areas is one covey per 15 acres. The diet of adults consists of seeds and fruits of cultivated crops, wild herbaceous plants, and woody plants. Insects are the primary food for quail during the first few weeks of life.

For nesting cover, bobwhites prefer warm season grass clumps left from the previous growing season. Most nests are within 50 feet or less of an open edge. Little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), eastern gamma grass (*Tripsacum dactyloides*), weeping lovegrass (*Eragrostis curvula*), and broomsedge (*Carex scoparia*) make up the majority of preferred nest habitats. An extremely important feature of good quail habitat is cover that is open at the ground level. Vegetation should provide protection, but plant stems need to be far enough apart and the ground bare enough to allow the birds to move freely. Tall fescue is often sod-bound and has been found to entangle immature quail and indirectly lead to starvation and predation. Conversion of fescue stands to native warm season grasses and forbs may be used to improve quail habitat. One to two-year-old fallow fields where thin grasses and tall perennial forbs abound are the preferred roosting habitat of the bobwhite. Woody thickets with a dense understory of honeysuckle are preferred roosts for enduring severe weather.

Quail begin breeding as early as mid-February. The first bobwhite whistle of spring is a sign that the mating period has begun. The nesting period commences in late April or early May and continues until late summer. Egg laying may take up to 20 days, and the average clutch size is 14 although it can vary widely. Incubation takes approximately 23-24 days.

Figure 3-6. Deer Spotlight Survey Routes at HPDTA

Figure 3-7. Hunting Stand Locations (Deer and Waterfowl) at HPDTA

Neotropical Migrant Birds

Birds that breed in the United States and Canada that journey south to spend the winter in the Caribbean, Mexico, and southward are known as neotropical migrants. Thrushes, warblers, vireos, and tanagers are probably the most familiar of the neotropical migrant songbirds. But this group actually comprises a large number of diverse species including waterfowl, shorebirds, terns, hawks, flycatchers, and hummingbirds. The decline of neotropical bird populations is a great concern to scientists and birdwatchers and has instigated the formation of such groups as Partners in Flight (PIF), a partnership of DOD, other state and Federal agencies, and private organizations. A key activity of PIF is the development of a bird conservation plan for every physiographic area in the United States. As declines in bird populations are primarily contributed to loss of habitat and habitat fragmentation, conservation strategies developed by PIF concentrate on maintaining healthy and productive natural systems at the landscape level. Because of the rapid pace of development and the abundance of agricultural lands in the region, the extensive forested land at HPDTA provides particularly important stop over grounds for neotropical migrants during their spring and fall migrations. Preserving large tracts of mature forest, creating and maintaining forested riparian buffers, and leaving snags in managed forests are ways of continuing to provide habitat for many neotropical migrant species.

The installation of artificial nest boxes and other structures (Figure 3-8) is a way of enhancing bird habitat in areas where there are few natural cavity trees or where competition from aggressive non-native species such as house sparrows and European starlings is great. Bluebirds, purple martins, barn swallows, and bats are species that commonly utilize artificial structures. Nest box construction and placement should consider the availability of appropriate habitat for the intended species. Bluebird nest boxes, for example, should be placed five to six feet off the ground and spaced about 100 yards apart with the entrance hole facing north or northeast. Boxes should be placed in an area comprised of mixed hardwood forests and grassland such as along the wood line at the abandoned agricultural field. Purple martin houses should be comprised of several compartments and should be placed in clearings at least 30 feet from trees. Barn swallows will utilize simple platforms attached to buildings. It is important to locate nest boxes and platforms away from doorways or high traffic areas to prevent bird droppings from becoming a nuisance. Brown bats and little brown bats are the most likely occupants of bat houses, which should be placed within a half of a mile of a marsh or open water where insect populations are high.

Amphibians

North Carolina supports a wide diversity of amphibians including some 90 species (Berkley, 2006). Amphibians include frogs, toads, and salamanders. Many of these species are declining due to loss of wetlands and use of pesticides. To favor current populations of amphibians at HPDTA, the installation should continue to maintain or construct new fishless pools for amphibian breeding, egg-laying, or the juvenile stage of development. Some salamanders may only breed in forest pools within mature hardwood forests; therefore, to prevent the further degradation of salamander habitat, ditch digging and stream channelization should not be permitted in any unditched areas. To improve habitat in areas where flooding will not cause mission related problems, blocking ditches will slow down flow and create the required pools and wet areas. Although larger pools tend not to dry up frequently, they may attract green frogs and bullfrogs, which are the primary predators of many other amphibians; and therefore, do not provide as good breeding habitat as smaller pools.

Nuisance Wildlife Damage Management

There are a number of primary nuisance wildlife species including Canada goose (*Branta canadensis*), ground hogs (*Marmota monax*), muskrats (*Ondatra zibethicus*), nutria (*Myocastor coypus*), and feral cats (*Felis silvestris catus)*. Wildlife damage control and management actions are divided into three primary categories: active management, habitat management, and inter-departmental coordination on nuisance and pest wildlife species management.

Although nuisance species populations on HPDTA have not yet exceeded manageable populations, wildlife damage control/management practices including the following are in place on the installation:

- Coordinate and respond to complaints from base personnel regarding nuisance wildlife pests.
- Maintain accurate records of nuisance wildlife handling for annual reporting.
- Coordinate maintenance and repair of base buildings (i.e. warehouses and office spaces) that have a history of nuisance wildlife pests.
- Provide technical coordination and participate in feral cat control programs.
- Provide information and education for Base residents and workers on wildlife, nuisance wildlife, wildlife disease vectors (ticks, small mammals) and situations where wildlife becomes both nuisance and pest.

Animal Rehabilitators

Occasionally, personnel at HPDTA are faced with injured or sick wildlife or domestic animals found on the installation. Points of contact for local wildlife rehabilitators and the Perquimans County Animal Control Officer are given in Table 3-5. Rehabilitators are able to assist in capturing and physical recovery of injured birds and small mammals. The Perquimans County Animal Control Officer will deal with suspected rabies cases in either domestic or wild animals. There have been no cases of rabies reported, but with the high population of gray fox observed during the deer census spotlight, there is the potential for rabies to become a problem on the installation. If an animal suspected of being infected with rabies is encountered, the animal should be killed and left in place without being touched. The animal control officer for Perquimans County should be contacted to remove the animal.

3.8 Grounds Maintenance

The urban landscape at HPDTA consists of mature trees, ornamental shrubs, and mowed grassy areas. Public Works personnel perform year-round maintenance including mowing and tree and shrub trim work. To help minimize costs, summer student laborers are employed.

Most of the urban trees are residuals from natural stands that were preserved during building construction. Threats to these trees typically include wounds inflicted from lawnmowers and weed eaters. Greater protection of these trees can be attained by the use of mulch, prohibiting parking from an area around the trees equal to the tree's crown, and the placement of trunk guards around the base of the trees. When used properly, mulch provides protection from damage by reducing the need for mowing and weed cutting near the tree's roots and trunk. Mulch should be applied to a weed-free area in a layer that is generally three to four inches thick. Piling mulch close around the tree trunk or putting down too thick of a layer creates an environment that promotes fungal growth and decay and should be avoided.

In areas where new or replacement landscaping is required, the focus of grounds maintenance should be implementation of the President's Executive Memorandum 50737, Use of Environmentally and Economically Beneficial Practices on Federally Landscaped Grounds. Benefits of using regionally native plant species are that they are more likely to thrive, often require less fertilizer and pesticides, and are less likely to invade new habitats than non-native species. In addition, native plants provide an important source of food and shelter for wildlife in urban environments.

Figure 3-8. Locations of Bird Boxes, Duck Boxes, and Proposed Duck Impoundment at HPDTA

Table 3-5. Trappers, Wildlife Damage Control Contractors, Animal Rehabilitators, County Animal Damage Control Officers, and NCWRC Wardens and Biologists Serving Perquimans County, North Carolina.

Name	*Status/Location*	*Phone*
Thomas Stanton	Perquimans Co. Animal Control Officer, Hertford	252-426-5751
Tri-County Animal Shelter	138 Icaria Road, Tyner, NC	252-221-8515
Dale Davis	NC Wildlife Resources Commission	252-482-7701
Chris Turner	NC Wildlife Resources Commission , Biologist	252-221-9961
William Hamrick bhamrick@vet.uga.edu	Southeast Cooperative Wildlife Disease Study College of Veterinary Medicine The University of Georgia	706-542-3432
James Claude Cumee Jr.	Southeast Cooperative Wildlife Disease Study College of Veterinary Medicine The University of Georgia	706-542-1741
Michael Kevin Keel	Southeast Cooperative Wildlife Disease Study College of Veterinary Medicine The University of Georgia	706-542-1741
James E. Trever Licensed home wildlife rehabilitator *jim_trever@yahoo.com*	North Carolina, Eastern region, Craven County (New Bern) *Wildlife Species:* rehab. of Eastern Gray squirrels and flying squirrels	252-466-2902
Jason Wood Licensed home wildlife rehabilitator *LogrHead1@aol.com*	North Carolina, Eastern region, Dare County (Manteo) *Wildlife Species:* sea turtles, some raptors, songbirds, waterfowl, mammals	252-473-4587
Eastern Wildlife Center, Inc. *Easternwildlife@aol.com*	North Carolina, Eastern region (Greenville) *Wildlife Species:* admit all wildlife, raptor surgery	252-758-8719
Elizabeth Hanrahan (Director) Ocracoke Wildlife Rehabilitation, Rescue, and Education ocracokebirdworld@earthlink.net	North Carolina, Eastern region, Hyde County (Ocracoke) *Wildlife Species:* Birds: Waterbirds, shorebirds, waterfowl, turtles and native snakes, sea and palegic birds	252-928-7132
Lee Anne Sinnott Licensed home wildlife rehabilitator	North Carolina, Eastern region (Kinston) *Wildlife Species:* raccoons, squirrels, and other small animals, owls	252-208-1442
Ellen L Westermann The WildARC of East Carolina	North Carolina, Eastern region (New Bern) *Wildlife Species:* songbirds, small mammals, raptors	252-638-4646
Vicki & Roger Waldren Critter Care *Critercare@aol.com*	North Carolina, Eastern region, New Bern area *Specialty:* Veterinary Technician, experience with mammals, birds and raptors	919-224-0663
Ed Hiestand Licensed home wildlife rehabilitator and bird bander *BirdFishrs@aol.com*	North Carolina, Eastern region (Rodanthe)	252-987-1165
Laurie Smith Licensed North Carolina wildlife rehabber *squirrelmom@alltel.net*	North Carolina, Eastern region (Sanford) *Wildlife Species:* birds, rabbits, squirrels	919-775-7852 or 919-775-8738
Carla Williams Emily's Ark Wildlife Refuge *Carlacarlita@aol.com*	North Carolina, Eastern region, Johnston County Wildlife Species: all species	919-922-1560

Under Executive Memorandum 50737, Federal agencies are directed to implement the following items where cost-effective and practicable:

- Use regionally native plants for landscaping so as to prevent the invasion of non-native species such as kudzu, phragmites, Johnson grass, and microstegium;
- Design, use, or promote construction practices that minimize adverse effects on the natural habitat;
- Reduce fertilizer and pesticide use by using integrated pest management techniques, recycling green waste, and minimizing runoff;
- Implement water-efficient practices such as the use of mulches, efficient irrigation systems, audits to determine exact landscaping water needs, using recycled or reclaimed water for irrigation purposes, and selecting and siting of plants in a manner that conserves water and controls soil erosion; and
- Create outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive.

Proper routine tree care is an important part of maintaining healthy trees in developed areas at HPDTA. Correct techniques as sanctioned by the International Society for Arboriculture (ISA) for pruning and tree planting are presented in Appendix B, Enclosure 7. Fertilizer recommendations made in the ISA guidelines should be closely followed. The Perquimans County Cooperative Extension Office furnishes soil testing kits and laboratory testing at the Soils and Agronomy Lab at North Carolina State University for a small fee.

Common Reed Control in Wetlands

Common reed is a tall perennial wetland grass that can grow as tall as 13 feet. Vertical stalks arise from rhizomes and stallions (tough horizontal shoots) that are found at or below ground level. The tendency of this species to form dense monospecific stands often results in displacement of native species that offer more beneficial values to wildlife (i.e., food and shelter) than does common reed. Common reed occurs extensively at the historic dredge disposal site on the south side of the installation in the Albemarle Sound as well as in other scattered clumps across HPDTA that have resulted from drainage ditch construction.

The best results for eradication of common reed have been achieved through a combination of herbicide applications and prescribed burning. Herbicides used to control common reed must be labeled for wetland use. Rodeo®, a glyphosate herbicide manufactured by the Monsanto Company, is such a chemical. The best time for application is in the early autumn (September to early October). A hand-pumped, low pressure, backpack sprayer should be used. The suggested application is 1.5 percent solution of Rodeo® and a 0.5 percent solution of surfactant TL-90® manufactured by Timberline Incorporated. Mechanical harvesting or burning the herbicide-killed common reed should follow in late fall or winter to remove above-ground biomass. Removal of this debris increases the effectiveness of future herbicide treatment and opens space for growth of desirable plants. Spot treatments following these same steps should be repeated during the following year to eliminate remaining plants that were not destroyed during the first year. Minimizing soil disturbance is important in avoiding re-colonization by common reed (Clark 1997).

3.9 Environmental Restoration Sites

The Navy ERP is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) releases. In addition, the ERP is responsible for considering risks and assessing impacts to human health and the environment as well as developing and selecting response actions when it is likely that a release could result in an unacceptable risk to human health and the environment. When appropriate, the EM identifies potential impacts to natural resources caused by the release of contaminants.

The Environmental Manager is also responsible for above and belowground storage tanks on the installation. In 1992, HPDTA removed 12 underground storage tanks (UST):

- Logistics or "Logs": two 5,000-gallon gasoline USTs, one 2,000-gallon gasoline UST and one 1,000-gallon No. 2 fuel oil UST
- Public Works: one 1,000-gallon heating oil UST
- Two 1,100-gallon USTs and one 1,000-gallon heating oil UST1
- Munitions: one 550-gallon heating oil UST2
- Boiler Building: one 500-gallon heating oil UST
- One 550-gallon heating oil UST3, and
- Administration Building: one 3,000-gallon UST (contents not defined).

Soil sampling for contaminated sediments was conducted and a total of 576 tons of contaminated soil was removed from all excavations and land farmed onsite. At the conclusion of the tank removal project, it was determined that contamination remained at the Administration Building, Logistics and Area 6. Records of the official closure of the sites are on file in the Environmental Compliance (EC) office at HPDTA:

- UST #1, Munitions, (no Public Notice required)
- UST #3 & UST #4, Antenna-1
- UST #5, Antenna-2
- UST #6, Administration Building, and
- Logistics or "Logs" area.

Simultaneously, the following aboveground storage tanks (ASTs) were installed as replacements:

- One 15,000-gallon gasoline AST
- One 2,000-gallon AST for Public Works
- One 3,000-gallon AST at the Administration Building, and
- Two 550-gallon heating oil ASTs at the Boiler Building and Public Works.

In 2011, HPDTA completed the abatement and disposal of above and below ground asbestos containing piping associated with concrete holding tank structures and horizontal steel tanks located at the intersection of Towers Boulevard and Fifth Street. Remediation efforts on the site have been completed which included the demolition and removal of two steel horizontal tanks and the demolition of three concrete holding tanks. All demolished tanks and materials were properly disposed of at an approved facility or recycled at an approved offsite location. The post removal inspection found no evidence of environmental damage or hazardous material that could pose a future environmental threat.

IV. SUMMARY OF MANAGEMENT RECOMMENDATIONS

Natural resources management recommendations for HPDTA include guidelines that will help ensure that natural resources management maintains regulatory compliance and incorporates principles of ecosystem management, as well as a number of specific projects that will enhance and protect the natural resources at HPDTA. Each recommendation is assigned to one of three categories.

- **Environmental Compliance** - Environmental compliance recommendations are defined as those recommendations that are based on some type of compliance issue. The compliance issue may involve state or Federal regulations (including Executive Orders). Other environmental compliance recommendations may be based on specific requirements for a permitted activity.

- **Environmental Stewardship** - Environmental stewardship recommendations include actions that demonstrate the Navy's commitment to being the best possible stewards of the land entrusted to its care and to maximize the extent to which it manages its natural resources for multiple uses.

- **Environmental Awareness** - Environmental awareness recommendations are for those activities which serve to educate the public and DOD personnel about the natural resources entrusted to the care of the Navy.

A schedule for implementation of recommended projects (Table 4.1) follows the recommendation summary. The prime legal drivers, Navy assessment level (described in the Chief of Naval Operations Navy *Environmental Requirements Guidebook*), a cost estimate, and potential funding source are identified for each action. Natural resources program administration and day-to-day program activities are not included in the table.

Table 4.1. Project Implementation Schedule including Planning Cost Estimates for Specific Tasks.

Recommendation #	Project Description	Prime Legal Driver[1]/ Initiative	Navy Assessment Level[2]	Cost Estimate	Funding Source[3]	Date (FY)	Date Project Completed	Comment
EC-1	Develop a NEPA Project Inventory which outlines the natural resource impacts associated with each project. Required to evaluate the environmental issues related to all proposed installation actions following the procedures contained within all applicable Federal Regulations and instructions, as well as with other applicable laws, ordinances, rules, and policies: CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Part 1500-1508), Section 102(2) (c) of the NEPA of 1969, DON regulations contained in 32 CFR Part 775; OPNAVINST 5090.1C (Chapter 2) and Environmental and Natural Resources Program Manual, September 9, 1999.	*40 CFR Part 1500-1800*	1	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring	Update inventory list prior to the finalization of the proposed project NEPA document. All NEPA documentation should be completed during the preliminary project design phase (generally not to exceed 35% design phase).
EC-2	When construction activities cannot be avoided within wetlands or Waters of the U.S., a jurisdictional determination and verification with the U.S. Army Corps of Engineers should be completed before proceeding.	*Section 404 of the Clean Water Act and Executive Order 11990: Protection of Wetlands.*	1	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring	Wetland delineations should be performed during the planning stage of all proposed actions. Military construction and other mission-related activities should avoid wetlands and Waters of the U.S. located on the installation. When construction activities cannot be avoided within wetlands or Waters of the U.S., a jurisdictional determination and verification with the U.S. Army Corps of Engineers should be completed before proceeding in accordance with *Section 404 of the Clean Water Act* and *Executive Order 11990: Protection of Wetlands*.
EC-3	Military construction and other mission-related activities must be reviewed and comply with all applicable Federal, state, and local erosion and sediment control measures and stormwater pollution plan requirements.	*Title 15A, North Carolina Administrative Code, Chapter 4*	1	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring	All appropriate sediment and erosion control plans and best management practices should be addressed initially during the planning and design stages of a proposed action and implemented throughout construction.
EC-4	Consistency reviews should be filed with the North Carolina Coastal Management Commission (NCCMC) whenever military construction (including breakwaters) is planned within 75 feet of the shoreline on HPDTA.	*North Carolina Coastal Area Management Act of 1974 (G. S. 113A- 100 et seq.)*	1	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring	Consistency reviews must be completed as part of the appropriate NEPA documentation during the planning stages of a proposed action.
EC-5	The *Best Management Practices For Forestry in the Wetlands of North Carolina* manual should be consulted and closely followed, particularly whenever any forestry activity occurs on hydric soils on the installation.	Best Management Practices	2	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring	Refer to best practices as outlined in the *Best Management Practices For Forestry in the Wetlands of North Carolina* manual and appropriate recommendations for the specific proposed forestry efforts.
EC-6	Obtain and keep on file, all attainment or non-attainment documentation of all former UST site monitoring wells on HPDTA.	OPA	1	$500	O&MN	2006	Action Completed	Recommendation completed. No further action required.

Recommendation #	Project Description	Prime Legal Driver[1]/ Initiative	Navy Assessment Level[2]	Cost Estimate	Funding Source[3]	Date (FY)	Date Project Completed	Comment
EC-7	Use prescribed burning to reduce hazardous fuel accumulations, manage wildlife habitat, prepare sites for seeding and planting, control undesirable vegetation, improve access and aesthetics, encourage oak regeneration, and thin overstocked natural loblolly pine regeneration. Ensure that all prescribed burning is conducted in accordance with the guidelines established by HPDTA's Fire Chief and burn permit authorizations.	Best Management Practices	2	Project Dependent (variable cost)	ENG/ENV	2012-2017	Recurring – Yearly Evaluations	All prescribed burning plans and best management practices should be addressed initially during the planning stages of a proposed action. Prescribed burn plans and smoke management plans should be carefully developed for each event in accordance with the guidelines established by HPDTA's Fire Chief and burn permit authorizations. In addition, establish a cooperative agreement with NCFS to ensure that there are no misunderstandings in the future regarding state fire suppression assistance on HPDTA.
EC-8	Create a project task for BASH efforts to reduce potential bird aircraft strike hazard by controlling the Canada goose population on HPDTA. Harassment, egg addling, and removal are recommended measures of control.	*Department of Navy OPNAVINST 5090.1C Chapter 22*	2	$25,000	ENV	2007	Action Completed – 2007 Recurring – Obtain Yearly Permits	HPDTA's BASH program is designed to identify and communicate hazardous conditions; establish operating procedures to avoid high hazard situations; and establish guidelines to eliminate, control, or reduce environmental factors that attract birds to the airfield.
EC-9	Contact USFWS for technical assistance and information regarding the Migratory Bird Treaty Act. According to 50 CFR Part 21 - Congress determined that allowing incidental take of migratory birds as a result of military readiness activities is consistent with the MBTA and the treaties.	*Department of Navy OPNAVINST 5090.1C Chapter 22*	2	Limited Cost	ENV	2007	Action Completed – 2007 Recurring Yearly Coordination	
EC-10	Complete a nearshore environment survey and assessment to evaluate the Atlantic sturgeon (Federally endangered) and American eel (Federal species of concern), Blueback herring, and alewives populations.	*Endangered Species Act*	2	Project Dependent (variable cost)	ENV	2012	To be initiated	Complete survey and assessments in coordination with USFWS.
EC-11	Complete migratory bird surveys following the guidance in the DOD coordinated bird monitoring plan.	*Endangered Species Act*	2	Project Dependent (variable cost)	ENV	2012	To be initiated	Complete survey and assessments in coordination with USFWS.
EC-12	In order to address climate change issues on the installation, a survey of pollinators which inhabit HPDTA should be completed.	Best Management Practices	2	Project Dependent (variable cost)	ENV	2012	To be initiated	Complete survey and assessments in coordination with USFWS.
EC-13	Complete a bat acoustic survey for the installation.	*Endangered Species Act*	2	Project Dependent (variable cost)	ENV	2012	To be initiated	Complete survey and assessments in coordination with USFWS.
ES-1	Control invasive species (both flora and fauna species) across the installation using approved management practices (i.e. control phragmites invasions at drainage ditches) including use of a wetlands approved herbicide, prescribed fire, and mowing without disturbing the soil.	*Executive Order 13112*	1	$25,000	O&MN	2012-2017	Recurring	Regionally native plant species are more likely to thrive, often require less fertilizer and pesticides, and are less likely to invade new habitats than non-native species. These activities should be incorporated into a yearly maintenance schedule.

Recommendation #	Project Description	Prime Legal Driver[1]/ Initiative	Navy Assessment Level[2]	Cost Estimate	Funding Source[3]	Date (FY)	Date Project Completed	Comment
ES-2	Develop an operations and maintenance standard operating procedure for proper drainage of ditches that includes best management practices for minimizing soil disturbance as well as control of invasive species.	*President's Executive Memorandum (EM) 50737*	1	Limited Cost	O&MN	2010	Recurring	Proper drainage ditch maintenance allows for reduced erosion and sedimentation in the drainage channels while serving as a means of controlling invasive species. These activities should be incorporated into a yearly maintenance schedule.
ES-3	Prepare a Shoreline Protection Plan for the Pirates Cove erosion area including conceptual plans for shoreline erosion control measures. The EM should provide expertise and acquire proper permits and documentation for the Proposed Action.	*Clean Water Act, Sikes Act Improvement Amendments*	2	$200,000	O&MN	Anticipated 2013/2014	Under Evaluation	Proposed 900 linear feet of wooden bulkhead installation.
ES-4	Prepare a Shoreline Protection Plan for the Recreational Beach erosion area including conceptual plans for shoreline erosion control measures. The EM should provide expertise and acquire proper permits and documentation for the Proposed Action.	*Clean Water Act, Sikes Act Improvement Amendments*	2	$12,000 (Bathymetric Surveys Only)	O&MN	Anticipated 2013/2014	Under Evaluation	A cost of $1,000 per linear foot of structure is a useful planning estimate. The exact location, dimensions, material quantities and final costs of the proposed systems will depend on a site survey and an assessment of bottom conditions.
ES-5	Prepare a Shoreline Protection Plan for the Cypress Cove erosion area including conceptual plans for shoreline erosion control measures. The EM should provide expertise and acquire proper permits and documentation for the Proposed Action.	*Clean Water Act, Sikes Act Improvement Amendments*	2	$30,000	O&MN	Anticipated 2013/2014	Under Evaluation	A structure in this location may alter the drainage of the installation; therefore additional studies need to be completed to determine the most ecologically beneficial shoreline erosion management strategy at this location.
ES-6	The HPDTA Environmental Manager will develop a base wide forestry management plan. As part of this effort, the Natural Resource Manager will perform ground reconnaissance on timber stands, develop a priority treatment recommendation plan, coordinate timber harvesting activities and natural regeneration or planting.	*Sikes Act Improvement Amendments*	2	$60,000	ENV	Anticipated 2013	Under Evaluation	Due to the additional land purchases over the last several years, HPDTA will complete an updated base wide forestry management plan.
ES-7	Continue participation in the DMAP sponsored by the NCWRC.	*Deer Management Assistance Program (DMAP) sponsored by the NCWRC*	2	Limited Cost	ENV	2012-2017	Recurring – Yearly Reporting to NCWRC	Continue to collect sex and age of harvest, weight, and antler development annually from a hunter check station at HPDTA.
ES-8	Coordinate with local forester to perform ground reconnaissance on timber stand treatments. Conduct highest priority treatments for forest health.	*Sikes Act Improvement Amendments*	2	Limited Cost	ENV	Anticipated 2014	Under Evaluation	These efforts will be evaluated as part of the development of the updated base wide forestry management plan.
ES-9	Conducted timber harvesting and use natural regeneration or planting to create a stand with a mid-story canopy to provide multiple layers of a visual barrier in stands where visual screening and sound buffering is important.	*Sikes Act Improvement Amendments*	2	$50,000	ENV	Anticipated 2014	Under Evaluation	These efforts will be evaluated as part of the development of the updated base wide forestry management plan.
ES-10	To facilitate the deer harvest, plant food plots of grain sorghum, corn, sunflowers, alfalfa, and ladino clover to create high energy and protein sources for white-tailed deer in the abandoned agricultural fields. Areas not converted to food plots would be well suited for establishment of warm season grasses such as eastern gama grass, prairie cordgrass, and/or switchgrass.	*Sikes Act Improvement Amendments*	2	$25,000 (Materials Only)	PW	2012-2017	Recurring – Yearly	These activities should be incorporated into a yearly maintenance schedule.

Recommendation #	Project Description	Prime Legal Driver[1]/ Initiative	Navy Assessment Level[2]	Cost Estimate	Funding Source[3]	Date (FY)	Date Project Completed	Comment
ES-11	Monitor the number of deer harvested each year in each sex and age group.	*Sikes Act Improvement Amendments*	2	Voluntary by hunters	ENV	2012-2017	Recurring – Yearly Reporting to NCWRC	These activities should be incorporated into a yearly maintenance schedule.
ES-12	Monitor the deer population using the spotlight census technique to obtain an estimate of deer density.	*Sikes Act Improvement Amendments*	2	$5,000	ENV	2012-2017	Recurring – Yearly	These activities should be incorporated into a yearly maintenance schedule.
ES-13	Continue to strive to preserve habitat for cavity-nesting birds and mammals.	*Sikes Act Improvement Amendments*	2	$5,000	ENV	2012-2017	Recurring – Yearly	These activities should be incorporated into a yearly maintenance schedule.
ES-14	Defer mowing of the abandoned agricultural fields until early to mid-July, allowing the first wave of nestlings to fledge, and then mow to stimulate new growth and allow for re-growth for the following winter and spring.	*Sikes Act Improvement Amendments*	2	$10,000	O&MN, ENV	2012-2017	Recurring – Yearly	These activities should be incorporated into a yearly maintenance schedule.
ES-15	Leave dead and down woody debris to provide important habitat for small mammals and herpetofauna. Minimize forest fragmentation to benefit forest interior species such as neotropical migrant birds. Adjacent stands should be different in age by at least seven years.	*Sikes Act Improvement Amendments*	2	Limited Cost (policy in place)	O&MN, ENV	2012-2017	Recurring – Yearly	These activities should be incorporated into a yearly maintenance schedule.
ES-16	Gypsy moth traps have been placed by the NC Department of Agriculture and Consumer Services. Coordinates are provided to us by the NCDA&CS contractor placing the traps. The traps are to be on base until August 2013. They will be picked up then by the NCDA&CS representative for them to count.	*Sikes Act Improvement Amendments*	2	No cost to HPDTA	NCDA&CS	2012-2017	Recurring – Yearly	These activities are dependent on the NCDA&CS gypsy moth sampling schedule.
EA-1	The HPDTA Natural Resource Manager review a deer hunting policy annually and encourage increased participation in white-tailed deer hunting by developing a "one doe before a buck" policy for eligible hunters.	*Sikes Act Improvement Amendments*	2	Limited Cost (policy in place)	ENV	2012-2017	Recurring – Yearly Policy Review	Yearly Policy Review
EA-2	Inform all security and natural resources/ environmental staff of points of contact for animal control and rabies testing.	*Sikes Act Improvement Amendments*	2	Limited Cost (policy in place)	ENV	2012-2017	Recurring – Yearly Policy Review	Yearly Policy Review
EA-3	Prevent the dumping of concrete or other fill along the shoreline. Any addition of fill or removal at these sites would require a U.S. Army Corps of Engineers permit and a Consistency review filed with North Carolina Coastal Resources Commission.	*Clean Water Act, Sikes Act Improvement Amendments*	1	Limited Cost (policy in place)	ENV	2012-2017	Recurring	Evaluated on a specific project-by-project basis.
EA-4	HPDTA will maintain an Environmental Management System (EMS) in which every natural resource program will have an Environmental Management Policy that will state specific training plans and standard operating procedures for the preservation of natural resources within the installation.	*Executive Order 13148*	1	$100,000	ENV	2012-2017	2009 - Recurring Semi-Annual EMS updates	These activities should be incorporated into a semi-annual update schedule.

[1] Legal Drivers and Initiatives: CWA-Clean Water Act, 33 USC 1251-1376; SAIA-Sikes Act, 16 USC 670a et seq.; OPA-Oil Pollution Act, 33USC 2701 et seq.; BASH-Bird Aircraft Strike Hazard; EO11990- Protection of Wetlands; EO 13112- Invasive Species;

[2] Navy Assessment Level: Navy
Level 1 requirements are those prescribed by laws, regulations, and Executive Orders. These projects or ongoing efforts are necessary to maintain compliance or correct situations that are currently out of compliance.
Navy Level 2 requirements are derived from DOD or Navy policy.

[3] Fund Source: O&MN, Operations and Maintenance, Navy; FOR, Forestry; AG, Agricultural Outleasing.

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APPENDICES

APPENDIX A - Agency Coordination
- 2008 – 2014 USFWS Federal Fish and Wildlife Permit
- NCDENR Hunting Reports

APPENDIX B - Sample Prescribed Burning Plans

APPENDIX C - HPDTA Base Hunting Policy

APPENDIX D - Flora Species Occurring at HPDTA

APPENDIX E - Fauna Species Occurring at HPDTA

APPENDIX F - Fin Fish and Shellfish Species Occurring in the Perquimans River and Albemarle Sound

APPENDIX G - National Bald Eagle Management Guidelines (USFWS, May 2007)

APPENDIX A – Agency Coordination

- Agency Coordination
- 2008 – 2014 USFWS Federal Fish and Wildlife Permit
- NCDENR Hunting Reports

Claudette Twichell

From: Finnegan, John [john.finnegan@ncdenr.gov]
Sent: Wednesday, May 16, 2012 11:05 AM
To: claudette@solsticeenv.com
Subject: RE: NHP interactive data request
Attachments: HPDTA.zip; Perquimans_Status_List.xls

Claudette,

Attached is an updated county status list for Perquimans County.

I've also attached a zipfile with two shapefiles, nheo_HPDTA and snha_HPDTA, if you have GIS capabilities. The shapefiles contain records for element occurrences and natural areas, respectively, that occur within 2 miles of the HPDTA. I've also included documents describing the shapefiles.

If you need more information or prefer the data in another format, please let me know.

John

John Finnegan, Conservation Information Manager
919 707 8630

North Carolina Natural Heritage Program
Office of Conservation, Planning, and Community Affairs
North Carolina Department of Environment and Natural Resources
1601 MSC
Raleigh, NC 27699 1601

From: Claudette Twichell [mailto:claudette@solsticeenv.com]
Sent: Tuesday, May 08, 2012 4:20 PM
To: Finnegan, John
Cc: 'Hpdta Env Saf'
Subject: NHP interactive data request

Mr. Finnegan:

In 1997, the Sikes Act (16 USC 670 a-f) was amended whereby Department of Defense (DoD) installations shall obtain mutual agreement on their Integrated Natural Resources Management Plan (INRMP) from the U.S. Fish and Wildlife Service and the cognizant State fish and wildlife agency concerning the conservation, protection, and management of fish and wildlife resources. The Sikes Act is the DoD's basic legislation for managing its natural resources.

The Harvey Point Defense Testing Activity (HPDTA), located in Perquimans County, North Carolina is currently updating their existing Integrated Natural Resources Management Plan for

the years 2012 through 2017 to document the condition of natural resources for which they are stewards as well as document basewide natural resource management practices. In an effort to continue the positive relationship that HPDTA has with your agency, HPDTA is respectfully requesting any information or issues pertaining to natural resources or regulatory compliance that your office would like to see addressed in the updated INRMP document currently being drafted.

In an effort to update the INRMP document, I tried accessing the North Carolina Natural Heritage Program Species List for Perquimans County http://portal.ncdenr.org/web/nhp and the website stated that the site was temporarily unavailable. HPDTA has a list dated 2006 (attached for your reference) and was wanting to determine if any changes have been made to this list. Is there a process in place to request an updated data list of species?

Thank you for assisting HPDTA with the conservation and management of fish and wildlife resources under their stewardship. If you have any questions regarding this request, please do not hesitate to contact me directly at 757.408.0023 or via email at claudette@solsticeenv.com.

Cheers,
Claudette

<<...>>

Claudette L. Twichell, Ph.D.
President
Solstice Environmental, LLC
800 Sandoval Drive
Virginia Beach, Virginia 23454-6544

Office & Mobile Phone: 757.408.0023
Fax: 866.783.5282
Email: claudette@solsticeenv.com

<<...>>

RECEIVED JAN 09 2008

INSTRUCTIONS FOR APPLICATION OF FEDERAL DEPREDATION PERMIT

1. Complete the FEDERAL FISH AND WILDLIFE LICENSE/PERMIT APPLICATION FORM (FORM 3-200-13; front and back). Answer all questions and be as specific as you can in your answers.

2. Once you have completed the application form, send the following to the U. S. Fish & Wildlife Service:

   + MIGRATORY BIRD Dl\MAGE PROJEcr REPORT (ADC-FORM 37). I have included: Part 1 - Permitting Agency {USFWS) and Part 4 - Re5ource owner copy for your records. This form is recommended only throuqh UDSA APHIS-WS.

   • Completed FEDERAL FISH AND WILDLIFE LICENSE/PERMIT APPLICATXON FORM (FORM 3-200-13). You complete this form. Be su e to inciude your signature and date in block 6 and 7. Thi5 form can be found at: http://www.fws.gov/forins/3-200-13 .pdf

   • A processing fee is required for most migratory bird permit applications. I?ro6essing fees range from $50 to $100 depending on the type of permit for which you are applying. The fe to prooess most migratory bird depredation permit applications is $100.00. This faa applies to new pennit applications and permit renewals. The fee to process a substantive amendment to an existing valid permit is $50.00. Substantive amendments are those that pertain to the purpose and conditions of the permit and are not purely administrative. Administrative changes, such as updating name and address information, are required under 50 CFR 13.23(c), and such amendments do not require a fee. The on1y exoeption to the cost of the perm.it is if you are a private homeowner requesting a permit to address damage to your personal residence or property, the permit application fee is then $50.00. There is no fee for amendment of a homeowner depredation permit. In addition, the application fee does not apply to any federal, tribal, state or local government agency or to any andividual or institution acting on behalf of such agency for the proposed activities.

Mail application to: Migratory Bird Permit Office, U. S. Fish and Wildlife Service, P. O. Box 49208, Atlanta, GA 30359.

If you have any questions regarding completion of the application, call the U. S. Fish & Wildlife Service directly. The cont.act in t.he Migratory Bird Permit Office is Ms .Carmen Simonton at 404-679-7049.

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL ANO PLANT HEALTH INSPECTION SERVICE
WILDLIFE S:F.RVICES

RECEIVED JAN 0 9 2008

MIGRATORY BIRD DAMAGE PROJECT REPORT

X RENEWAL

Permit No: MB 164478-0

1. Name, Address, and Telephone Number
(P.O.C) Paul Hunter
Harvey Point Defense Testing Activity
2835 Harvey Point Road
Hertford, NC 27944

Telephone O Home Work (252) 426-2811

2. Location of Damage

Airport Property at location 1B

3. County
Perquimans

4. State
NC

Ci RESOURCE/DAMAGE ESTIMATE

A.. Resources Damaged

Potential for aircraft/bird strike hazard

B. Description ofDam!1£e

Potential Bird strike hazard

6. MIGRATORY B!R.D SPECIES Depredating Species	Number Involved	7. PERMIT RECOMMENDATION Take Rttommendation	Number Recommended	Methods
1. None	Open	X Yes O No	Minimum	Minimum number aml p c)cs to protect aircraft/passengers.
2.		O Yes O No		
3.		O Yes O No		
4.		O Yes O No		

8a: PREVIOUS.ACTIONS TO ADDRESS PROBLEM AND RESULTS OF THOSE ACTIONS:

Pyrotechnics and physical chase are typically used to disperse birds from runway and airport areas. See attached application provided by cooperator.

Sb. COMMENTS:

USDA APHJS WS recommends a depredation permit be issued allowing for the lethal removal of any birds that are determined to be a flight hazard for planes along the airport runway and adjacent facilities; *minimum numbers and species to protect aircrtift is recommended.*

No take of threatened or endangered species is allowed.

9- RECOMMl?,NDED ACTIONS

Action:

X Harassment X Habitat Alteration D Husbandry X Exclusion X Lethal trapping O Chemical repeJlent

O Capture and relocatio n X Egg/nest destroction X Other: Take minimum numbtr of spedes, except T&E species.

1OA. WS Investigator Na me and Addre:is: *(Print)*
Darbafa Schcllingcr
6213 E Angus Drive
Raleigh, NC 27617

Tekpltont:: Number: (919) 786-4480 x 225

Email :barbara.Lschelling er @aphis.usda gov

1OB. WS Investigator Signature

Dale: January 7, .2008

WS Fonn 37S

Part 4
your copy

RECEIVED JUL 21 2008

North Carolina Wildlife Resources Commission

SPECIAL AIRPORT DEPREDATION PERMIT

Pamela Klepec
Env. Manager
Harvey Point Defense
2835 Harvey Point d
Hertford, NC 27944

TE

and Airport personnel, or other individuals under written contract and under direct supervision of the pennittee are authorized to remove or take small mammals and deer on the airport property subject to the following conditions:

CONDITIONS
:

1. All individuals exercising the authority granted by this pennit shall carry a copy of the permit and a letter of authorization from"the pennittee listed above while conducting activities:
2. Animals posing an immediate or potential threat to the safe operation of the Airport may be removed or taken to remove the threat at anytjme by Airport personnel.
3. The NCWRC recognizes hunting as an acceptable way to reduce animal populations on the property of the Airport. However, this pennit does not authorize the hunting of deer on airport p.roperty without adherence to the established Local and State regulations pertaining to deer and deer hunting.
4. All small mammals and dee.r which are removecl by lethal m thods shall be disposed of in a sanitary manner on the airport property; or, deer may be donated to a charitable organuation for human consμmption. Raccoons, foxes, coyotes. skunks, and bats must be released at the site of capture o.r eutharozed. Relocation of raccoons, fo"Jf.es, coyotes, skunks and bats is prohibited
5. An annual report of all activities including date of km, numbers killed, sex, antler development and disposition is required within fifteen (15) days after the expiration of this permit.

DATE ISSUED: ;,,.,;Ju=-lyr.......;1=8_._, 2=0"""0s..

DATE EXPIRES: December 31. 2008

AUTHORIZED BY:

David T. Cobb, PhD, Chief
(919) 707-0060

tlm

cc: Tammy Minchew, Division of Wildlife Management
Division of Wildlife Enforcement

D-1 Biologist

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUJrnORlIY•ST ATUTf.S
16 USO 703-712

AEQAAJI()f<S
50CFR 13
50CFR21.41

l.PVUTIIE

HARVEY POINT DEFENSE TESTING ACTIVITY
2835 HARVEY POINT ROAD
HERTFORD, NC 27944
U.S.A.

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MB164478.0

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06/11

I NAME ltHOTm.ECW PRNCltM. OffCER
PAULA ARON HUNTER
NATURAL RESOUCC MANAGER

l.n'PE*OF* Pl:.RMT
DEPREDATION AIRPORT

tO. lOCAOON WHERE AUT»OR.CU:DACTMTV MAY BE CONDUCTED
AIRPORT PROPERTY

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A. GfNEAAI. CONOffiONS SETOUT IN SU89AAT0OF50CJ"R 1L AND$PE.C\fl0CONDmoNS CONTA.t.IEO IN FtotAAI.R£<M.ATK>HS CtltO IN 8t.OCK 12 A80\lt. *AAE.* HE:Af8V MADE APART OF Tli$ PERMtr.M.LACTMTIUAUTHOAIZtD HEIUIN MUST 8E CAAAIEO **our** IN ACCORD wrrHNfD FOR Tii£ PURPOses DESCRI8(.0 IN rue APPUCATION SU8M11TED. CONTNJeOV/IU)ITY, OR EWA&..*OF* nfOSPf.RMITtSSUUCTTO COMPUTE *AHO* TMa.Y COMPLIANCE WITH AU.N'PIJCAS&.E CONOO'IOHS.INCUJOING THE fiUNO Of AU.RtOUIRCO INFOAMATIOH ANO AEPORTS..

I. THIVM.DTY 0# nlS flVtMl1" ISALSO COHOfn)H(O *l..POH* STRICT OOURVNfa OF N.LAPPUCAIU: fOA:EliH. STATE. LOCAL OR 011ifft fEOERA&. LAW.

C. V.M.O FOR US!8Y KRMITTEE HAMl£O ABOVE.

D. You are authorized to take, temporarily possess, and t1ansport the migratory bltds specified below to relieve or prevent injurious situations Impacting public safety. All take must be done as part of an Integrated wlldlife damage management prog1am that emphasizes nonlethal management techniques. You may not use this authority for situations Inwhich migratory bds are merely causing a nuisance.

(1) The following may bo lelhaly .ken:

MClimum numbers and species.

(2) The following may be live-trapped and 1eloeated:

Mmlmum numbers and species.

E. You are aUU>or1ted lJ1emergency sftuatlons only to take, trap,°' relocate any migratory birds, nests and eggs, lndudlng species that are not sted In Condition D (except bald eagles, golden eagles, or endangered °''Ihreate species) when the mlgratCH)' birds, nests, °' eggs are posing a diree1 threat to human safety. A dreci threat to human 11fety is one which Involves a th1eat of sotlous bodily mjury or a risk to huimn lao.

You must report any emergency take aciMty to your migratory bifd permit issuing office at 404-079-7070 v.ithln 72 hours atter tho emergency take ae1ion. Your report must Include the species and number of birds taken, method, and a complete description of tho circumstances warranting lhe emergency acilon.

F. You. re authorized to $1lvage and temporarily possess mlgratCH)' bltds found dead°' taken under thls permlt fQ((1) disposal, (2) transfer to the US. Department of Agricll ure, (3) aiagnostic purposes, (4) purposes or llairmg airport personnel, (S) do natlon to a public charity (those suitable for human coosumption). °'(6) donation to a public scientific or edl!Cltion•l iMtitution as defined In 50 CFR 1012. Any dead bald eagles°' golden eagles salvaged

181 ADOmOrW. CONDITIOl<S N>OAIJTl<ORIZATIOHS Al.$01oPPt.Y

2. REPORTINOR EOUIAEUf:NtS
ANNUAL REPORT DUE: 1/31
1/31

ISSUED BY

TIII.E
FOR: Mo. MIGRATORY BIRDS & STATE PROGRAMS

DATE
06/1112008

muSI bereported within 48 hoots to the National Eagle Reposftoty•t r.03) 287-2110 and to the migratory bird penn\ Issuing office 11404-679-7070. The Reposaory w\11 P<oWle d•edions for slllpment of IMso specimens.

G: You may not **salvage** and must imme<fsately report to U.S. Fish and *Wll<Me* SeM<e Law Enf0<cement ony mlg'"tO<Y birds lhot **oppear** to """" bttn poisoned, sho or other. Ase Injured as the result of crminal acjJyity.

H. You may use the following methods of lal<e:(1) f•eanns;(2) nets;131 registered animal drugs (excluding nic:ait>uln). pesticides and repellents; **(4)** falconry abatement and (5) legal lethal and live traps (exdudlng polo traps). B scaught five may be eulhanlted or transpotled and relocated to anolher site approved by lhe apptoprbte State wildlffo agency, requ red. When using firearms, you may use lilies°' air rifles to shoot any bird When you detonnino lhat lhe use of **a** shotgun I$ Inadequate lo resolve tho Injurious situation. The use of any of the above techniques Is at yoor discretion for each **situation.**

I. You may tempo rarily possess and stabi ize sidt and Injured mig ratory birds and Immediately transport them to **a** federally neenstd rehabllitstor ro care.

J. The following subperminees are authorized: any other personWho Is (1) employed by or under contrad to you for the activities specified Int is permit, or (2) otherwise designated a subpermittee by you In writing, may exordso the authority of this permlL

K You and any subpermittee(s) must comply with lhe attached Standard Conditions *for* MJgratory Bird Depredation Permits

For suspected Illegal ocUvity, Immedlatety contact USFWS Law Enlorcement at: 404·763-7959.

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FEDERAL FISH AND WILDLIFE PERMIT

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HARVEY POINT DEFENSE TESTING ACTIVITY
2835 HARVEY POINT ROAD
HERTFORD, NC 27944
U.SA.

2. AU'THORf'TY-STATI\ITES
16 USO 703-712

REGULATIONS *(A:l«:htd)*
50 CFR Part 13
50 CFR 2141

3..NUMB£R
MB164478-0

4. RENEWADt.E
1:83 s
O NO

5.MAYCOPY
1:83 —
O NO

8..EffECTIVE
04/0112009

7.EXMES
..0313112,0JO _

8.NAMEANOTm..E OfPRIHCIPALOFfICER *(t•tts·*
PAULAARON HUNTER
NAIURAI. RESOUCEtMNAGER

t.'l'll't!OFPERMIT
DEPREDATION -AIRPORT

10.LOCATIOH \'MERE MmiORctmACTMfY MAY8ECONOOCTEO
AIRPORT PROPERTY

1t,CONOmONS AND AU™OIUZA110.HS :

A GEHERAI.COHDmONSseTOUTIHSU8PAAtOOFS0 ·13. AAO ICCONomoHSCOtn'AINEOINFEDEIW..AECIAAt10t4SCITEOIN BLOCK *I'I* ME. HEREBY w.-DE APART OF nusPERMIT. AU.ACTMn£SAUT»ORIttD HERE.IN MUST 8ECAAftltD OIJT IN ACCORO'MTH AHO FOR TliE PURPOSES DESCRIBED IN ntE APPUCATION SUSMITTED.COHTINUEDVAUOITY, ORRE.HEWN..OF THIS PERMIT IS SUBJECT TO COMPLETENKJ may COMPLWfCe wmtAU.*APPUCABl.E* CONOmoNS. INQ.UOINGTIE FLIHO *OF* ALL RE01.ME.D INFOIUMTION AND REPORTS.

8. THE VAUDfTY OF THI$ fERMIT ALSO CONomom:oUPON ST1UCt OBSERVANCE *OF* ALL ,t.pPUCA8t.£ FOREIGN, $TATE, lOCAL OR OTHER FEDERAL LAW.

C. VAUOFORUSE8YPERMITTE:EHAMEOMIOVE.

D. You are authorized lotake, temporarily possess, and transport the migratoiy birds specified below to relieve or prevenl Injurious siluauons Impact ng public safely. All take musl be done as part of an Inlegraled wildlife damage management program thal emphasizes nonlethal management techniques. You may not use tls authorily for siluaUons Inwhich mlgratoiy birds are merely causing a nuisance.

(I) The foUowing may be lethaly taken: Mifllmum numbers and speclu

(2) The foRowlng may be live trapped and relocated: Minimum numbers and species.

E. You are authorited in emergency situations only to lake, trap, or relccale any mlgraloiy bds, nests and eggs, Including species that are not listed Ill CondHlon D (excepl bald eagles, golden eagles, or endangered or threatened species) when the mlgratoiy bd, nesls, or eggs are posing a direct threat lo human safely. A decl threat to human safely Is one wlch Involves allyeal of serious bo<! ly lnJuiy or a risk lo human Gfe.

T'

You must report Sir/ emergency take activily to your mlgratoiy bird permit ssuing office al 404-679-7070 wlthfn 72 hours after the emergency lake action. Your report musl Include the species and number of bds lakO<I, method, and a complele description of lhe circumstances wanan Ung lhe emergency acUon.

F. You are authorized 10 salvage and lemporarily possess m!gratoiy bds found dead or taken under this permit for (1) disposal, (2) transrer to *tho* U.S. Department of Agria Jllure, (3) diagnostic purposes, (4) purposes of lrab ng aport personnel, *(S)* donation to a pubUc charily (those suitable for human consumpUon), or (6) donation toa pubc scientific or educational institution as defined In 50 CFR tO.12. Any dead bald eagles or golden eages salvaged musl be reported v.;lhltl 48 hours lo the National Eagle Repositoiy at (303) 287·2tt0 and to the migratoiy bd permit Issuing office al 404-679-7070. The Reposltoiy will provide directions for sp ment of these specimens.

G. you may not salvage and must Imm ediately report to U.S. Fish and Wild Gfo Service Law Enforcemenl any mlgraloiy birds lhal appear lo have been

18J *ADOITIOI<AL CONIliTIOOS /WOAI/THOIUZATIONS ALSO APPLY*

2.AEPORnNC REQUIRE.MENTS
ANNUAL REPORT DUE: 1/31
1/31

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poi$oned, shot, or othel'M$o Injured as *tho* resutt of criminal adlvily•

H. You may use the followlng methods of lake: (1) fireanns; (2) nets; (3) registered animal dtugs (excludi119 nicarbazln), puUcldes and repel nts; (4) faltonry abatemen and (5) legal \hal and live traps (excluding pole traps). Birds caught live may bo euthanlzed or transported and relocated lo another site aj>pr&ied by tho appropriale Stato wildl fe agency, Ilrequired. When uslllg fireanns, you may uso rifles or air rifles to shoot any bd wllon you detennino that *tho* use of a sholguls Inadequate to resolve the injurious sltuaUon. The use of any of tho above techniques ls at your disaetion for each **situation.**

f. You may temporarily possess and stabOlze sick and Injured migratory bds and Immediately transport them to a federally licensed rehabilitator for care.

J. Tho roUowlng subpennlttees are authorized: any olhet person wllo s (1) empbyed by or under contract to you ror *tho* activities specified in tls pennit, or (2) otherwise designaled a subpenn ttee by you hwriling, may exercise tho au\horily of lhls pennit.

K. You and any subpermlttee(s) musl comply wilh lhe atlached Stand•rd CondiUons for Mlgralory Bini Depredation Permits

For suspected Illegal acUvlly, Immedlately contact USFWS Low Enforcement at: 4Q.4.76J.7959.

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AI,I1HORfIY..sTATUTES
15USO 70:1-712

Recieved

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1. PERMITTEE

HARVEY POINT DEFENSE TESTING ACTMTY
2835 HARVEY POINT ROAD
HERTFORD, NC 279«
US.A.

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4.REN&IAaE
YES
NO
5. MAY COPY
YES
NO

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08/1812010 03131/2011

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PAULAARON HUNTER
NATURAL RESOUCE MANAGER

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DEPREDATION AT AIRPORTS

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Airport property

t t. CONDmONSNGJ MlliORSl.ATIOHS:

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C. VIUJ FOR USE flY PERtMTTEE *HAMEO* ABOVE..

D. You are authorized lo lake, lemporarily possess, and transport IIIe migratoiy blrds speeif"oed below to rellovo or prevent Injurious sijualions impacting pubfic sarely. All take must bo done as part or an Integrated wildl e damage managemenl program thal emphasizes nonlelhal management lechniques. You may noluse lhls aulhority lor situations Inwhich mlgratoiy birds are merely causing a nul'8nce.

(I) The lollowing may be lethally laken: Minimum numbers and species.

(2) The following may bo live-ltapped and relocated; Minimum numbers and species.

£. You .,,, !'lemes.uations <>nly 10ta e.trap.or relocate any mlgraloiy birds.r1s and eW•. inclucf"'9 species 1hat01e not listed in Condilion D(except baldeagles, golden eagles, or endangered or lhteale<id species) when tho mlgrato<y bln!s, ne$1s, or eggs aro posing adire<:1lhtea1 10 human 5"fely. A direct lhreal lo human salely Is one which Involves a tlireat olserious bodily injuiy or a risk lo human 61e.

You musl report any emergency lake adivily 10your mlgraiiy bird permtt ssuing office al 40-41679·7070 wllhln 72 hours after lho emergency take action. Your report must Inc:ludo tho species and number or birds laken, method, and a completo descripllon of\ho circumstances warranling lhe emergency action.

F. You are •U1loo!iUd losa,.,ago and temporarily possess migralory birds lound dead or taken under lhJs permit for(\) disposal, (2) lransfer to I/lo US. OepartmenI olAgricu ure,(3) diagnostic purposes,(4) purposes oltraining airport personne {S) donalion to a public charily (\hose sullablo lor human consumption), *a* (6) donation loa public .O.ntifoc: or educational ins!Jutlon as defined In 50 CFR 10.12. Any dead bald eagles or golden eagles salvaged must be reported within 48 hOUI$ to I/lo National Eagle Reposaoiy at 303/287·2110 and lo ll>e mlgralory bln! perma Issuing off1CO al 404/67g.1010. The Reposttoiy wiD proYid'e directions lor shipm.,nl of I/lese specimens.

G. You may nol alvage and m•!I""!'edially 'report to US. Fish and Wildl fe Service Law Enrorcemenl any mlgraloiy birds thal appear to have been

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2 RUOATl<O R£ow;fMfHI S
ANNUAL REPORT DUE; 01131

ISSUED BY

TITLE
CHIEF, MIGRATORY BIRD PERMIT OFFICE - SOUTHEAST REGION

CATE
08/t 8/2010

pOlsoned, shot, or ctbeiwise as the result of aVninal activb.

H. You may use the following methods oltake: (I) firearms; (2) ne1s; (3) registered animal drugs (exdudillg nlcal1>azin), pestic:ides and repellents: (4) falconiy abatement and (5) legal lelhal and live trips {exduding polltt rapa). Birds caught IMi may bo eull>anlzed or transportOcl and relocated to 1nother sftoipproved by the appropriate Stale wildlife agency, Ilrequired. When using f•earms, you may use rifles or olr rilles to shoot any bird wllen you determine lliallleuse of a shOtgun Is Inadequate to reso!Ye lheInJ rious sftuallon. Tho use of any of Ille above techniques Is at your dlsetellon for each sftuaUon.

I. You may temporarily possess and stabMlze sick and Injured mlgratoiy birds and Immediately transport lhem to a federaUy licensed rehabintator for care.

J. Tho following subpirmittHs are authorized: any olher person wile Is (I) employed by or under contract lo you for the aclivilles spec!foed In lhls permi or (2) olhetwise designated a subpermtteo bY you Inwrilillg, may eierdse the aulhe<ity clthis permit.

K. You end any subpermlttee(s) must comply will> the attached Stadard Conditions lor Migralory Bird De11<edatlon Pennils

For suspected llleg acUvlly, Immedlatoty eontact USFWS Law Enforcement 11: Raleigh, North Carolina 9191856-478&

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FEDERAL FISH AND WILDLIFE PERMIT

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PERMITTtE

HARVEY POINT DEFENSE TESTING ACTIVITY

2835 HARVEY POINT ROAD
HERTFORD, NC 27944
USA

MBt64478

4. RENEWABLE: YES ☒ NO ☐
5. MAY COPY: YES ☒ NO ☐
6. EFFECTIVE: 04/01/2011
7. EXPIRES: 03/31/2012

e. NAME/IOnn.£OFPRWCIP.M..OFFUR ttlf it•bwi1rts:a}
PAULAAR HUNTER
NATURAL RESOUCE !MffAGER

O'M'I! PERMIT
DEPREDATION AT AIRPORTS

10. lOCATIOH WHUtf NJ™ORIZEDACTMTY MAY lf COtQ.IC'TlD
Airport proj)erty

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I. THC VliJJOrN *OF* nus P£RMIT ISALSO CONOfTtOHtO *UPOH* STRICT 08SE.RVAHCE OF N...L APPUCABU FOROGH. STAT£. LOCAL OR Onf!R FECERAL U.W.

C. VAUO 'OR ust 8Y PEIUlmU HAM(O A80VE

D. You 110 aulllorized to take, ll!mpo<arily possess, and tr.u>sport the migratory birds spedfaed below to reliovo 0< prevent Injurious situations Impacting publlc safely. *M* lake must be done as part of an Integr.aled >Wdlife damage management piogram that empllasluo nonlethal management techniques. You may not uso lhis authority f0< duallons Inv.tilch migratory blnls are merely causing a nuisance.

(1) Tho following may be lethaDy taken: MlnImum numbers and species.

(2) Tho rollowfng may be live-trapped and relocated: Minimum numbers and species.

E. You are authorized In emergency sltya!lons only to take, *trap,* or relocate any migratory birds, nests and eggs, Including species that are nolli1ted In Condillon D (except bald eagles, golden eagles, or endangered or threatened species) when tho migratory birds, nests, 0<r eggs are posing a dhect threat lo human safety. A. direct threat to human safety Is one Which Invo.'Ves a threat of se o.!'s bod'ly injury or a risk to huma''tie.

You inust report any eme<gency tal<o actMly to your migratoty bltd permtt bsuklg olfac:e 404-679-7070 within 72 hours alter the emergency tal<e action. Your report must indude the species and number of bitds tal<en, rn.thod, and 1ccmplete desaiplion of the c:ilcumstances warranting the emergency action.

F. You are aUlhorited to samgo and temporarily possess m!gratoiy birds found dead or taken under this permit for (1) dlsposal, (2) transfer to tho US. Depaitment of Agricu ure, (3) diagnostic: purposes, (4) puiposes of training airport personnel, (5) donation to a pubric scientiric or educational Institution as defined In 50 CFR 10.12, (6) donation lo persons authorized by permtt or regulaUon to possess them, or (7} donation of migratory game birds only to a publiccharity (those suitable for human consumption), Any dead bald eagles or golde neagles salvaged must be reported wlthln 48 hours to tho National Eagle Rep0sttory at (303) 287-2110 and to the migratory bird permit Issuing ofliC4 at 404-679-7070. Tho Reposttory wil provide directions for shipment of those specimens.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

2. R'!'OfITIHO IfICOUIRDIIEHTS
MJNUAL REPORT DUE: 01/31

ISSUED BY: Carmen L. Smalls

TntE: CHIEF, MIGRATOJW BIRD PEIWIT OFFICE ·sotmiEAST REGION

DATE: 08/0112011

!'.i, You may net salvage and must immediatel'/ report lo U.S. flsh and Wildlife Service Office of law Enforcement 1ny dead or injuted mlgratory t>Uds t
('"1CQU•l•t 1/111 appur to have been polscned, shot. eleclrocuted, have c:ol!ded Yillh lndlistrial power generatlon equij>menl or weie olheiwise kiled or
,. -W Hlhe resu• or potential crimlnal actMty. See USFWS OLE conlaclInlormallon below.

H You may use Ille following methods olteke: (l) firearm$; (2) nets; (3) registered animal drugs (excluding nlcarbuln), pe•tlcides and repellents; (4) lalc:onry batement and (5) legal lethatal\(I live !taps (excludng polo !tips). Blri!s caught rrYO may be eulhanlzed or ttansi>orted and relocated to another site approved by tlie appropriate State w!ldlIfo egoncy. Jf required: When using firearms, you may use rifles or air rifles to shoot any bird when you determine lhallho use of a shotgun ls Inadequate to resolve lhe injurious slfuaUon. You may use paint ballguns lo ha1" bds or deter birds onl'f when olher methods of hazing are lneffecUve.

Anyone who takes migratory birds under tho aulhority of lhis permit must oDow tho American Veterinary M<!dlcal Association Guidellnes on Eulhanasla when eulhanlzaUon of a bdls necessary (httpo/lwww.avma.orgfissues/anlmal_wellare/eulhanasia pdl).

I. You may tempo1arily possess and stablze sld< and Injured mlgratory bllds and lnvned!ate{y ttansport lhem to a federally &censed rehabilita!ot for care.

J. The lollowlng slbpermil1ees are authorized: any oilier person who Is(I) employed by or under conttact to you for lhe actMies specified In this permit. or (2) olherwlse designated a subpermitteo by you In writing, may exercise lhe 1uthority of !his petmil.

K. You and any subpennil!ee(s) must compl'f with the attached Standard Condillolls lot Migratory Bird Depredation Permits. These sl<lndard conditions are a conUnuaUon ot'youipemil con lUons ind *must* nmiiln *with your* permit

For euspocted lllcgal3ctlvlty, lmmodl1t ly conbct SFWS Law En orcomont at: 404·733·7959.

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FEDERAL FISH AND WJLDLrFE PERMIT

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HARVEY POINT DEFENSE TESTING ACTIVITY
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HERTFORD, NC 2794-1
US.A.

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OWI/2012

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PAULMRON HUNTER
NA1URAL RES0UCE MANAGER

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DEPREDATIONATAIRPORTS

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Airport property

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C. VALID FOR U$E lYfU.MJnU NAJ..«D"60\'I.

D. You are aulllorize<l lotake. temporarily possess. and ttanspOll the migratory birds specified below to relieve or prevent Injurious s ualions impacting pubGcsafety. AIJlako must be done as part or an Integral od wildlife damago management pram that emphasizes nonlethal managemenl techniques.

You may not use this authority for siluatlons In which migratory birds aro merely causing a nuisance•

(1) The following *may* be lethally taken: Minimllm numbers and species.

(2) The following *may* be Jive.tr.lpped and relocatn Minimum numbers and species.

(3) The following active nesls (including eggs) may be destroyed: Canada geese.

E. You aro authorized In ememency sjtuat!gns only to take, trap, or relocate any migralory birds, nesls and eggs, including species that are not lisle<! in Condition D (except bald eagles, golden eagles, or endangered or threatene<l specios) when the migratoiy bird$, nests,or eggs are posing a dired threat to human safety. A di.ect lllrnal lo human safety is one whleh Involves• tlvealof serious bodily injuiy 0< a risk lo human ifo.

You must report *1f1Y* emergency take actWll)I to your migralory bird permit issuing office 4 9-7070 within 72 hours after the emergeocy take actlon. Your report must Include the species and number of birds taken, method, and a complete description of the circumstances warranting the emergency actlon.

F. You are authorized to salvage and lemporarily possess migratory birds found dead or taken under tis pennil ror (1) disposal, (2) ttansler 10 tho U.S. Department of AgricoJure, (3) diignoslic pu .(4) purposes of ttalning af<port personnel. {S) donation to a public scientific or educational Institution as defined In 50 CFR 10.12, (6) donation to persons authorize<! by pennit 0< regutalion to posseu them, 0< (7) donation of migratory game b4rcls only to a pub&:charily (those subble fa<human consumption), *Any* dud bald eagles 0< golden ea9les salvage<! must be repOlle<I within 48 hows to the Notional Eagle Reposllory at (303) 287-2110 and to tho migratory b4rcl petmlt lssuil1g office at 4Q4.67&-7070. The Reposlory wil provide directions la<shipment of

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IJ,UPORTINO REQUIWU!NTS

ANNUAL REPORT DUE: 01131
You must submit a report to your Regional Migraioiy Bird Permit Office even if you hod no actMty. Report form is at w\\'\fws.gov/formsf.J-202-9.pdC

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rnu
CHIEF, MIGRATORY BIRD PERMIT OFFICE · SOUTHEAST REGION

DATE
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these spec:inens.

G. You may not salvage and must Immediately report to U.S. Fjsh and Wildlife Seivlce OfflC8 of Law Enforcement any dead or Injured mlgratoiy birds that you enccunler that appear to have been poisoned, shoL electtoeuted. have collided with Industrial power generation equipment. or were otherwise kUled or Injured as the resuk of potential aimlnal 1ctMty. See USFWS OLE contact Informa on below.

H You may use the foCow!ng methods of take: (1) lileanns; (2) nets; (3) registered animal dlllgs (Pdudlng nlcarbazin), pesllcides and repellents;(4) falconry abatement and (5) legal lethal and live traps (excluding poletraps). B&ds caughl live may be euthanired or transported and relocated lo another site approved by the appropriate Siate wlldl e agency, requred. Wien using r eanns, you may use rifles or arifles to shoot any bird when you determine that the use of a shotgun is Inadequate to resolve the Injurious situation. You may use paint bah guns to hazo birds or deter birds only whon other methods of twlng are Ineffective.

Anyone who takes migratory birds under the authority of this permit must follow the American Vetennaiy Medical Assod:Itlon Guidelines on Euthanasia wheneuthanizalionofabirdIsneceuaiy(http:/IWNvavmaorglluues/animaLwelfare/eulhanasiapdl).

IYou may tempotarily possess and stabilize sic!< and lnjuted mlgr.atory birds and knmediately transport them loa federally licensed rehabifitator for c:are.

J. The following subperrrUttees are authortzed :any other pel'M>nwhols (1) empk1yed by *ot* under contract to you for the «Jvi1tc:1$pccifacd InIh> pennit. or (2) otherwise deslgnated a subpermittee by you Inwriting, may exercise the authority of this permft.

K. You and any subpermittee(s) must comply with the attaelled Standard Condftlons for Migratory Bird Depredation Pennils. These standard condlUons are a conUnuaUon of your permit condions *and* mu$f *rom1/n with your* permit

For suspedttd Ulogal 1ellvily,Immttdlatoly contact USFWS I.aw Enforument at: /.tlanta, Georgia 404/763-7959 GA, AL. NC, SC

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FEDERAL FISH AND \VILDLIFE PERMIT

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I. P'Ellf.UTTEE

HARVEY POINT DEFENSE TEST!t-.'O ACTIVITY
2835 HARVEY POINT ROAD
HERTFORD. NC27944
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a. NAME Mt>Tln.EOFn.Jl\°Cl.PAL Of'FICER fV//;,•6.-...,i
PAUL AARON HUlffER
NATURAL RESOUCE MANACER

9.TYPEOFPO.\OT
DEPREDATION AT AIRPORTS

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n TUVAi U)ITYOF nos Kl..\tl"T /SAl.SOCO 'OmO!<-'tO 1..'PO SnxTO&SttVA.'tt OF AU.AJl'PUCASLE rol..OGN. nAJE. LOCAL TIUBAL.OkOTI!Etl FWs;tv.L uw.

C. \'AUDfOA USE BYFEJL\OTIEE No'..\W>ADO\'E.

D. You are authorized to take. temporarily possess. and transport the migratory birds specified below lo relieve or prevent injurious situations Impading public safety. All take must be done as part of an iotegrated wildlife damage management program Iha! emphasizes nonlethal management techniques. You may not use lhis authority for situations Inwhich migraloty birds are mefefy causing a nuisance.

(1) The foUowing may be lethally taken: Minimum numbers and species.

(2) The following may be live-trapped and relocated: Minimum numbers and species.

(3) The fol owing active nests (including eggs) may be destroyed: Canada 9e<1se.

E. You are authorized Jn ememeocy siiuations onfy to take, trap, or relocate any migratory birds, nests and eggs, including species that aro not listed in Condttion D (except bald eagles, golden eagles, or endangered or threatened species) when the migratory birds, nests, or eggs are posing a direct threat to human safety. A dlred threat to human safety ls one which Involves a threat of serious bodily Injury or a risk lo human Ole.

You must report any emergency lllke activity to yot.f migratory bird perma Issuing office 4 79-7070 within 72 hours after the emergency take adlon. Your report must Include the species and number of birds taken. method. and a complete descripoon of the circumstances warranting the emergency action....

F. You are authorized to salvage and temporarily p0ssess migratory birds found dead *or* taken under this permit for (1) disposal. (2) transfer to the U.S. Department of Agriculture, (3) diagnostic puQ>OSes, (4) purposes of training airport personnel, (5) donation to a public scientific or educational instttulion as defined in 50 CFR 10.12. (6) donation to persons avlhorlzed by permit or regulalion to possess them, or (7) donation of migratory game birds only to a public charity (those suttable for human consumption), /\tty dead bald eagles or golden eagles salvaged must be reported wilhln 48 hours to the National Eagle Repository at (303) 287-211O and to the migratory bird perma Issuing otfice at 4 79-7070. Tho Rop0$itory will provide directions for shipment of

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2. Jt.£QCJIUMENTS

>.,."!NUAL REPORT DUE: 01131
mus1 submit an:port lo your Regional Migratory Bird Pennil Office C\'en if)'Ou had no aclivity. Report form is at \\WW.l\\'S.gov/fonns/3-202-9.pdf.

ISSQMUIA f?.Lr,.. mu:
F,MIORATORY DIRO PERMIT OFFICE · SOUTIlEAl>'T REOION

DATE
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these specimens•

- You may not salvage end must Immediately report to U.S.Fish and Wildlife Service Office of law Enforcement any dead or Injured migratory birds that uencounter that appear to have been poisoned. shot. e!eettoeuted, have colUded with Industrial – . r generation eqpment, orwero otherwise killed or njured as the resutt of potenUal crlmlnaladitv. Seo USFWS OJ,E contact lnfonnatlon below.

H You may use the fdlowing methods of take: (I) ruearms; (2) nets: (3) registered animal drugs (excluding nieart>azin), pesticides and 19pellents; ( ) falconry aNlement and (5) legal lethal and live traps (excluding po!e ttaps). Binls caugtll live may bo eulh1nlzed or llanspotted and relocated to another sae 1pp<OYed by the appropriate State wildife agency, f req11ired. When using f•eanns, you may use mr.s°'altril!es *to* slloot any bird when you detenn&le that I.he use of a sholgun Is Inadequate to 19SOlve I.he Injurious siluation. You may use paint N9guns *to* hue birds °'deter birds only when other melhods of huing are lnelfective.

Anyone Who takes mlgralory birds under the authority of this penna must foQow the American Veterinary Medical Association GuldcUnes on Euthanasia '"1ien euthanlzation of a bird is ne<Msary (http:Jtwwavma.org/issues/anlmaLwettaroteuthanasia .pdl).

I. You may tempor arily pouess and stabilize sick and li!Jured migratory birds and Immediately !Jan.sport them lo a federally llcenstd rehabUaacor for care.

J. The following Mlbpennlttees are authorized: any other pe1$on who is (I) employed by or under contrad to you for the adMties specified li!I.his permit, or (2) otherwise designated a subpe e by you lnwriting, may exetcise l.he •uthoriY of this penniL

K. You and any subpermittee(s) must axnply with I.he attached Standard COnditlons for Migratory Bird ptedation Pennits. These standard conditions ire a continuation of your permit condiUons *and must remain with your ptrm/L*

For suspected Illegal activity, Immediately contact USFWS Law Enforo1ment at: Allanla, Georgia Ooln&:l-7959 GA. AL. NC,SC

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Standard Conditions
Migratory Bird Depredation Permits
50 CFR21.41

All of the provisions and condilion.s of the governing regulations at *SO* CFR pan 13 and *SO* CFRpazt 21.41 are conditions ofyourpcrmiL Failure to comply with the conditions of your pennit could be cause for suspension of the pennit The S1andard conditions below are a continuation of your pennit conditions and must remain with your pennit If you have questions regarding these conditions, refer to the regu.lations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: http:Uwww.fws.gov/migratorvbjrds/mbru:onits.html.

I. To minimize the lethal W<e of migratory birds, you are required to continually apply non-lethal methods of harassment in conjunction with lethal control.
(Note: Explosive Pest Control Devices (EPCDs) orertgulated by the Bureau of Alcohol, Tobacco, Firtorms, and Explosives (ATF}. lfyoupion to use EPCDs, you require o Fedual explosives permit, unless you ore exempt under 27 CFR555.UI. Information and contacts maybefound at htto;//www.atfgo"lqp/osfy q/how-to/become·an·f<l.htm.)

2. Shotguns used to take migratory birds can be *no* larger than 10-gauge and must be fired from the shoulder. You must use nontoxic shot listed in *50* CFR 20.21(j).

3. You m•y not we blinds, piu, or other mearu of concc•lmcnt, decoys. duck culls, or other devices to lure *or* entice migratory birds into gun range.

4. You are not authorized to take, caprure, harass, or disturb bald eagles or golden eagles, or species listed as threatened or endangered under the Endangered Species Act found in *SO* CFR 17, without additional authorization.

   For a list of threatened and endangered species in your state, visit the U.S.Fish and Wildlife Service's Threatened and Endan,sered Species System (TESS) at: http:l/www.fws.gov/endangered.

S. lfyou encounter a migratory bird with a Federal band issued by the U.S.Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to 1·800-327-BAND or h11p;l/www reoo1tband .goy.

6. This permit docs not authorize W<e or release of any migratory birds, nests, or eggs on Federal lands without additional prior written authorization from the applicable Federal agency, or on State lands or other public or private property without prior written permission or pe.nnits from the landowner or custodian.

7. Unless otherwise specified on the face of the pennit, migratory birds, nests, or eggs taken under this permit must be:
   (a) turned over to the U.S.Depaztmcnt of Agriculture for official pwposes, or
   (b) donated to a public educational or scientific institution as defined by *SO* CFR 10, or
   (c) completely destroyed by burial *or* incineration, or
   (d) with prior approval from the permit issuing office, donated to persons authorized by permit or regulation to possess them.

8. A subpenninee is an individual to whom you have provided wrinen authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 yean of age. As the pennittee, you are legally responsible for enswing that your subpermittces are adequately trained and adhere to the tcnns of your permiL You are responsible for maintaining cumnt records of who you have designated as a subpermittce, including copies of designation letters you have provided.

9. You and any subpermiltees must carry a legible copy of this permit, *including these Standard Conditions,* and display ft upon request whenever you are exercising its aulhority.

10. You must maintain records as required in *SO* CFR 13.46 and *50* CFR 21.41. All records relating to the permitted activities must be kept at the location indicated inwriting by you to the migratory bird permit issuing office.

11. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.

12. You may not conduct the activities aulhorizcd by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable Jaw.

(DPRD • 12/J/2011)

North Carolina Wildlife Resources Commission

Richard B. Hamilton, Executive Director

July 18, 2007

Hlll'Vey Point DOD Base
clo Mr. Paul Hunter
2835 Harvey Point Road
Hertford, NC 27944

Dear Hlll'Vey Point Base:

Please 6nd eoclosed a summmy of tho deer data your club collected as part of the Deer Management Assistance Program (DMAP) during lho 2006-07 deer season. I have attached several graphs showinp, some general harvest trends noted since your club begun participating in DMAP.

The NCWRC appreciates your club's efforts in maintaining complete and accurate deer harvest data to fulfill the prognm requirement. Bqjaala: at tile e8d of tile 2007 _.,ple9se man all ••aleld DMAP tap aloa& wldi yoar jawboas •ad datllslleets.

Prior to lhe 2007 season, be sure to inform all club members of the following important notes:
The BONUS ANTL!lRLESS HARVEST REPORT CARDS to be m&de available for lhe2007-08 deer season are NOT legal to use on lands enrolled with !lie DMAP program! ITT1js Bonus Antlerless Card is only legal to use on .oa-DMAP private laads (not gamelaads) ia couaties baying a Maxhn•m e!lhe"" IP gua .-. ALL antleriess deer taken on emptied lands MUST still be tagged with the adhesive DMAP tap immedjatelv after hmyes!ing the and then properly registqrid. Untaggaj antlertess deer are not legal !leer. DMAP tap cannoc be used on antlered bucks. Also. mnemb« tlult yon can only take tlte numbtr or ••tlerless deer Chat you llave DMAP tap for! On all land enrolled in tile DMAP orogram. once WU have used all of the DMAP tags issued bv the NCWRC. no more antlerless deer mav be legally taken during that season.

Again thank you for your help. Please let me know if I can be of any further assislance to your club. I look forward to your continuing participation in DMAP.

Sincacly.

,CJw,

J. Chris Turner
District I Wildlife Biologist
N.C. Wildlife Resources Commission
(919) 27 S73 mobile
(252)221-9961 office/fax

SEX AND AGE STRUCTURE OF THE HARVEST

y–	C®niy	Pna	0.6	1.5	2.5	3.5	4.5	5.s+	0.5	1.8	2.8	3.5	4.5	5.s+	Total Buck&	Tat.al Doee	Tolal HaM19t	% O–
0.;e	"EROUIMANS	HARVEY POINT	0	0	3				Q	11	6		5		11	9	..,,	S: S3

,.EAR	COUNT\AREA	0.6	1.5	2.5	3.5	4.s+	0.5	1.5	2.8	3.8	4.5+	FAWNS	DOES (1s+)	BUCKS (1.s+)
OOii	PERQU HARVE 't	0	0	,.Γ. /	152.5	183	67.3	64.0	SM	1250	91.7	3.1	3..2	3.3

ANTLER CHARACTERISTICS

.R	COUNnAREA	BEAM DIAMETER 1.8	2.5	3.5	4.5+	INSIDE SPREAD 1.6	2.6	3.8	4.&+	POINTS u	2.6	3.6	4.&+	% SPIKES by Age Class 1.8	2.5
2006	PEROUI HARVE'I	0 0	23.S	29.0	SI.5	No Oata	:IZ<.O	319.7	!'3.0	0.0	1.1	1.0	9.5	0	0

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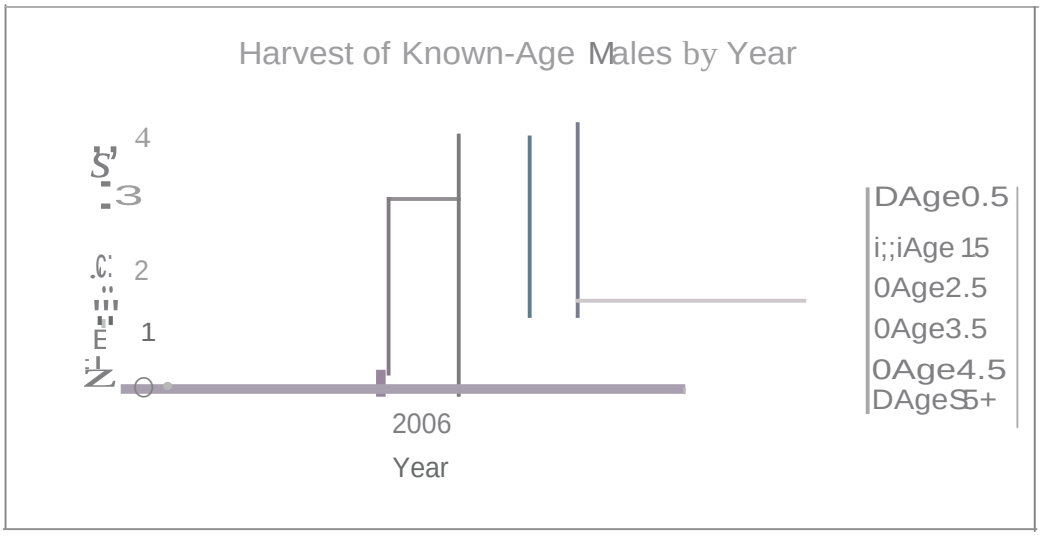
Harvest of Known-Age Males by Year
4
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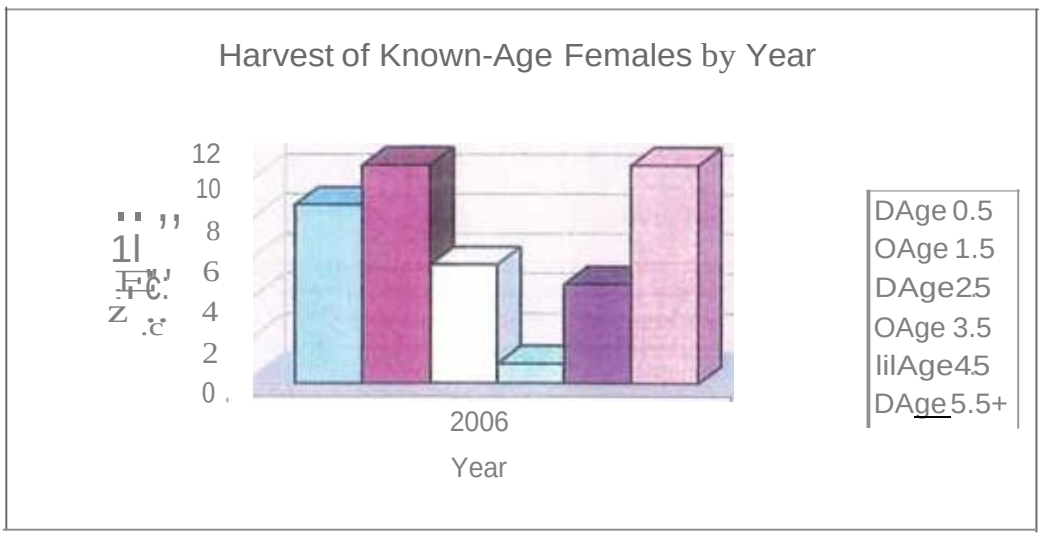
DAge5.5+


Harvest of Known-Age Females by Year
12
10
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Year
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DAge2.5
OAge 3.5
lilAge4.5
DAge 5.5+

f:d North Carolina Wildlife Resources Commissio11 *El*

Richard B. Hamilton. Executive Director

August29, 2008

Harvey Point DOD Base
clo Mr. Paul Hunter
2835 Harvey Point Road
Hertford, NC 27944

Dear Harvey Point Base:

Please find enclosed 11 summary of the deer data your club collected as part of the Deer Management Assistance Program (DMAP) during the 2007-08 deer season. The NCWRC appreciates your club's efforts in maintaining complete and accurate deer harvest data to fulfill the program requirement

Prior to the 2008 season, be sure to inform all club members of the following important notes:
The BONUS ANTL.ERLESS HARVEST REPORT CARDS are NOT legal to use on lands enrolled with the DMAP program! ALL antlerless deer taken on enrolled lands MUST still be tagged with the adhesiye DMAP tags immediately after harvesting the deer and then properly registered in your Coooorator books. Untagged antlerless deer are not legal deer. DMAP tags cannot be used on antlered bucks. Also. remember tbat you can only take tbe nnmber of anderless deer that yoa bave DMAP tags for! On all land enrolled in the DMAP program, once you have used all of the DMAP tags issued by the NCWRC, no more ant!erless deer may be legally taken during that season.

Also, the WRC will be working on a statewide surveillance for Chronic Wasting Disease (CWD- has not been found in N.C. to date!) during the 2008 deer season. Your club may be contacted regarding samples from harvested deer to assist us with this project. llyou have questions or wonld like *to* snbmit a sample. contact me at (252) 221-9961 (offil».aosweriog machine).or (919) 270-6573 cell

Again thank you for your help. Please let me know if I can be of any further assistance to your club. look forward to your continuing participation in DMAP.

Sincerely,

17 ;: /

J. Chris Turner
District J Wildlife Biologist
N.C. Wildlife Resources Commission
(919) 270-6573 mobile
(252) 221-9961 office/fax

SEX AND AGE STRUCTURE OF THE HARVEST

Year	eo..mty	''_	bhraiba ICAQIAIQ Age ••ale• 0.S	1.5	2.8	3.5	4.5	8.5+	t.lui:abe' ka.oum Ae• Eaa:ialea 0.S	u	2.S	3.S	4.5	5.5+	TOlal Bucks	Tol!d D	Total Harvest	%DoeG
:1006	PERQUIMANS	HP.RVEY POINT	0	0	3	●	1	1	9	11	8	1	5	11	9	43	0:	83
:?2007	PERQUIMANS	HPRVEY POINT	1	2	3	2	0	0	5	13	3	10	2	10	15	••	83	,''

.6. -1Vk_M.ll:_lr--l.CN:: _Ll_Q_ \

VEAR	COUNT'\	AREA	i''CK$ Y ⁰ge Clesa) 0.8	1.5	2.6	3.S	4.5>	oos (by •ea ciess) 0.5	1.G	2.5	3.6	4.5>	.cn.ti.1n.lTiC'l.l\L.0..6. Til'.Jl1 FAWNS	DOES (1.6+)	BUCKS (1.5+)
2006	PERQUI	HARVC't	'''Cota	0	f4'1,7	152:.5	103	57.3	8'.0	88.3	125.0	91.7	3..1	3.2	3.3
2007	PERQUI	HARVE)	&&a	126.0	128.3	155.0	No Oala	00.0	80.2	90.0	96.7	08.9	3.2	3.1	3.4

ANTLER CHARACTERISTICS

YEAR	COUNT'l	AREA	BEAM DIAMETER hu-6.n6.rJ.o,- ll'lft'l}_ 1.S	2.6	3.6	4.5+	INSIDE SPREAD u	u	3.5	.u+	POINTS {by Aee Cl111 1.6	2.5	3.5	4.S+	%SPIKES I;C ge Claa u	2.s
2006	PERQUI	HAR\IE)	'''Dato	28.3	29.0	32.5	No Dau!	324.0	319.7	3'3.0	0.0	7.7	7.0	9.5	0	0
:::007	PERQUI	HARVC't	8.0	26.0	35.0	Ho Data	No Data	3'0.0	44Q.O	No Oala	2.G	5.5	7.0	NoOa;..	100	0

Notes:

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l""".1 North Carolina Wildlife Resources Commission [J

Oordon Myers, Blcecutive Direcior

August 18, 2009

Harvey Point DOD Base
c/o Mr. Paul Hunter
2835 Harvey Point Road
Hertford, NC 27944

Dear Harvey Point Base:

Please find enclosed a summaiy of the deer data your club collected as part of the Deer Management Assistanoe Program (DMAP) during the 2008--09 deer season. The NCWRC appreciates your club's continued efforts in mainwning complete and accurate deer harvest data to fulfill the program requirement.

Prior to the 2009 season, be sure to inform all club members of the following impor!ant notes: The BONUS ANTLERLESS HARVEST REPORT CARDS are NOT cun"t:ntly legal to use on lands enrolled with the DMAP program! ALL antlerless deer taken on enrolled lands MUST still be tagged with the adhesive DMAP tags immediately after harvesting 1he deer and then properly registered in your Coooerator books- Untagged antlerless deer are not legal deer. Also. DMAP tags cannot currently be used on antlered bucks. Remember that you can only take the nnmber of anderless deer t•atyoa have DMAP tags for! On all lands enrolled in the DMAP orogram. once you have used nil of the DMAP tags issued by the NCWRC. no more antlerless deer may be legally taken during tliat season. For updates and additional infonnation concerning hunting regulations go to the NCWRC website at ncwiklUfe.org.

Again thank you for your help. Please lei me know if) can be of any further assistance to your club. I look forward to your continuing participation in DMAP.

Sincerely,

J. Chris Turner
District IWildlife Biologist
N.C. Wildlife Resources Commission
(919) 270-6573 mobile
(252)22 1-9961 office/fitx

sex AND AGE STRUCTURE OF THE HARVEST

Y6llr	Counly	Area	0.6	1.4	2.6	3.5	4.3	5.6+	0.5	1.5	2.6	ᵍ3.s---•.s	5.6+	Total Bucka	Total Does	Total Heivest	% Doee
:?006	FERQUIMANS	HARVEY POINT	0	0	3	•	t	1	a	II	e	1	•	11	•	43	03
2007	PERQUIMANS	HARVEY POINT	7	2	3	2	0	0	6	13	3	10	▪	10	15	48	63 10
2003	PERQUIMANS	HARVEY POINT	•	2	•	2	1	0	J	•	a	e	4	2	19	32	II 113

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EAR	COUNT'tAREA	0.8	1.5	2.6	M	4.5+	0.5	U	2.e	3.5	4.6+	FAWNS	DOES (1.6+)	BUCKS (1.6+)
ZOOS	PERQUI'HARVE'<	No Otta	0	1411,7	152.!	163	67.3	ıɒ	8a.3	120.0	91.7	,1	3.2	3.3
2007	PERQUI1 HARVE	'5.3	125.0	128.3	iM.o	No Cata	50.0	00.2	90.0	96.7	98.9	3.2	3.1	
2008	PERQUIlHARVE'<	570	107.6	122.0	118.0	1.ao	57.5	87.9	102.0	1017	992	3.1	3.2	2.9

SIICI';S by; Age Class) — ClOl'iS AOG Cl1ss) — COtilClXIOlil RA:CltlG

ANTLERCHARACTERJSTICS

BEAM DIAMETER — INSIDE SPREAD — POINTS 'by; Ago C&aas — %SPIKES 't1i91C1a1s

\' AR	COUNT'tAREA	1.5	U	3.5	4.6+	1.6	U	3.5	4.6+	1.5	2.6	3.5	4.6+	U	2.5
	PERQUI HARVE'<	No O...	m	29.o	32.5 No°""		32..0	s1•1	343.o	00	7.7	7.0	U	0	0
:007	PERQUIlHARVE'<	60	260	3M No Data	No°""	340.0	4'0.0 No Dai>			2.0	•••	1.0 Noo.ta		100	0
:?COS	PERQUI1 HARVE'r	NoOa!a	18.3	O	32.o No°""	192.6	300.o	360.o		3.5	4.3	e.o	70	50	0

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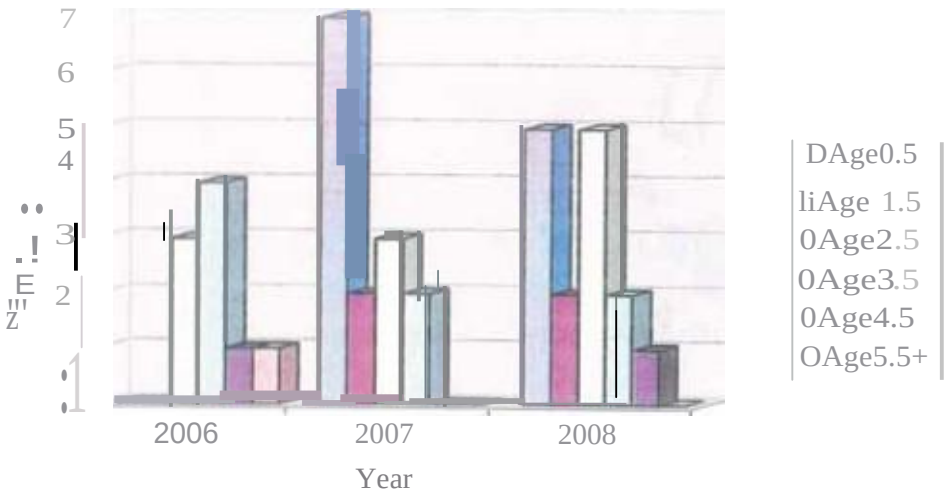
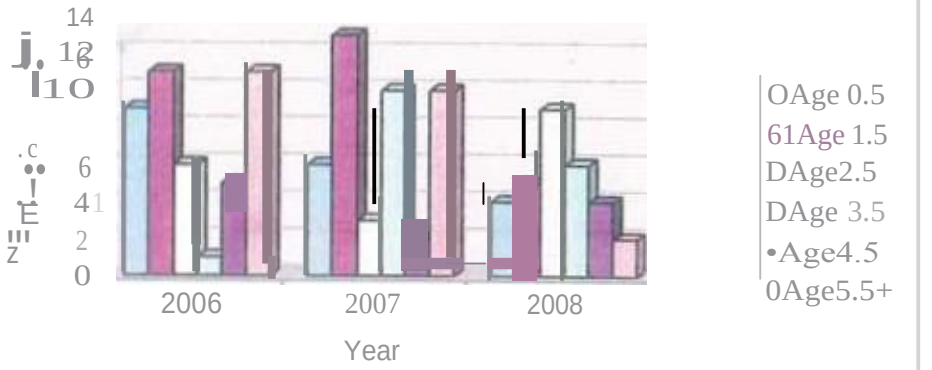
Harvest of Known-Age Males by Year



Harvest of Known-Age Females by Year



[I N-0rth Carolina Wildlife Re.smu·ce.s Commissionl I

Gordon Myers, E eeu rivc Director

August 19,2010

Harvey Point DOD Base
c/o Mr. Paul Hunter
283S Haney Point Road
Hertford, NC 27944

Dear Harvey Point Base:

Please fmd enclosed a summary of the deer data your club collected as part of the Deer Management Assistance Prognun (DMAP) during the 2009·10 deer season. The NCWRC appreciates your club's continued efforts in maintaining complete and accurate deer harvest data to fulfill the program requirement. TI1ere have been several important changes in the deer hunting regulations this yenr. One of these cl1anges affects DMAP clubs statewide and concerns the new abilily to legnlly use Big Game Harvest Report Canis and Bonus Antlerless Report Cards on acreage e11rollcd in DMAP.

.Beginning this vear. hunters' BIO OAME REPORT CARDS and BONUS ANTLERLESS HARVEST REPORT CARDS ARE lef!lll to use on lands enrolled with the PMAP programI ALL antlerless deer taken on e11rollesl lands mus t EITHER be tagged with the adhesive DMAP tags immediately after harvesting Lhe deer and then properly registered jn your Cooperator books OR oossesscd by immediately notching your Big Game Report Card.resistering lhc deer. and reg>rding your authorizatioo 11umber, just as you would on other non-DMAP lands, Rqlster aad collect data from EVERY llarvested deer just as you have ia tile past, regardles. orwlletber a DMAP tag or your Big game reoort cardfBonu' antlertm t!p are med. DMAP plastic llll!!! !¢ill cannot. be used on antlered bucks. You shoukl still attempt to take the number ora11tlerim deer that you liave DMAP tag• ror, whether you u!Ml the plMlic tap or noL For all updates and additional infonnation concerning hunting regulations go to lJ1e NCWRC website at ncwlldlife.org.

Again thank. you for your help. Please lel me know if I can be of any further assistance to your club this fall. I look forward to your continuing participation in DMAP.

Sincerely,

J, Chris TumeT
Di trict I Wildlife Biologist
N.C.. Wildlife Resooroes Commission
(919) 270-6573 mobile
(25'.') 221-9961 office/fax

SEX ANO AGE STRUCIURE OF THE HARVEST

:?007 PERQUIMANS HARVEY POINT 7 0 0 Toe.I Tolal Tollll

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Year	Counly	Ive•	o.a		2.5	3.5	4.a	5.5+	0.5	1.5	2.5	3.8	4.5	5.5+	eucl<a	Doee		
2006	PERQUIMANS	HARVEY POINT	0	0													HorvHt	%Does
2008	PE IMANS	HARVEY POINT				2		0									$:?	83
:2009	PERQUIMANS	HARVEY POINT			3	2	3	0	12				2				32	83
																	XI	51 64

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ANTI.ER CHARACTERISTICS

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						182,$	300.0	300.0		3.!	43				
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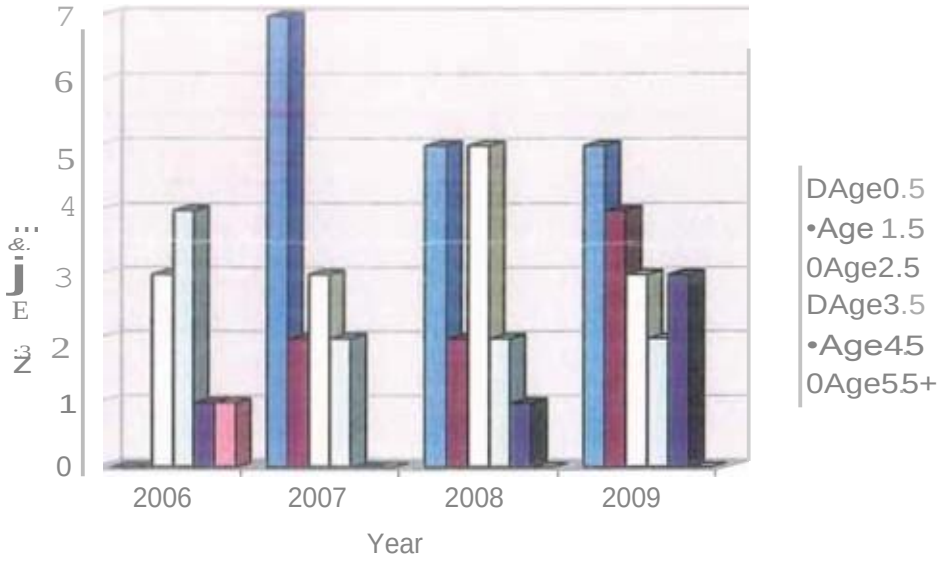
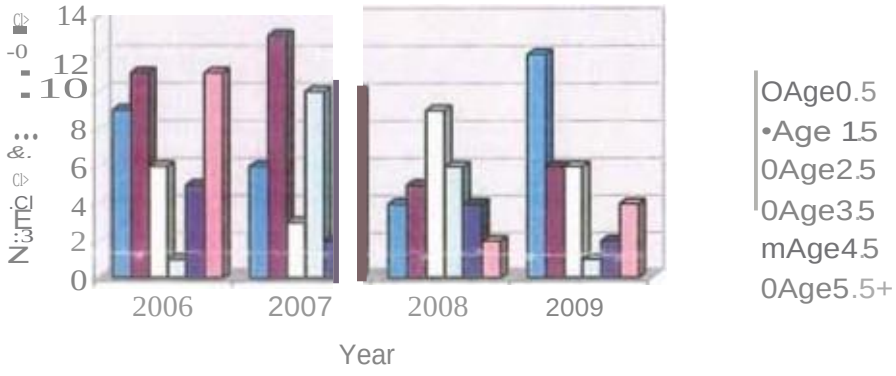
Harvest of Known-Age Males by Year

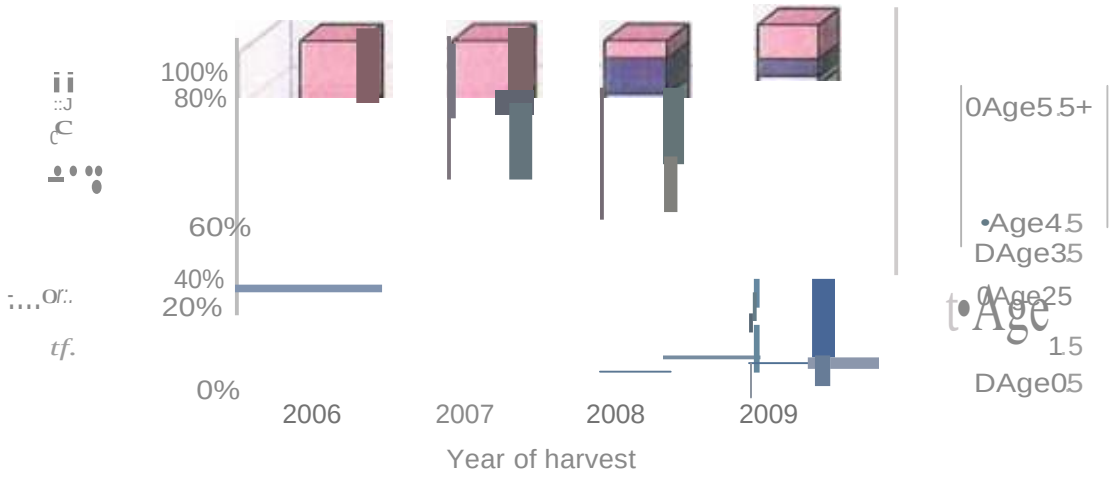


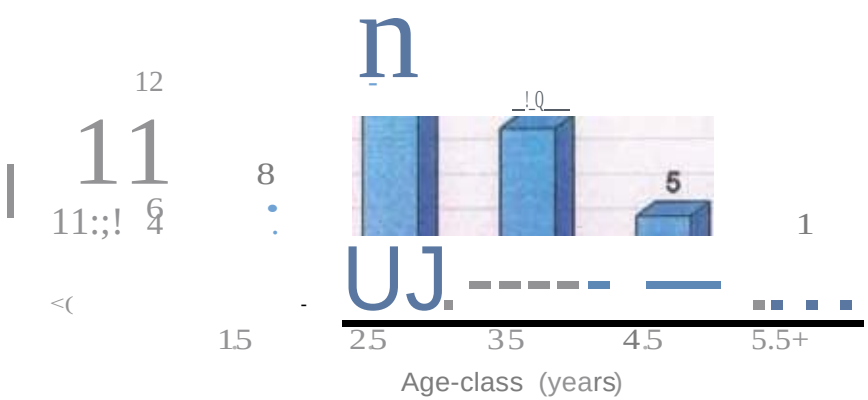
Harvest of Known-Age Females by Year



AnUered buck harvest by % Ag lass, 2006-2009

Antlerless deer harvest by % Age-class, 2006-2009




Antlered Bucks Harvested by Age-Class, 2006-2009
12
11
8
6
4
1
5
1.5
2.5
3.5
4.5
5.5+
Age-class (years)

I INorth Carolina Wildlife.Resources Commission F-3

Gordon Myers, Executive Director

July 25, 2011

Harvey Point DOD Base
c/o Mr. Paul Hunter
2835 Harvey Point Road
Hertford, NC 27944

Dear Harvey Point Base:

Please find enclosed a summary of the deer data your club collected as part of the Deer Management AssiSlance Program (DMAP) during the 20 l0-11 deer season. The NCWRC appreciates your club's continued efforts in maintaining complete and accurate deer harvest data to fulfill the program requirement.

Please continue tll mister and collect data from EVERY barvested deer lust a5 yoa have in the past, reganlless or whether a OMAP tac or your Big game rePOrt gird/Bon usantleria• tan are Ulled. DMAP plastic tags still cannot be used on antlered bucks. You shooJd still attempt to take the number or aatlerfess deer tllat yon have OMAP tap for, whether you ase the plastic *tw* or not. For all updates and additional information concerning hunting regulations go to the NCWRC website at ac:wildlife.org.

Again, thank you for your help and good luck in 2011. Please let me know if I can be of any further assistance to your club this full. I look forward to your continuing partici1ation in DMAP.

Sincerely,

J. Chris Turner
District I Wildlife Biologist
N.C. Wildlife Resources Commission
(252) 333-5028 mobile
(252) 221-9961 office/fax

SEX AND AGE STRU:TURE OF THE HARVEST

		H··=br Kpz·n Oge 'I•N						Ni•mMr KW'T •e• Fw'''s					Total	Total	ToGI
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:009 ri:ROUIMAHS	POINT	◖													
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2008 PERQUI	HARVEY	670	107,$	122.0	118.0	14'0	67.1	67.9	102.0	101.7	tt.2	3.1	32	2.9
2009 PEROUI	HARVE'r	MO	103 3	1200	117,$	1476	56,7	60.4	92.4	NO	100.8	3.6	31	3.7
2010 PERQUI	HARVE'r	• • ••	98.0 No Olla		10.S.O	1420	e10	66.0	103.0	100.0	106.0	3.1	3.2	3.2

ANTLER CHARACTERISTICS

		BEAM DIAMETER ...,•ge C1ett mmJ				INSIDE SPREAD p,r •a•c,,., ...				POINTS ·g•C'an)				% SPIJ<ES (rr °S·C'...	
EAR	COUNT'I AREA	u	2.5	u	4.5+	u	:u	u	4.5+	u	:u	u	4.5+	1.5	2.5
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:!008 PERQUI	HARVE'r	No Olla	18.3	25.0	32.0 NoDoll		102.5	300.0	300.0		4.3	e.o	1.0	00	0
2009 PERQUI	HARVE'r	::01	28.0	170	33.S	2200	325.0	3000	420.0	37	•••	7.0	TS	33	0
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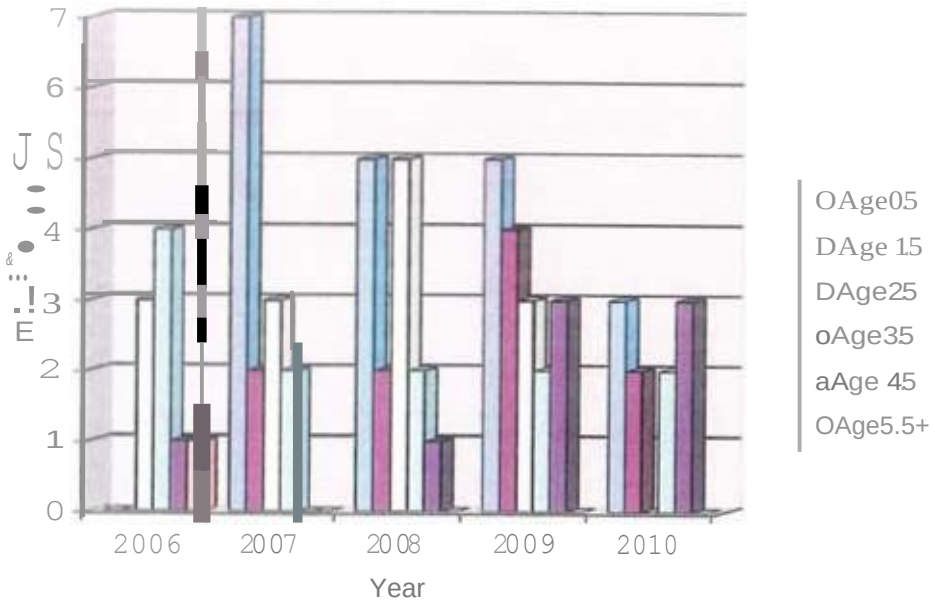
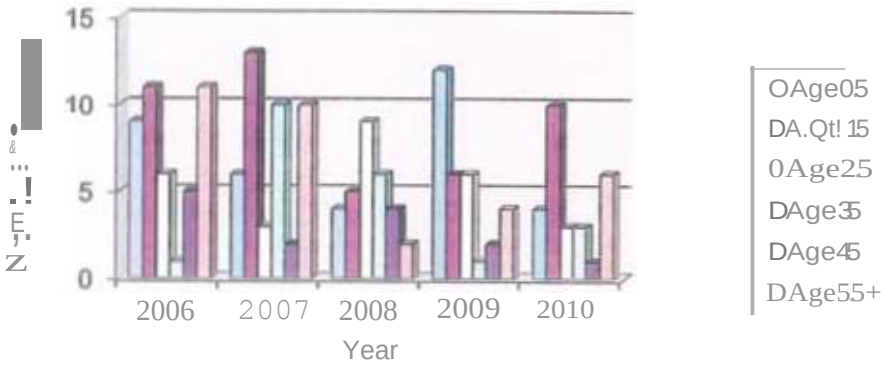
Nolet: 2010

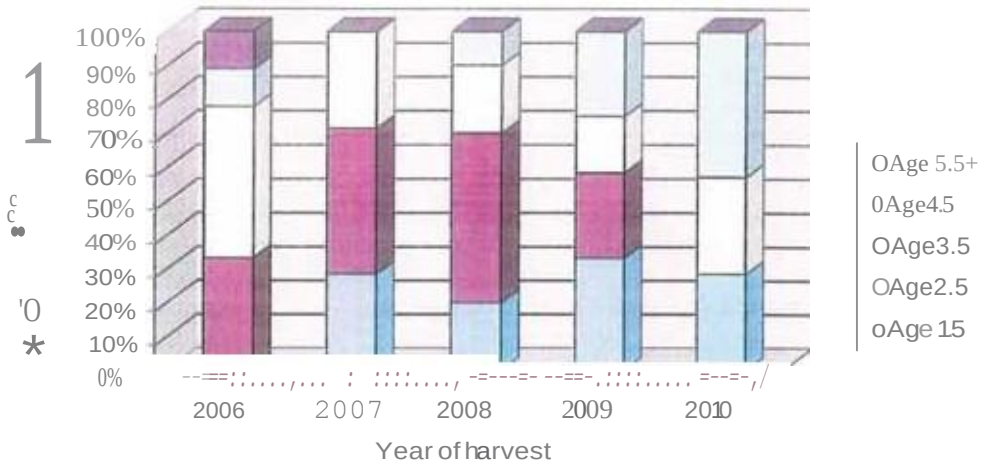
Harvest of Known-Age Males by Year



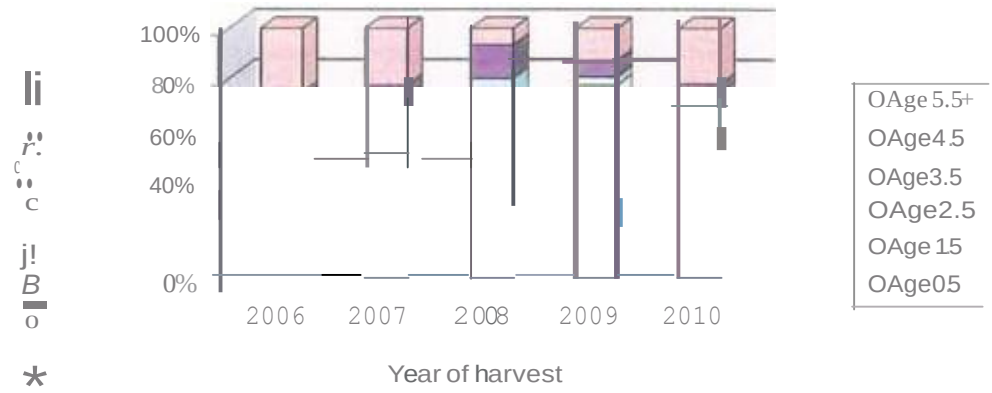
Harvest of Known-Age Females by Year



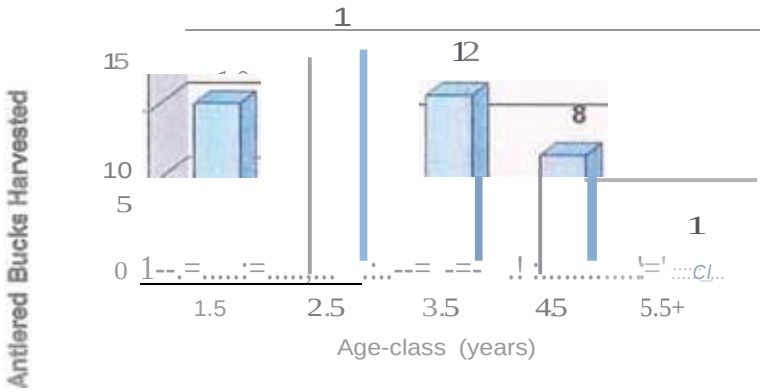
Antlered buck harvest by % Age-class, 2006-2010



Antler ess deer harvest by% Age-class, 2006-2010



Antlered Bucks Harvested by Age-Class, 2006-2010



APPENDIX B
Prescribed Burning Plans

Simple Understory Prescribed Burning Unit Plan

Landowner_____ Permit no._____
Address_____ Phone no._____
S___T___R___County_____Acres to Burn_____ Previous burn date_____
Purpose of burn_____

(Draw map on back or on a separate piece of paper and attach)

STAND DESCRIPTION

Overstory type & size_____Height to bottom of crown_____
Understory type & height_____
Dead fuels: description and amount _____

PRE-BURN FACTORS

Manpower & equipment needs _____
List smoke-sensitive area & locate on map _____
Special precautions _____
Estimated no. hours to complete_____Passed smoke screening system _____
Adjacent landowners to notify _____

WEATHER FACTORS:	**Desired Range**	**Predicted**	**Actual**
Surface winds (speed & dir.)			
Transport winds (speed & dir.)			
Minimum mixing height			
Dispersion/stagnation index			
Minimum relative humidity			
Maximum temperature			
Fine-fuel moisture (%)			
Days since rain_____Amount			

FIRE BEHAVIOR:	**Desired Range**	**Actual**
Type fire		
Best month to burn		Date burned
Flame length		
Rate of spread		
Inches of litter to leave		

EVALUATION:	**Immediate**	**Future**
Any escapes?_____Acreage		Evaluation by
Objective met		Date
Smoke problems		Insect/disease dam. ___ Crop tree mortalit
% of area with crown discoloration of		% understory kill ___
5-25%____26-50%____51-75% ____76%+ ____		Soil movement ___
Live crown consumption		Other adverse effects
Adverse publicity		
Technique used OK		Remarks
Remarks		

Prescription made by: _____
Title: Date: / /

Understory Prescribed Burning Unit Plan

Prepared by _____ Signature _____ Date _____ Permit # _____
State _____ County _____ District _____ Comp't _____
Burning unit no. _____ S _____ T R ___ Gross acres _____ Net acres _____
Landowner _____ Address _____ Phone _____
Person responsible & how to contact day & night _____

(Draw map on back or on a separate piece of paper & attach)

A. **Record of Previous Burning:** Date _____ Fire type _____ Results _____

B. **Description of Stand:**
1. Overstory: Type, density, size _____ Height to bottom of crown _____
2. Understory: Type, density, height _____
3. Dead fuels: Type, density, age, volume _____
4. Soil type and topography _____

C. **Purpose(s) of Burn:** _____

D. **Specific Objectives:** _____

E. **Pre-burn Factors:**
1. Chains to plow (see map): Exterior _____ Interior _____ Total _____
2. Chains to fire (see map): Exterior _____ Interior _____ Total _____
3. Crew size _____ Equipment needs _____
4. Estimated tons/acre _____ Total tons to be burned _____
5. Ignition procedure (see map) _____
6. Passed screening system? _____ Special precautions _____
7. Notify _____
8. Regulations that apply _____
9. List smoke-sensitive areas & critical targets (see map) _____

F. **Weather Factors:** **DESIRED RANGE** **ACTUAL RANGE**
1. Surface wind (speed & dir.) _____ _____
2. Transport wind (speed & dir.) _____ _____
3. Stability/stagnation index _____ _____
4. Minimum mixing height _____ _____
5. Dispersion index _____ _____
6. Minimum relative humidity _____ _____
7. Maximum temperature _____ _____
8. Fine fuel moisture _____ _____
9. Days since rain _____ Amount _____ _____
10. Burning Index _____ Drought Index _____ _____

G. **Fire Behavior:** **DESIRED RANGE**
1. Type fire _____
2. Best month to burn _____
3. Time of day to start _____
4. No. hours to complete _____
5. Flame length _____
6. Rate of spread _____
7. Fire-line intensity _____
8. Inches of litter to leave _____

ACTUAL RANGE

Date burned _____
Time set _____
Completed _____

Litter left _____

H. **Evaluation: IMMEDIATELY AFTER BURN**
1. Acres burned _____
2. Spotting _____ Distance _____
3. Any escapes _____
4. Objectives met _____
5. Smoke problems _____
6. % understory vegetation consumed _____
7. % of area with crown discoloration of
   5-25%_ 26-50%___ 51-75%____ 76%+____
8. Live crown consumption _____
9. Adverse publicity _____

FUTURE

Evaluation by _____
Date made _____
Insect/disease damage _____

Crop tree mortality _____

% understory kill

_____ Soil movement

Other adverse effects _____

Postharvest Prescribed Burning Unit Plan

Prepared by _____ Signature _____ Date _____ Permit No. _____
State _____ County _____ District _____ Comp't _____
Burning unit no. _____ S _____ T R ____ Gross acres _____ Net acres _____
Landowner _____ Address _____ Phone _____
Person responsible & how to contact day & night _____

A. **Description of Area:** (Draw map on back or on a separate piece of paper & attach)

1. Natural stand or plantation _____ Stand age _____ Harvest date _____
2. Clearcut _____ Harvest method _____ Pine basal area removed _____
3. Organic soil _____ Hardwood basal area _____ Hardwoods utilized _____
4. Unmerchantable trees felled _____ Snags felled _____ Debris evenly distributed _____
5. Debris (light, medium or heavy) _____ Brush (light, medium or heavy) _____
6. Herbaceous fuels (light, medium, heavy) _____ Herbaceous fuels continuous _____
7. Herbicide used _____ Date applied _____/_____/_____
8. Drum chopped _____ Single or Double Pass _____ Date completed _____/_____/_____
9. Windrowed and/or piled _____ Date piled _____/_____/_____ Piled when wet _____
10. Pile or windrow dimensions: Ht. _____ Width (diameter) _____
11. Windrow break interval _____

B. **Pre-burn Factors and Desired Fire Intensity:**

1. Areas to exclude _____
2. Chains to plow (see map): Exterior _____ Interior _____ Total _____
3. Chains to fire (see map): Exterior _____ Interior _____ Total _____
4. Equipment needs _____
5. Crew size _____ Type of fire _____ Type of ignition _____
6. Ignition procedure (see map) _____
7. No. of hours to complete _____ Tons/acre to consume _____ Litter to leave (in.) _____
8. Special precautions _____
   _____
9. Notify _____
10. Regulations that apply _____
11. Passed screening system? _____

C. **Weather Factors:**

	DESIRED RANGE	PREDICTED	ACTUAL
1. Surface wind (speed & dir.)	_____	_____	_____
2. Transport wind (speed & dir.)	_____	_____	_____
3. Mixing height	_____	_____	_____
4. Dispersion Index (or comparable)	_____	_____	_____
5. Relative humidity	_____	_____	_____
6. Temperature (^{0}F)	_____	_____	_____
7. Fine-Fuel moisture (%)	_____	_____	_____
8. 10-hr. Fuel moisture (%)	_____	_____	_____
9. Days since rain _____ Amount	_____	_____	_____
10. Burning Index _____ Drought Index _____		_____	_____
11. Best month to burn	_____	Dates burned	_____
12. Time of day to start	_____	Time set	_____

D. **Summary of Burn:**

1. Type fire & ignition _____
2. All piles, windrows & logging decks ignited _____
3. % of area burned _____ Did area between piles burn? _____
4. Spotting frequency _____ Distance _____ Firebrand material _____

E. **Evaluation Immediately After Burn:**

1. Any escapes: Number _____ Adjacent to burn area? _____ Acres involved _____
2. Hours to burnout: Active flaming _____ Smoldering _____ Total hours _____
3. % understory veg. consumed _____ Depth of litter remaining (in.) _____
4. % material < 3" dia. consumed _____ Did piled debris burn down? _____
5. Objectives met _____
6. Adverse publicity _____
7. Smoke problems _____

APPENDIX C
HPDTA Base Hunting Policy

Status: Approved

HPDTA POLICY

Date: 0812012012
Subject: HPDTA HUNTING POLICY 2012-2013
Polley No.: 2012-0012
Reclslon:
Updated: 08120/2012

HPDTA HUNTING /FISHING POLICY

2012- 2013 HUNTING/FISHING SEASON

Table of Contents

INTRODUCTION

1. In accordance with base regulations, the following policy is published for compliance by all persons hunting on the government reservation of Harvey Point Defense Testing Activity. Violation of the Base Hunting Policy will be dealt with in balance with the violation. Penalties for violations can vary and may include losing hunting privileges for up to one year.

2. Any game killed or taken within the boundaries of HarVey Point Defense Testing Activity will be in accordance with the currant North Carolina gamo lawo iooued by tho North Carolina Wildlife Resources Conunission; migratory game regulations as prescribed by the United States Department of the Interior Fish and Wildlife Service, and this instruction.

3. The Base Natural Resources Coordinator has been designated as the Base Game Warden. The Environmental Safety Manager is responsible for the Natural Resources Program.

4. Persons authorized to hunt on the Base are: assigned Government staff employees and their immediate dependents, cleared contract rs working on base and their inunediate dependents, and special hunters authorized by the Director. Immediate Dependents must be escorted at all times by the sponsoring employee. Immediate dependents are defined as spouses, Officially Declared Members of Household (see Base Policy on Members of Household eligibility) and children over the age of 10.

5. A walk-in cooler has been provided for hunters to hang their deer during hunting season at the Natural Resources Building #7-18. Hunters will be able to store their harvested deer until it can be cleaned, but no longer than one week (depending on space available). The temperature of the walk-in cooler shall be set by the Base Game Warden and must not be

changed. Hunters are expected to keep the walk-in cooler clean of debris and blQod. A drain is in the walk-in cooler and each hunter is expected to wash their harvested deer's blood from the floor when hung. Walk-in cooler temperature and/or sanitation issues must be brought to the attention of the Base Game Warden (x 2817 or cell 312-6935).

GENERAL INFORMATION

General information and instructions for hunting are outlined below.

1. Hunting will be permitted Monday through Friday from hour before sunrise to 0700 hours and from 1530 hours to hour after sunset. Hunting on Saturday will be from hour before sunrise to hour after sunset. Hunting on Sunday from hour before sunrise to hour after sunset is allowed with bow and crossbow only. In addition, hunters will be allowed to hunt on holidays providing there are no other activities in the area prohibiting hunting.

A. All hunters must:

a. Read and comply with Base regulations concerning the contents of this instruction.

b. Read and sign the Hunter's Memorandum of Understanding and the Release and Hold Harmless Agreement before hunting on the Base.

c. Have in their possession a current, valid hunting license issued by the State of North Carolina. A copy of the hunter's valid hunting license must accompany the Hunter's Memorandum of Understanding form. No license, no hunting.

d. Be checked into hunting areas each day by the Security Force Officer at the Main Gate.

e. Report the number of all game harvested per day in the log book at cleaning station at Building 7-18 after checking out of a hunting area. Report should include weight, sex, antler measurements, and approximate age, and jawbone of each deer. Removal of jawbone from each deer is required for estimating age. Hunters are responsible for putting each jawbone in the mesh box located at the cleaning station.

f. Familiarize themselves with the hunting map (maps can be obtained from the Environmental Safety Office) prior to

each period of hunting.

g. Report any violations of these regulations to the Base Game Warden and Environmental Safety Officer or Base Security.

h. Must wear a cap or hat made of hunter orange material when hunting deer on base during firearm season, or an outer garment made of hunter orange material which is visible from all sides.

i. Agree to allow inspection of their bag limit, vehicle, and surrounding hunting area by Base Game Warden and/or Security force employees at any time. Refusal to allow such inspection will immediately cancel the Base hunting privileges for that individual.

j. Check out of their stand with the Main Gate promptly in order that other hunters may have access to the stand or area. All hunters are required to report whether or not they have discharged their weapon while on base.

k. Register all firearms at main gate:

1. Be sure a child is at least ten (10) years old in order to hunt with responsible parent.

B. Other restrictions:

a. In the event that official activity is scheduled near any of the hunting locations, that area will be designated off limits and hunters will be prohibited from entering such areas. The Base Game Warden and the Main Gate Security Force Officer will be responsible for disseminating such information, and will post schedules of off-limits areas at the main gate guard building.

b. . Hunting is allowed down range, this will include everything east of the runway. However, operational activities inside this area must have ceased for the day. These areas include, A Range, B Range, c Range, PBI City, CAT Building, Small Arms Range and G Range.

c. Other restrictions include sites 1-1, 1-15, and 8-60. When these sites are occupied no hunting is permitted within 500 yards of the building. And, those individuals permitted within 500 yards must be "cleared badged" Base personnel only. NO FAMILY MEMBERS.

d. For questions not covered by this and other Base

regulations, hunters and Security personnel should contact the Base Game Warden, or the Environmental Safety Manager on ext. 4360 during work hours. After hours, call 252-340-0011.

AUTHORITY AND CONTROL

The Director, HPDTA, is the controlling authority of all hunting on this facility. Responsibility for control is delegated to the following:

1. The Base Natural Resource Coordinator is designated as the Base Game Warden and is responsible to:

a. Complete and maintain an accurate assignment roster of all hunters and their assigned areas/stands and provide this by 1530 hrs to Boxer each day, as applicable during hunting seasons. Rosters for the weekend will be turned into Boxer on Friday prior to the hunting weekend. Requests to hunt after this deadline will be denied.

b. Ensure that all hunters are familiar with all applicable laws and regulations governing hunting on this facility to include acknowledgement of this policy.

c. Verify authorization of each hunter and ensure possession of a valid North Carolina state hunting license. A copy must be filed with the Environmental Safety Office.

d. Conduct weapons qualification and record results for hunters annually.

e. Verify current information on areas being used for official business and deny hunting access to such areas. Any area may be closed to hunting when safety factors so dictate.

f. Through the Base Security Force, ensure proper hunting procedures are being followed.

2. The Base Security Force is responsible to:

a. Log Hunters into and out of Hunting areas as they enter and leave the Base and provide this Log to the Base Game Warden.

b. Maintain current information on areas closed due to official activities and deny access to such areas. Note: The Security Force Duty Supervisor has the authority to close any area for safety reasons.

c. Report in writing any violations of the established hunting regulations which are reported or observed.

d. In the event a hunter fails to report out of their assigned area hour after sunset or the agreed upon departure time, a patrol will be dispatched to search for the hunter.

DISCIPLINE

Violation of any HPDTA, State, Federal hunting or fishing regulation on the Base may result in up to one year revocation of hunting or fishing privileges, and the possibility of further disciplinary action.

HUNTING AREAS AND STANDS

The base has been divided into hunting areas and deer stand locations for the purpose of control and safety. Control over all hunting on base will be maintained by the Game Warden during normal duty hours. A list of authorized hunters and their stands will be provided to Boxer for after-hours and weekend hunting.

1. Team hunting is allowed for small game in gun areas indicated on map. Groups may be as many as four (4) when rabbit and squirrel hunting. When dove hunting, groups can be as big as 12.

2. Reserving Hunting Areas or Stands: Hunters may reserve a hunting area or deer stand before 1430 hours weekdays at HPDTA by signing-up with the Game Warden. Weekend hunting must be reserved and authorized by the Game Warden by 1430 hrs on the previous Friday. The Game Warden will provide a list of authorized hunters, their estimated arrival/departure times and their assigned stands to Boxer by 1530 hrs each weekday. Hunters not reporting in will lose their reservation.

3. Hunters per Area/Stand: Only one (1) hunter and their dependents per area are authorized on Base.

4. All firearms hunting will be from elevated stands as provided at various locations on Base. Some areas have multiple stands. All stands have been numbered. Left and Right markers are posted for all gun stands. Access lanes will be noted on the base hunting map at Main Gate.

5. Base Hunting Map shows the areas hunters need to respect in regard to bow only and black powder and shotgun usage areas:

A. Crossbow and Bows Only - Main Gate to the east end of Peninsula.

B. Black Powder and Shotgun - Main Gate to western portion of base (areas 9, 11 & 12 and new property).

C. EXCEPTION: Water Fowl in Spoil Area and other designated areas of shoreline hunters may use Shot Gun (see 2012-2013 hunting map for identification of areas).

ARCHERY

1. Archery hunting is limited to longbows and recurve bows having a minimum pull of 40 pounds, compound bows with a minimum pull of 35 pounds, and crossbows with a minimum draw weight of 150 pounds and minimum broadhead width of 7/8 inch.

2. Archery hunters must be within a 100 yards of marked stand on hunting map when using a portable climbing stand.

FIREARMS

The use of firearms has the following restrictions:

a. During muzzle loading season, no other type of weapon may be used.

b. Shotguns will be no larger than 10-gauge. Ammunition will include shot for small game and birds, rifled slug only for deer.

c. When hunting migratory game birds, shotguns must be plugged to limit their maximum capacity to three (3) shells.

d. All waterfowl must be taken with steel shot or non-toxic loads.

DEER HUNTING

1. Deer Management Assistance Program (DMAP) has been integrated into our deer hunting program. The State has given HPDTA extra doe tags in order to increase the number of deer taken this season.

2. The Base is committed to a Quality Wildlife Management program which will include both deer harvest restrictions and supplemental wildlife food plantings. The goal of Base

management and Base hunters is the same; we wish to have a population of game on Base which are large, healthy, and in good male/female balance. To that end, instructions for deer hunting are as follows:

a. When harvesting antlered deer, hunters may take only deer whose antler spread is at least as wide as the animal's ears and has 8 points. Hunters must make every effort to avoid harvest of button bucks. A young buck left on base this year will be a trophy in future years.

b. Maps of deer stand locations are available at the main gate. All gun hunting for deer is to be performed from stands, and not from the ground.

c. All wounded deer must be reported either to the Base Game Warden or the Base Security Force. Hunters may track wounded deer for 100 meters from point of impact, and may finish off wounded deer within that distance from the ground. For distances beyond 100 meters from point of impact, hunters will not track wounded deer by themselves for safety reasons; they may only track these wounded deer after reporting
their intentions to the main gate security officer. Failure to report wounded deer will result in disciplinary action.

3. All deer hunters (archers, muzzleloaders, and shotgun hunters) are required to report any time they discharge their weapons while hunting. This report must be made to Security the same day the weapon was fired.

4. Persons using the skinning area are required to clean up after themselves.

5. Unusable, crippled or inedible game: If a hunter takes a deer that has previously been identified as crippled, inedible, or unhealthy (as determined by the Base Game Warden) the deer will not have to be checked with a tag, and becomes the property of the Base in its entirety. If the hunter keeps any part of said animal, then a tag is required for that animal regardless of any other physical condition.

USE of TM and/or GOVERNMENT VEHICLES

TM and/or government vehicles are permitted to be used for hunting within the main Base perimeter area only - not on the newer western plots across Goose Nest Road. Base management has approved the use of TM's (preferred) and GOV's for these purposes as hunters are officially assisting with Base's Natural Resource management programs with Base-sanctioned hunting activities. In

addition, Base is very concerned about the visibility of employee personal vehicles (POV's), the presence of State license plates and other location-associations within sensitive areas of our Base. As use of government vehicles for hunting is an officially-sanctioned activity, the rules governing damage to these vehicles on official business will apply and hunters may be subject to penalties if negligence is found to be involved. Operators of GOV's and TM's must be US Government employees or contractors only, and must abide by all vehicle regulations to include keeping to established roads.

SAFETY RULES

1. Loaded weapons will not be transported in a motor vehicle. Deer hunters must load and unload their weapons on the stand.

2. Never leave a weapon unattended without first unloading and securing it.

3. Report to the Base Game Warden any stand that is found to be unsafe.

4. Never point a weapon at anything you don't want to shoot.

5. Never hunt while under the influence of any intoxicant or drug. Persons found hunting under the influence may be banned from the base hunting program and may include other disciplinary action.

6. Hunters must carry a Base radio with them at all times. If you do not have a Base radio, you must report to the SOC upon arrival to have one assigned to you. Radios must be returned to the SOC prior to leaving the Base.

WATERFOWL

1. Waterfowl includes ducks, geese, and swans.

2. You must abide by all North Carolina regulations on limits, seasons, and ammunition.

3. Dogs are allowed for waterfowl hunting. Please see HPDTA Dog Hunting Policy.

4. Waterfowl areas are indicated in green on the map.

SMALL GAME

1. Small game includes squirrels, rabbits, doves, quail, and wild turkey.

2. You must abide *by* North Carolina regulations on limits, seasons, and ammunition.

3. Dogs are allowed for small game. Please see HPDTA Dog Hunting Policy.

4. Small game areas are indicated in red on map.

FISHING

Fishing at HPDTA is a privilege and as a government installation we abide *by* all the rules and regulations established by the state of North Carolina as well as federal regulations. Fishing without a valid North Carolina license or possessing fish out of season can put the Base at risk as well as the individual. Disciplinary action will be taken against the individual found breaking the law.

1. Includes all fish species that inhabit the waters around the base or seasonally passing through.

2. You muot have a North Carolina fighing license and abide by North Carolina regulations on catch limits, sizes, and seasons.

a. Please note Rock or Striped Bass Season is October 1, 2012 - April 30, 2013.

b. There is a three (3) bag limit per person per day. It is unlawful to possess striped bass or striped bass hybrids less than 18 inches in length.

c. It is unlawful to possess striped bass or striped bass hybrids from May 1 through September 30

3. Fishing can be done around the whole perimeter of the base unless an area is active and deemed unsafe by security.

PROHIBITED PRACTICES

1. Violation of any State or Federal hunting and fishing regulation.

2. Hunting without registering with the Game Warden.

3. Hunting in an area that has not been designated a

hunting area.

4. Hunting within 100 meters of the main gate guard building.

5. Hunting any species of game after obtaining the day's bag limit.

6. Taking or attempting to take any species of game from a motor vehicle.

7. Hunting on Base with a rifle.

8. Hunting in or near areas where official activity is being conducted.

9. Conducting unauthorized deer or wild bird drives.

10. Use of full automatic weapons.

11. Use of shotgun ammunition other than rifled slugs for deer.

12. Hunting or taking game on another person's h1.1Ilting license.

13. Failure to report discharge of weapon while deer hunting.

14. No personal ATVs or UTVs allowed. (No exceptions) .

15. No use of personal game cameras on Base property. Only those owned by the Environmental Safety Office are to be used.

16. Hunters changing stands without notifying the Game warden . (Hunters must be in the stand to which they were authorized-No exceptions.)

The management at HPDTA looks forward to another successful, safe hunting season for 2012 - 2013.

John A. Gerig

Director

Attachments:

A. Hunter's Memorandum of Understanding
B. Release and Hold Harmless Agreement
C. Hunting Consent Form for Minor Child

Distribution: **All Base Employees**

ATTACHMENT A

HUNTER'S MEMORANDUM OF UNDBRSTANDING

I understand that hunting on Harvey Point Defense Testing Activity is a privilege and not a right.

:r, , have read and understand the HPDTA Hunting Rules and Regulations. I also understand and agree to abide by all hunting laws issued by the State of North Carolina and a1l migratory game regulations prescribed by the U.S. Department of Interior Fish and Wildlife Service.

I understand that any violation of State or Federal game laws or articles of the Base rules will invalidate my hunting privileges on this Base and could lead to possible prosecution; loss of Base access; and, in the case of employees, disciplinary action. I agree to allow inspection of my bag limit, vehicle, and surrounding hunting area by Base Game Warden and Security Branch members at any time. X understand that refusal to allow such inspection will immediately cancel my Base hunting privileges.

Signature Date

Witness Signature Date

ATTACHMENT B

RELEASE AND HOLD HARMLESS AGREEMENT

In consideration for being allowed to participate in hunting, I hereby release the Harvey Point Defense Testing Activity, employees and management thereof, and the United States Government, from any liabilities or claims arising from my own participation. I agree that I will never prosecute or, in any way, aid in prosecuting any demand, claim, or suit against the United States Government for any loss, damage, or injury to my person or property that may occur from any cause whatsoever as a result of taking part in this activity.

I also understand and agree that I may be held liable for any damage or loss to the United States Government that is caused by my negligence, willful misconduct, or fraud.

I also take sole responsibility for the behavior and safety of any dependents I may bring on the facility to participate in hunting.

_____

Signature Date

_____

Witness Signature Date

ATTACBMBNT C

BUNTING CONSENT PORM POR MINOR ClliLD
(A CHILD MOST BB 10 YEARS OP AGB TO BUNT)

I:, _____ parent/legal guardian of minor child (full name) _____ consent to his/her take part in hunting activities on BPDTA property. I will abide by all Base hunting policies, and I am solely responsible for the behavior of the above-said child.

_____
Signature of Parent/Guardian

Date_____

_____
Witness Signature

_____
Date

§North Carolina Wildlife Resources Comi::nission —

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NORTH CAROLINA WILDLIFE RESOU ES COMMISSION

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APPENDIX D
Flora Species Potentially Occurring at HPDTA

Species	*Common Name*
Tree Species	
Acer rubrum	Red maple
Acer saccharinum	Silver maple
Alnus serrulata	Smooth alder
Betula nigra	River birch
Carpinus caroliniana	American hornbeam
Carya aquatica	Water hickory
Carya cordiformis	Bitternut hickory
Carya glabra	Pignut hickory
Carya ovata	Shagbark hickory
Carya tomentosa	Mockernut hickory
Cellis laevigata	Sugarberry
Chionanthus virginicus	Fringetree
Cornus florida	Flowering dogwood
Diospyros virginiana	Persimmon
Fagus grandifolia	American beech
Fraxinus pennsylvanica	Green ash
Ilex opaca	American holly
Juglans nigra	Black walnut
Juniperus virginiana	Eastern red cedar
Liquidambar styraciflua	Sweet gum
Liriodendron tulipifera	Yellow poplar
Magnolia grandiflora	Southern magnolia
Magnolia virginiana	Sweetbay
Nyssa sylvatica	Black gum (tupelo)
Ostrya virginiana	Eastern hophornbeam
Oxydendrum arboreum	Sourwood
Persea borbonia	Redbay
Pinus taeda	Loblolly pine
Platanus occidentalis	American sycamore
Populus deltoides	Eastern cottonwood
Prunus serotina	Wild black cherry
Quercus alba	White oak
Quercus falcata	Southern red oak
Quercus falcala var. pagodifolia	Cherrybark oak
Quercus laurifolia	Laurel oak
Quercus michauxii	Swamp chestnut oak
Quercus nigra	Water oak

Species	*Common Name*
Quercus phellos	Willow oak
Quercus rubra	Northern red oak
Quercus virginiana	Live oak
Salix nigra	Black willow
Sassafras albidum	Sassafras
Taxodium distichum	Bald cypress
Ulmus americana	American elm
Ulmus rubra	Slippery elm
Shrubs and Woody Vines	
Ampelopsis arborea	Peppervine
Aralia spinosa	Devil' s walking stick
Ascyrum hypericoides	St. Andrews-cross
Asimina triloba	Pawpaw
Berchemia scandens	Alabama supplejack
Bignonia capreolata	Crossvine
Callicarpa americana	American beautyberry
Cephalanthus occidentalis	Button- bush
Clethra alnifolia	Sweet pepper-bush
Craetaegus marshallii	Parsley hawthorn
Craetaegus uniflora	One- flower hawthorn
Cyrilla racemiflora	Swamp cyrilla
Gelsemium sempervirens	Yellow jessamine
Hamamelis virginiana	Witch hazel
Ilex cassine	Dahoon
Ilex glabra	Inkberry
Ilex vomitoria	Yaupon
Leucothoe axillaris	Coastal dog hobble
Leucothoe racemosa	Fetter-bush
Lindera benzoin	Spice bush
Lonicera japonica	Japanese honeysuckle
Lyonia lucida	Fetter-bush
Myrica cerifera	Southern wax myrtle
Parthenocissus quinquefolia	Virginia creeper
Rhododendron serrulatum	Hammocksweet azalea
Rhododendron viscosum	Swamp azalea
Rhododendron nudiflorum	Pinxter flower
Rhus copallina	Shining sumac
Rhus glabra	Smooth sumac
Rubus spp.	Dewberries , blackberries , raspberries
Sambucus canadensis	Elderberry
Smilax bona-nox	Saw greenbrier

Species	*Common Name*
Smilax glauco	Cat greenbrier
Smilax laurifolia	Laurel-leaf greenbrier
Smilax rotundifolia	Common greenbrier
Smilax smallii	Lanceleaf greenbrier
Symplocos tinctoria	Horse-sugar
Toxicodendron radicans	Poison ivy
Vaccinium angustifolium	Low-bush blueberry
Vaccinium arboreum	Farkleberry
Vaccinium corymbosum	High-bush blueberry
Viburnum acerifolium	Mapleleaf viburnum
Viburnum dentatum	Arrowood viburnum
Viburnum rufidulum	Rusty blackhaw
Vitis aestivalis	Summer grape
Vitis rotundifolia	Muscadine grape
Herbaceous	
Achillea millefolium	Yarrow
Agropyron repens	Quackgrass
Agrostemma githago	Corncockle
Allium canadense	Meadow onion
Allium vineale	Field garlic
Amaranthus retroflexus	Red-root amaranth
Ambrosia artemisiifolia	Common ragweed
Andropogon glomeratus	Bushy bluestem
Andropogon virginicus	Broomsedge
Anthemis cotula	Mayweed
Apocynum cannabinum	Clasping-leaf dogbane
Arctium minus	Burdock
Arisaema triphyllum	Jack-in-the pulpit
Arundinaria gigantea	Giant cane
Asclepias syriaca	Common milkweed
Asplenium platyneuron	Ebony spleenwort
Athyrium asplenioides	Southern lady fern
Barbarea vulgaris	Yellow rocket
Botrychium dissectum	Common grape fern
Brassica nigra	Black mustard
Campsis radicans	Trumpet creeper
Capsella bursa-pastoris	Sheperd's purse
Carex complanata	Hirsute sedge
Carex lurida	Shallow sedge
Cassia fasciculata	Partridgepea
Cenchrus spp.	Sandbur

Species	*Common Name*
Centaurea cyanus	Bachelor's button
Cerastium vulgatum	Mouse-ear chickweed
Chasmanthium laxa	Slender spike grass
Chenopodium album	White goosefoot
Chrysopsis graminifolia	Grass-leaved goldenaster
Cicuta maculata	Water hemlock
Cirsium arvense	Creeping thistle
Cirsium vulgare	Bull thistle
Coreopsis lanceolata	Lanceleaf tickseed
Crotalaria sagittalis	Weedy rattlebox
Croton capitatus	Wooly croton
Ctenium aromaticum	Toothache grass
Cuscuta spp.	Dodder
Cynodon dactylon	Bermuda grass
Cyperus rotundus	Purple flatsedge
Cyperus virens	Green flatsedge
Cypripedium acaule	Pink lady's slipper
Dactylis glomerata	Orchard grass
Daucus carota	Wild carrot
Dennstaedtia punctilobula	Hay-scented fern
Desmodium ciliara	Littleleaf tick-trefoil
Digitaria sanguinalis	Crab grass
Diodia teres	Buttonweed
Dryopteris intermedia	Evergreen wood fern
Echinochloa crusgalli	Barnyard grass
Eleocharis microcarpa	Small-fruit spikerush
Eleusine indica	Goose grass
Erigeron strigosus	Prairie fleabane
Eryngium yuccifolium	Rattlesnake-master
Eupatorium album	White-bracted eupatorium
Eupatorium capillifolium	Dogfennel
Eupatorium hyssopifolium	Hyssopleaf eupatorium
Eupatorium rotundifolium	Roundleaf eupatorium
Euphorbia maculata	Spotted broomsedge
Euphorbia supina	Prostrate spurge
Festuca arundinacea	Kentucky 31 tall fescue
Gentiana clausa	Closed gentian
Geranium carolinianum	Carolina cranes-bill
Glecoma hederacea	Ground ivy
Goodyera repens	Rattlesnake plantain
Helenium amarum	Five-leaf sneezeweed
Helianthus angustifolius	Swamp sunflower

Species	*Common Name*
Hexastylis arifolia	Little brown jug
Hibiscus moscheutos	Swamp rose mallow
Impatiens capensis	Jewel-weed
Ipomoea hederacea	Ivy-leaved morning glory
Ipomoea purpurea	Common morning glory
Iris virginica	Blue flag
Juncus biflorus	Turnflower rush
Juncus effusus	Soft rush
Juncus scirpoides	Needlepod rush
Juncus tenvis	Slender rush
Lactuca serriola	Prickly lettuce
Lamium amplexicaule	Henbit
Lemna spp.	Duckweed
Lepidium virginicum	Poor-man's peppergrass
Lespedeza striata	Japanese clover
Listera australis	Southern twayblade
Lobelia cardinalis	Cardinal flower
Lobelia puberula	Downy lobelia
Medicago lupulina	Black medic
Mitchella repens	Partridge berry
Mollugo verticillata	Green carpet-weed
Muhlenbergia expanse	Cut-over muhly
Muhlenbergia schraberi	Nimble-will
Onoclea sensibilis	Sensitive fern
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Oxalis stricta	Yellow wood sorrel
Panicum aciculare	Narrowleaf panic grass
Panicum anceps	Beaked panic grass
Panicum dichotomiflorum	Fall panic grass
Panicum virgatum	Switchgrass
Paspalum dilatalum	Dallis grass
Paspalum floridanum	Florida paspalum
Phytolacca americana	Pokeweed
Plantago aristata	Bracted plantain
Plantago lanceolata	Buckhorn plaintain
Plantago major	Plaintain
Poa annua	Annual blue grass
Podophyllum peltatum	May-apple
Polygonum aviculare	Knotweed
Polygonum convolvulus	Black bindweed
Polygonum erectum	Erect knotweed

Species	*Common Name*
Polygonum pennsylvanicum	Pennsylvania smartweed
Polygonum persicaria	Lady's thumb
Polypodium polypodioides	Resurrection fern
Polystichum acrostichoides	Christmas fern
Pontederia cordata	Pickerelweed
Portulaca oleracea	Common purslane
Prunella vulgaris	Heal-all
Pteridium aquilinum	Bracken fern
Rhexia mariana	Pale meadow-beauty
Rhexia virginica	Meadow- beauty
Rhynchospora globularis	Globe beakrush
Rhynochosia difformis	Hairy rhynchosia
Rudbeckia hirta	Black-eyed susan
Rumex crispus	Curly dock
Rumex obtussifolius	Bitter dock
Saururus cernuus	Lizard' s tail
Setaria glauca	Yellow bristle grass
Setaria viridis	Green bristle grass
Sida spinosa	Prickly sida
Sisyrinchium angustifolium	Blue-eyed grass
Solanum carolinense	Horse nettle
Solidago odora	Fragrant goldenrod
Sonchus arvensis	Perennial sow thistle
Sorghum halepense	Johnson grass
Sporobolus indicus	Smut grass
Sporobolus junceus	Piney woods dropseed
Stellaria media	Common chickweed
Taraxacum officinale	Dandelion
Thelypteris noveboracensis	New York fern
Thelypteris palustris	Marsh fern
Thlaspi arvense	Field penny-cress
Tipularia discolor	Crane-fly orchid
Trifolium repens	White clover
Typha angustifolia	Narrow-leaved cattail
Vicia sativa	Common vetch
Woodwardia areolata	Netted chain-fern
Woodwardia virginica	Virginia netted chain-fern
Xanthium pennsylvanicum	Cocklebur

APPENDIX E
Fauna Species Potentially Occurring at HPDTA

Species	*Common Name*
MAMMALS OCCURRING AT HPDTA	
Marsupials: *Marsupialia*	
Didelphis marsupialis	Opossum
Insectivores: *Insectivora*	
Blarina brevicauda	Short- tailed shrew
Cryptotis parva	Least shrew
Bats: *Chiroptera*	
Lasionycteris noctivagans	Silver haired bat
Lasiurus borealis	Northern red bat
Gnawing Mammals: *Rodentia*	
Castor canadensis	Beaver
Lutra canadensis	River otter
Microtus pennsylvanicus	Meadow vole
Pitymys pinetorum	Pine vole
Mus musculus	House mouse
Myocastor coypus	Nutria
Ondatra zibethica	Muskrat
Oryzomys palustris	Marsh rice rat
Peromyscus leucopus	White- footed mouse
Rattus norvegicus	Norway rat
Rattus rattus	Black rat
Reithrodontomys humulis	Eastern harvest mouse
Scalopus aquaticus	Eastern mole
Sciurus carolinensis	Gray squirrel
Sigmodon hispidus	Hispid cotton rat
Synaptomys cooperi	Southern bog lemming
Pikes, Hares, & Rabbits: *Lagomorpha*	
Sylvilagus floridanus	Eastern cottontail
Sylvilagus palustris	Marsh rabbit
Hoofed Mammals: *Artiodactyla*	
Odocoileus virginianus	White- tailed deer
Carnivores: *Carnivora*	
Lynx rufus	Bobcat
Mustela frenata	Long- tailed weasel
Procyon lotor	Raccoon
Urocyon cinereoargenteus	Gray fox
Ursus americanus	Black bear
Vulpes vulpes	Red fox
AMPHIBIANS OCCURRING AT HPDTA	
Salamanders	
Ambystoma opacum	Marbled salamander
Amphiuma means	Two-toed amphiuma
Desmognathus auriculatus	Southern dusky salamander
Eurycea cirrigera	Southern two-lined salamander
Necturus punctatus	Dwarf waterdog
Notophthalmus viridescens viridescens	Red-spotted newt
Plethodon glutinosus	Slimy salamander

Species	*Common Name*
Siren intermedia	Lesser siren
Siren lacertina	Greater siren
Stereochilus marginatus	Many-lined salamander
Frogs and Toads	
Acris gryllus	Southern cricket frog
Bufo quercicus	Oak toad
Bufo terrestris	Southern toad
Bufo woodhousii fowleri	Fowler's toad
Gastrophryne carolinensis	Eastern narrow-mouthed toad
Hyla chrysocelis	Gray treefrog
Hyla cinerea	Green treefrog
Hyla femoralis	Pine woods treefrog
Hyla squirella	Squirrel treefrog
Hyla versicolor	Gray treefrog
Pseudacris brimleyi	Brimley's chorus frog
Pseudacris crucifer	Spring peeper
Pseudacris ocularis	Little grass frog
Rana catesbeiana	Bullfrog
Rana clamitans melanota	Green frog
Rana palustris	Pickerel frog
Rana utricularia	Southern leopard frog
Rana virgatipes	Carpenter frog
Scaphiopus holbrookii holbrookii	Eastern spadefoot
Reptiles	
Turtles	
Chelydra serpentina	Common snapping turtle
Clemmys guttata	Spotted turtle
Pseudemys rubriventris	Red- bellied turtle
Sternotherus ororatus	Stinkpot turtle
Terrapene carolina carolina	Eastern box turtle
Trachemys scripta scripta	Yellow- bellied slider
Lizards	
Eumeces fasciatus	Five- lined skink
Eumeces inexpectatus	Southeastern five- lined skink
Eumeces laticeps	Broad- headed skink
Scincefla lateralis	Ground skink
Snakes	
Agkistrodon contortrix contortrix	Southern copperhead
Agkistrodon piscivorus piscivorus	Eastern cottonmouth
Carphophis amoenus amoenus	Eastern worm snake
Coluber constrictor constrictor	Northern black racer
Diadophis punctatus punctatus	Southern ringneck snake
Elaphe obsoleta obsoleta	Black rat snake
Farancia abacura abacura	Eastern mud snake
Heterodon platirhinos	Eastern hog-nosed snake
Lampropeltis getula getula	Eastern kingsnake
Nerodia erythrogaster erythrogaster	Redbelly water snake
Nerodia taxispilota	Brown water snake
Opheodrys aestivus	Rough green snake
Storeria dekayi dekayi	Northern brown snake
Thamnophis sirtalis sirtalis	Eastern garter snake

BIRD SPECIES OCCURRING AT HPDTA	
Acadian flycatcher	European starling
American crow	Field sparrow
American goldfinch	Fish crow
American kestrel	Franklin's gull
American robin	Grasshopper sparrow
American woodcock	Gray catbird
Bald Eagle	Great blue heron
Barn swallow	Great crested flycatcher
Barred owl	Great egret
Belted kingfisher	Great horned owl
Black and white warbler	Green-backed heron
Blue grosbeak	Hairy woodpecker
Blue jay	Hermit thrush
Blue-gray gnatcatcher	Herring gull
Blue-winged warbler	Hooded warbler
Bonaparte's gull	House finch
Brown creeper	House sparrow
Brown-headed nuthatch	Indigo bunting
Brown pelican	Kentucky warbler
Brown thrasher	Killdeer
Brown- headed cowbird	Laughing gull
Canada goose	Least tern
Carolina chickadee	Louisiana waterthrush
Carolina wren	Mallard
Caspian tern	Mourning dove
Cedar waxwing	Northern bobwhite
Chipping sparrow	Northern cardinal
Common grackle	Northern flicker
Common yellowthroat	Northern harrier
Cooper's hawk	Northern mockingbird
Dark-eyed junco	Northern parula warbler
Doublecrested comorant	Northern waterthrush
Downy woodpecker	Osprey
Eastern bluebird	Ovenbird
Eastern kingbird	Pileated woodpecker
Eastern meadowlark	Pine warbler
Eastern phoebe	Prairie warbler
Eastern wood peewee	Prothonotary warbler
Purple martin	Swainson's warbler
Red- bellied woodpecker	Tree swallow
Red- breasted nuthatch	Tufted titmouse
Red-eyed vireo	Turkey vulture
Red-shouldered hawk	Veery
Red- tailed hawk	Whip- poor-will
Red-winged blackbird	White- breasted nuthatch
Ring- billed gull	White-eyed vireo
Rock dove	White- throated sparrow
Ruby-crowned kinglet	Willow flycatcher
Ruby-throated hummingbird	Wood duck
Rufous-sided towhee	Wood thrush
Scarlet tanager	Worm-eating warbler
Screech owl	Yellow warbler

BIRD SPECIES OCCURRING AT HPDTA	
Sharp-shinned hawk	Yellow-bellied sapsucker
Snowy egret	Yellow-billed cuckoo
Solitary sandpiper	Yellow- breasted chat
Song sparrow	Yellow-rumped warbler
Spotted sandpiper	Yellow-throated vireo
Summer tanager	

APPENDIX F
Fin Fish and Shellfish Species Potentially Occurring in the Perquimans River & Albemarle Sound

Species	*Common Name*
Acipenser oxyrhynchus	***Atlantic sturgeon****
Acipenser brevirostrum	***Shortnose sturgeon****
Lepisostaus osseus	Longnose gar
Amia calva	Bowfin
Anguilla rostrata	American eel
Alosa aestivalis	***Blueback herring****
Alosa mediocris	Hickory shad
Alosa pseudoharengus	***Alewife****
Alosa sapidissima	American shad
Brevoortia tyrannus	Atlantic menhaden
Dorosoma cepedianum	Gizzard shad
Anchoa mitchilli	Bay anchovy
Anchoa hepsetus	Striped anchovy
Cyprinella analostana	Satinfin shiner
Hybognathus regius	Eastern silvery minnow
Notropis hudsonius	Spottail shiner
Ameiurus callis	White catfish
Ameiurus natalis	Yellow bullhead
Ameiurus nebulosus	Brown bullhead
Ictalurus punctatus	Channel catfish
Menida peninsulae	Tidewater silverside
Morone americana	White perch
Morone saxatilis	Striped bass
Lepomis auritus	Redbreast sunfish
Lepomis gibbosus	Pumpkinseed
Lepomis macrochirus	Bluegill
Micropterus salmoides	Largemouth bass
Etheostoma olmstedi	Tessellated dartes
Pomatomus saltatrix	Bluefish
Bairdiefla chrysoura	Silver perch
Cynoscion nebulosus	Spotted seatrout
Cynoscion regalis	Weakfish
Leiostomus xanthurus	Spot
Micropogonias undulatus	Atlantic croaker
Sciaenops oceflatus	Red drum
Mugil cephalus	Striped mullet
Paralichthys lethostigma	Southern flounder
Perea flavescens	Yellow perch

Archosargus probatocephalus	Sheepshead
Cyprinus carpio	Carp
Fundulus diaphanus	Banded killifish
Notemigonus crysoleucas	Golden shiner
Trinectes maculatus	Hogchoker
Dorosoma petenense	Threadfin shad
Strongylura marina	Atlantic needlefish
Elops saurus	Ladyfish
Callinectes sapidus	Blue crab
Palaemoneles spp	Grass shrimp

Source: North Carolina Division of Marine Fisheries

* Three species on the above list are considered rare: the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrhynchus*) are Federally listed as an endangered species; the Blueback herring (*Alosa aestivalis*) is listed as a Species of Concern beginning in 2006, and the Alewife (*Alosa pseudoharengus*) is listed as a Species of Concern beginning in 2006.

APPENDIX G
National Bald Eagle Management Guidelines as determined by the USFWS (May 2007)

NATIONAL BALD EAGLE MANAGEMENT GUIDELINES

U.S. Fish and Wildlife Service

May 2007

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INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service (Service) developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

The Guidelines are intended to:

(1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law,

(2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and

(3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

While the Guidelines include general recommendations for land management practices that will benefit bald eagles, the document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing bald eagles. Many States and some tribal entities have developed state-specific management plans, regulations, and/or guidance for landowners and land managers to protect and enhance bald eagle habitat, and we encourage the continued development and use of these planning tools to benefit bald eagles.

Adherence to the Guidelines herein will benefit individuals, agencies, organizations, and companies by helping them avoid violations of the law. However, the Guidelines themselves are not law. Rather, they are recommendations based on several decades of behavioral observations, science, and conservation measures to avoid or minimize adverse impacts to bald eagles.

The U.S. Fish and Wildlife Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be sustained. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. Although it is not possible to absolve individuals and entities from liability under the Eagle Act or the MBTA, the Service exercises enforcement discretion to focus on those individuals, companies, or agencies that take migratory birds without regard for the consequences of their actions and the law, especially when conservation measures, such as these Guidelines, are available, but have not been implemented. The Service will prioritize its enforcement efforts to focus on those individuals or entities who take bald eagles or their parts, eggs, or nests without implementing appropriate measures recommended by the Guidelines.

The Service intends to pursue the development of regulations that would authorize, under limited circumstances, the use of permits if "take" of an eagle is anticipated but unavoidable. Additionally, if the bald eagle is delisted, the Service intends to provide a regulatory mechanism to honor existing (take) authorizations under the Endangered Species Act (ESA).

During the interim period until the Service completes a rulemaking for permits under the Eagle Act, the Service does not intend to refer for prosecution the incidental "*take*" of any bald eagle under the MBTA or Eagle Act, if such take is in full compliance with the terms and conditions of an incidental take statement issued to the action agency or applicant under the authority of section 7(b)(4) of the ESA or a permit issued under the authority of section 10(a)(1)(B) of the ESA.

The Guidelines are applicable throughout the United States, including Alaska. The primary purpose of these Guidelines is to provide information that will minimize or prevent violations only of *Federal* laws governing bald eagles. In addition to Federal laws, many states and some smaller jurisdictions and tribes have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines. If you are planning activities that may affect bald eagles, we therefore recommend that you contact both your nearest U.S. Fish and Wildlife Service Field Office (see the contact information on p.16) and your state wildlife agency for assistance.

LEGAL PROTECTIONS FOR THE BALD EAGLE

The Bald and Golden Eagle Protection Act

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb'' means:

> "Disturb means 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-induced 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.

A violation of the Act can result in a criminal fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The Migratory Bird Treaty Act
The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."

Copies of the Eagle Act and the MBTA are available at: http://permits.fws.gov/ltr/ltr.shtml.

State laws and regulations
Most states have their own regulations and/or guidelines for bald eagle management. Some states may continue to list the bald eagle as endangered, threatened, or of special concern. If you plan activities that may affect bald eagles, we urge you to familiarize yourself with the regulations and/or guidelines that apply to bald eagles in your state. Your adherence to the Guidelines herein does not ensure that you are in compliance with state laws and regulations because state regulations can be more specific and/or restrictive than these Guidelines.

NATURAL HISTORY OF THE BALD EAGLE

Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. After severely declining in the lower 48 States between the 1870s and the 1970s, bald eagles have rebounded and re-established breeding territories in each of the lower 48 states. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Juvenile bald eagles have mottled brown and white plumage, gradually acquiring their dark brown body and distinctive white head and tail as they mature. Bald eagles generally attain adult plumage by 5 years of age. Most are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Bald eagles may live 15 to 25 years in the wild. Adults weigh 8 to 14 pounds (occasionally reaching 16 pounds in Alaska) and have wingspans of 5 to 8 feet. Those in the northern range are larger than those in the south, and females are larger than males.

Where do bald eagles nest?

Breeding bald eagles occupy "territories," areas they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). The Eagle Act prohibits removal or destruction of both active and alternate bald eagle nests. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year. Some territories are known to have been used continually for over half a century.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.

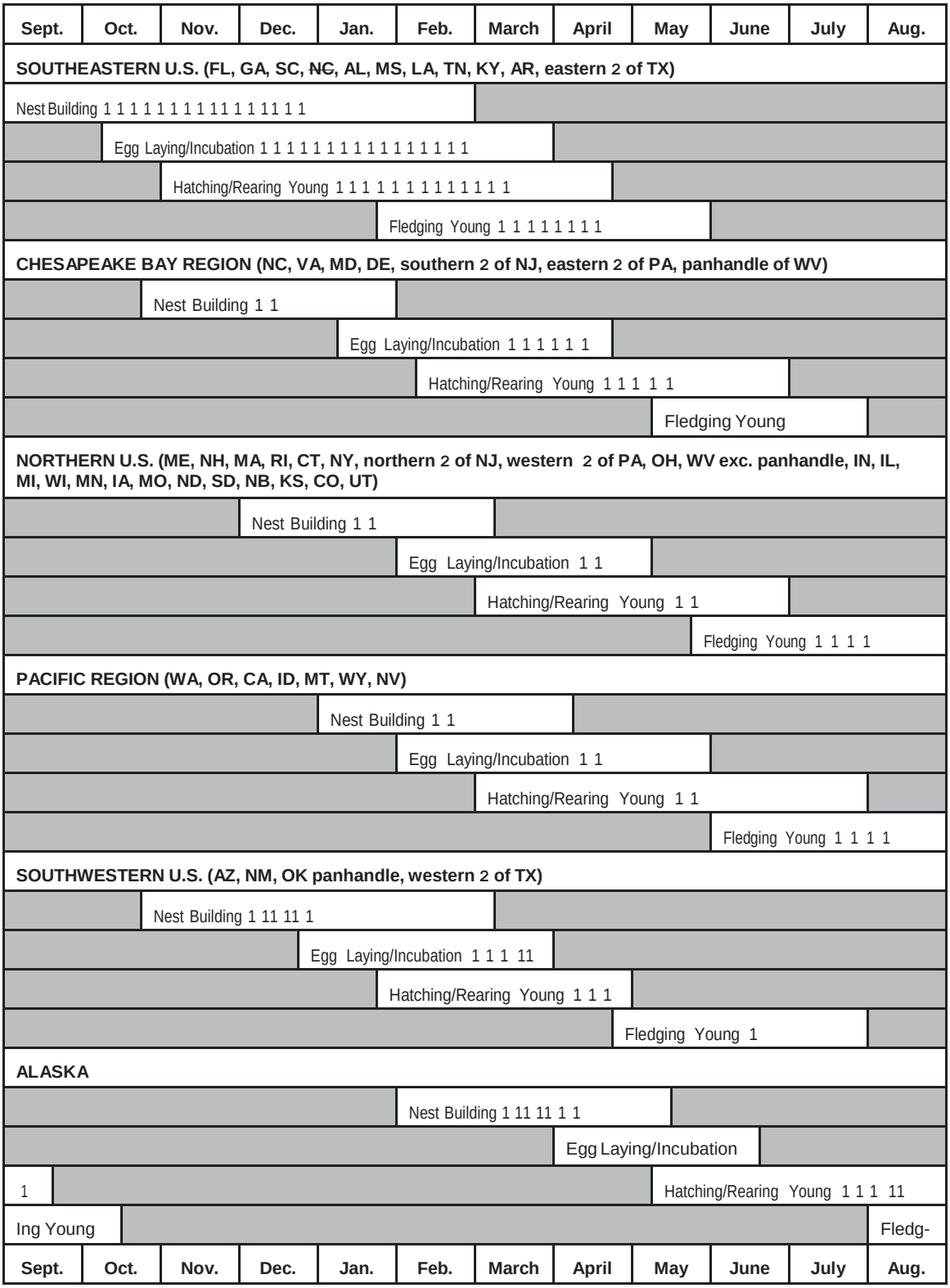
The range of breeding bald eagles in 2000 (shaded areas). This map shows only the larger concentrations of nests; eagles have continued to expand into additional nesting territories in many states. The dotted line represents the bald eagle's wintering range.

When do bald eagles nest?

Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the U.S., ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching, and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

The bald eagle breeding season tends to be longer in the southern U.S., and re-nesting following an unsuccessful first nesting attempt is more common there as well. The following table shows the timing of bald eagle breeding seasons in different regions of the country. The table represents the range of time within which the majority of nesting activities occur in each region and does not apply to any specific nesting pair. Because the timing of nesting activities may vary within a given region, you should contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16) and/or your state wildlife conservation agency for more specific information on nesting chronology in your area.

Chronology of typical reproductive activities of bald eagles in the United States.



How many chicks do bald eagles raise?
The number of eagle eggs laid will vary from 1-3, with 1-2 eggs being the most common. Only one eagle egg is laid per day, although not always on successive days. Hatching of young occurs on different days with the result that chicks in the same nest are sometimes of unequal size. The overall national fledging rate is approximately one chick per nest, annually, which results in a healthy expanding population.

What do bald eagles eat?
Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles also take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

The impact of human activity on nesting bald eagles
During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability 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 tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table.

Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

The impact of human activity on foraging and roosting bald eagles

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles

from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES

In developing these Guidelines, we relied on existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and Federal biologists who monitor the impacts of human activity on eagles. Despite these resources, uncertainties remain regarding the effects of many activities on eagles and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the collection of better biological data on the response of eagles to disturbance as a high priority. To the extent that resources allow, the Service will continue to collect data on responses of bald eagles to human activities conducted according to the recommendations within these Guidelines to ensure that adequate protection from disturbance is being afforded, and to identify circumstances where the Guidelines might be modified. These data will be used to make future adjustments to the Guidelines.

To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer. Consequently, in open areas, the distance between the activity and the nest may need to be larger than the distances recommended under Categories A and B of these guidelines (pg. 12) if no landscape buffers are present. The height of the nest above the ground may also ameliorate effects of human activities; eagles at higher nests may be less prone to disturbance.

In addition to the physical features of the landscape and nest site, the appropriate size for the distance buffer may vary according to the historical tolerances of eagles to human activities in particular localities, and may also depend on the location of the nest in relation

to feeding and roosting areas used by the eagles. Increased competition for nest sites may lead bald eagles to nest closer to human activity (and other eagles).

Seasonal restrictions can prevent the potential impacts of many shorter-term, obtrusive activities that do not entail landscape alterations (e.g. fireworks, outdoor concerts). In proximity to the nest, these kinds of activities should be conducted only outside the breeding season. For activities that entail both short-term, obtrusive characteristics and more permanent impacts (e.g., building construction), we recommend a combination of both approaches: retaining a landscape buffer *and* observing seasonal restrictions.

For assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, we encourage you to contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16).

Existing Uses

Eagles are unlikely to be disturbed by routine use of roads, homes, and other facilities where such use pre-dates the eagles' successful nesting activity in a given area. Therefore, in most cases *ongoing* existing uses may proceed with the same intensity with little risk of disturbing bald eagles. However, some *intermittent, occasional, or irregular* uses that pre-date eagle nesting in an area may disturb bald eagles. For example: a pair of eagles may begin nesting in an area and subsequently be disturbed by activities associated with an annual outdoor flea market, even though the flea market has been held annually at the same location. In such situations, human activity should be adjusted or relocated to minimize potential impacts on the nesting pair.

ACTIVITY-SPECIFIC GUIDELINES

The following section provides the Service=s management recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of bald eagle nests. Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Activities with similar or comparable impacts are grouped together.

In most cases, impacts will vary based on the visibility of the activity from the eagle nest and the degree to which similar activities are already occurring in proximity to the nest site. Visibility is a factor because, in general, eagles are more prone to disturbance when an activity occurs in full view. For this reason, we recommend that people locate activities farther from the nest structure in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The recommendations also take into account the existence of similar activities in the area because the continued presence of nesting bald eagles in the vicinity of the existing activities indicates that the eagles in that area can tolerate a greater degree of human activity than we can generally expect from eagles in areas that experience fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, we have incorporated the recommendations for some activities into a table (categories A and B).

First, determine which category your activity falls into (between categories A – H). If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity represented.

If your activity is under A or B, our recommendations are in table form. The vertical axis shows the degree of visibility of the activity from the nest. The horizontal axis (header row) represents the degree to which similar activities are ongoing in the vicinity of the nest. Locate the row that best describes how visible your activity will be from the eagle nest. Then, choose the column that best describes the degree to which similar activities are ongoing in the vicinity of the eagle nest. The box where the column and row come together contains our management recommendations for how far you should locate your activity from the nest to avoid disturbing the eagles. The numerical distances shown in the tables are the closest the activity should be conducted relative to the nest. In some cases we have included additional recommendations (other than recommended *distance* from the nest) you should follow to help ensure that your activity will not disturb the eagles.

Alternate nests

For activities that entail permanent landscape alterations that may result in bald eagle disturbance, these recommendations apply to both active and alternate bald eagle nests. Disturbance becomes an issue with regard to alternate nests if eagles return for breeding purposes and react to land use changes that occurred while the nest was inactive. The likelihood that an alternate nest will again become active decreases the longer it goes unused. If you plan activities in the vicinity of an alternate bald eagle nest and have information to show that the nest has not been active during the preceding 5 breeding seasons, the recommendations provided in these guidelines for avoiding disturbance around the nest site may no longer be warranted. The nest itself remains protected by other provisions of the Eagle Act, however, and may not be destroyed.

If special circumstances exist that make it unlikely an inactive nest will be reused before 5 years of disuse have passed, and you believe that the probability of reuse is low enough to warrant disregarding the recommendations for avoiding disturbance, you should be prepared to provide all the reasons for your conclusion, including information regarding past use of the nest site. Without sufficient documentation, you should continue to follow these guidelines when conducting activities around the nest site. If we are able to determine that it is unlikely the nest will be reused, we may advise you that the recommendations provided in these guidelines for avoiding disturbance are no longer necessary around that nest site.

This guidance is intended to minimize disturbance, as defined by Federal regulation. In addition to Federal laws, most states and some tribes and smaller jurisdictions have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines.

Temporary Impacts

For activities that have temporary impacts, such as the use of loud machinery, fireworks displays, or summer boating activities, we recommend seasonal restrictions. These types of activities can generally be carried out outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched (depending on the distance between the alternate nest and the active nest).

In general, activities should be kept as far away from nest trees as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized. If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity addressed, or contact your local U.S. Fish and Wildlife Service Field Office for additional guidance.

If you believe that special circumstances apply to your situation that increase or diminish the likelihood of bald eagle disturbance, or if it is not possible to adhere to the guidelines, you should contact your local Service Field Office for further guidance.

Category A:
Building construction, 1 or 2 story, with project footprint of ½ acre or less.
Construction of roads, trails, canals, power lines, and other linear utilities.
Agriculture and aquaculture – new or expanded operations.
Alteration of shorelines or wetlands.
Installation of docks or moorings.
Water impoundment.

Category B:
Building construction, 3 or more stories.
Building construction, 1 or 2 story, with project footprint of more than ½ acre.
Installation or expansion of marinas with a capacity of 6 or more boats.
Mining and associated activities.
Oil and natural gas drilling and refining and associated activities.

	If there is no similar activity within 1 mile of the nest	***If there is similar activity closer than 1 mile from the nest***
If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season. Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

The numerical distances shown in the table are the closest the activity should be conducted relative to the nest.

Category C. Timber Operations and Forestry Practices

- Avoid clear cutting or removal of overstory trees within 330 feet of the nest at any time.

- Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched.

- Selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the breeding season. Precautions such as raking leaves and woody debris from around the nest tree should be taken to prevent crown fire or fire climbing the nest tree. If it is determined that a burn during the breeding season would be beneficial, then, to ensure that no take or disturbance will occur, these activities should be conducted only when neither adult eagles nor young are present at 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). Appropriate Federal and state biologists should be consulted before any prescribed burning is conducted during the breeding season.

- Avoid construction of log transfer facilities and in-water log storage areas within 330 feet of the nest.

Category D. Off-road vehicle use (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

Category E. Motorized Watercraft use (including jet skis/personal watercraft). No buffer is necessary around nest sites outside the breeding season. During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity. Other motorized boat traffic passing within 330 feet of the nest should attempt to minimize trips and avoid stopping in the area where feasible, particularly where eagles are unaccustomed to boat traffic. Buffers for airboats should be larger than 330 feet due to the increased noise they generate, combined with their speed, maneuverability, and visibility.

Category F. Non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing). No buffer is necessary around nest sites outside the breeding season. If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

Category G. Helicopters and fixed-wing aircraft.
Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity.

Category H. Blasting and other loud, intermittent noises.
Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.

2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.

3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.

4. Do not use explosives within ½ mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.

5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.

ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.

1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.

2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.

3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.

4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.

5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.

6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.

7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.

8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.

9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.

CONTACTS

The following U.S. Fish and Wildlife Service Field Offices provide technical assistance on bald eagle management:

Alabama	Daphne	(251) 441-5181
Alaska	Anchorage	(907) 271-2888
	Fairbanks	(907) 456-0203
	Juneau	(907) 780-1160
Arizona	Phoenix	(602) 242-0210
Arkansas	Conway	(501) 513-4470
California	Arcata	(707) 822-7201
	Barstow	(760) 255-8852
	Carlsbad	(760) 431-9440
	Red Bluff	(530) 527-3043
	Sacramento	(916) 414-6000
	Stockton	(209) 946-6400
	Ventura	(805) 644-1766
	Yreka	(530) 842-5763
Colorado	Lakewood	(303) 275-2370
	Grand Junction	(970) 243-2778
Connecticut	(See New Hampshire)	
Delaware	(See Maryland)	
Florida	Panama City	(850) 769-0552
	Vero Beach	(772) 562-3909
	Jacksonville	(904) 232-2580
Georgia	Athens	(706) 613-9493
	Brunswick	(912) 265-9336
	Columbus	(706) 544-6428
Idaho	Boise	(208) 378-5243
	Chubbuck	(208) 237-6975
Illinois/Iowa	Rock Island	(309) 757-5800
Indiana	Bloomington	(812) 334-4261
Kansas	Manhattan	(785) 539-3474
Kentucky	Frankfort	(502) 695-0468
Louisiana	Lafayette	(337) 291-3100
Maine	Old Town	(207) 827-5938
Maryland	Annapolis	(410) 573-4573
Massachusetts	(See New Hampshire)	
Michigan	East Lansing	(517) 351-2555
Minnesota	Bloomington	(612) 725-3548
Mississippi	Jackson	(601) 965-4900
Missouri	Columbia	(573) 234-2132
Montana	Helena	(405) 449-5225
Nebraska	Grand Island	(308) 382-6468
Nevada	Las Vegas	(702) 515-5230
	Reno	(775) 861-6300
New Hampshire	Concord	(603) 223-2541
New Jersey	Pleasantville	(609) 646-9310
New Mexico	Albuquerque	(505) 346-2525
New York	Cortland	(607) 753-9334
	Long Island	(631) 776-1401
North Carolina	Raleigh	(919) 856-4520
	Asheville	(828) 258-3939
North Dakota	Bismarck	(701) 250-4481
Ohio	Reynoldsburg	(614) 469-6923
Oklahoma	Tulsa	(918) 581-7458
Oregon	Bend	(541) 383-7146
	Klamath Falls	(541) 885-8481
	La Grande	(541) 962-8584
	Newport	(541) 867-4558
	Portland	(503) 231-6179
	Roseburg	(541) 957-3474
Pennsylvania	State College	(814) 234-4090
Rhode Island	(See New Hampshire)	
South Carolina	Charleston	(843) 727-4707
South Dakota	Pierre	(605) 224-8693
Tennessee	Cookeville	(931) 528-6481
Texas	Clear Lake	(281) 286-8282
Utah	West Valley City	(801) 975-3330
Vermont	(See New Hampshire)	
Virginia	Gloucester	(804) 693-6694
Washington	Lacey	(306) 753-9440
	Spokane	(509) 891-6839
	Wenatchee	(509) 665-3508
West Virginia	Elkins	(304) 636-6586
Wisconsin	New Franken	(920) 866-1725
Wyoming	Cheyenne	(307) 772-2374
	Cody	(307) 578-5939

National Office

U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, MBSP-4107
Arlington, VA 22203-1610

(703) 358-1714
http://www.fws.gov/migratorybirds

State Agencies

To contact a state wildlife agency, visit the Association of Fish & Wildlife Agencies' website at http://www.fishwildlife.org/where_us.html

GLOSSARY

The definitions below apply to these National Bald Eagle Management Guidelines:

Communal roost sites – Areas where bald eagles gather and perch overnight – and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

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.

Fledge – To leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

Fledgling – A juvenile bald eagle that has taken the first flight from the nest but is not yet independent.

Foraging area – An area where eagles feed, typically near open water such as rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents) or carrion (such as at landfills) are abundant.

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 – A structure built, maintained, or used by bald eagles for the purpose of reproduction. An **active** nest is a nest that is attended (built, maintained or used) by a pair of bald eagles during a given breeding season, whether or not eggs are laid. An **alternate** nest is a nest that is not used for breeding by eagles during a given breeding season.

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 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.

Project footprint – The area of land (and water) that will be permanently altered for a development project, including access roads.

Similar scope – In the vicinity of a bald eagle nest, an existing activity is of similar scope to a new activity where the types of impacts to bald eagles are similar in nature, and the impacts of the existing activity are of the same or greater magnitude than the impacts of the potential new activity. Examples: (1) An existing single-story home 200 feet from a nest is similar in scope to an additional single-story home 200 feet from the nest; (2) An existing multi-story, multi-family dwelling 150 feet from a nest has impacts of a greater magnitude than a potential new single-family home 200 feet from the nest; (3) One existing single-family home 200 feet from the nest has impacts of a lesser magnitude than three single-family homes 200 feet from the nest; (4) an existing single-family home 200 feet from a communal roost has impacts of a lesser magnitude than a single-family home 300 feet from the roost but 40 feet from the eagles' foraging area. The existing activities in examples (1) and (2) are of similar scope, while the existing activities in example (3) and (4) are not.

Vegetative buffer – An area surrounding a bald eagle nest that is wholly or largely covered by forest, vegetation, or other natural ecological characteristics, and separates the nest from human activities.

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