Naval District Washington
Update of Integrated Natural Resources Management Plan

for Washington Navy Yard, Naval Support Facility Potomac Annex, Naval Support Facility Suitland, Naval Support Facility Arlington, and Naval Support Facility Naval Observatory

Prepared for:
Washington Division,
Naval Facilities Engineering Command
Washington, D.C.

Contract #: N62470-02-D-9997, Delivery Order 0095
Document cleared for public release.

Final
October 2010

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Prepared for:
Washington Division,
Naval Facilities Engineering Command
Washington, DC

Activity Point of Contact:
Ms. Maria A. Vargas

Prepared by:
Geo-Marine, Inc.
2713 Magruder Blvd., Suite D
Hampton, Virginia 23666

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for Naval District Washington Installations
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SIGNATURE PAGE (1 of 2)

The signatures below specify mutual consent for development and implementation of the Integrated Natural Resources Management Plan for Washington Navy Yard, Naval Support Facility Potomac Annex, Naval Support Facility Suitland, Naval Support Facility Arlington, and Naval Support Facility Naval Observatory.

Installation Commanding Officer	Date
Regional Director, U.S. Fish and Wildlife Service	Date
Director, District of Columbia Department of the Environment	Date
Director, Maryland Department of Natural Resources	Date
Director, Virginia Department of Game and Inland Fisheries	Date

SIGNATURE PAGE (2 of 2)

The signatures below specify mutual consent for development and implementation of the Integrated Natural Resources Management Plan for Washington Navy Yard, Naval Support Facility Potomac Annex, Naval Support Facility Suitland, Naval Support Facility Arlington, and Naval Support Facility Naval Observatory.

Installation Natural Resources Manager	Date
Natural Resources Manager, Naval Facilities Engineering Command Washington	Date

EXECUTIVE SUMMARY

The Department of Defense (DoD) manages approximately 25 million acres of land in the United States. Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP). This INRMP was prepared to encompass five Naval District Washington (NDW) installations, specifically including Washington Navy Yard, Naval Support Facility (NSF) Potomac Annex, Naval Support Facility (NSF) Suitland, Naval Support Facility (NSF) Arlington and Naval Support Facility (NSF) Naval Observatory in accordance with DoD Instruction 4715.3 – Environmental Conservation Program, Navy Series OPNAVINST 5090.1C – Environmental and Natural Resources Program Manual, 16 U.S. Code (USC) §670a-f – Sikes Act, as amended, and 32 Code of Federal Regulations (CFR) Part 190 – DoD Natural Resources Management Program.

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

In accordance with the Sikes Act, this INRMP was prepared in cooperation with the Secretary of the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service (USFWS), and the heads of Maryland Department of Natural Resources (MDNR), Virginia Department of Game and Inland Fisheries (VDGIF), and the District of Columbia Department of the Environment (DDOE), Fisheries & Wildlife Division. Because of this coordination effort, the INRMP reflects the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources. Future involvement of the federal and state wildlife agencies will ensure continued mutual agreement and cooperation in managing the natural resources at the five NDW installations outlined above. The effectiveness of this INRMP will be evaluated annually in cooperation with the appropriate field-level offices of the USFWS and state fish and wildlife agencies. Evaluation of the successes and issues resulting from INRMP implementation will be facilitated by the web-based Metrics Builder tool on the Navy Natural Resources Data Call Station website (https://clients.emainc.com/dcs/navfac/index.asp).

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

- Rare, Threatened, and Endangered Species Management
- Wildlife Management

- Vegetation Management including Grounds Maintenance
- Migratory Bird Management
- Invasive Species Management
- Geographic Information Systems Management
- Training of Natural Resources Personnel
- Coastal / Marine Management
- Floodplains Management

The management actions and projects identified in this INRMP are intended to help NDW installation commanders manage natural resources effectively, to ensure station lands remain available and in good condition, to support the military mission, and to ensure compliance with relevant environmental regulations. These actions incorporate the principles of ecosystem management and are consistent with Navy policy on sustainable, multiple use of natural resources on Navy property.

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ACRONYMS and ABBREVIATIONS

AFB	Air Force Base
BASH	Bird-Aircraft Strike Hazard
BMPs	best management practices
BRAC	Base Realignment and Closure
BUMED	Bureau of Medicine and Surgery
CAA	Clean Air Act
CBA	Chesapeake Bay Agreement
CBP	Chesapeake Bay Program
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIN	course identification number
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRMA	Commander Navy Region Mid-Atlantic
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DCA	Defense Communications Agency
DISA	Defense Information Systems Agency
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoN	Department of Navy
DDOE	District of Columbia Department of the Environment
EFH	essential fish habitat
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Projects Request
ERL	Environmental Readiness Level
ESA	Endangered Species Act
°F	degrees Fahrenheit
GIS	Geographic Information System
GPS	Global Positioning System
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPMP	Integrated Pest Management Plan
IPM	Integrated Pest Management
IR	Installation Restoration
IRP	Installation Restoration Program
LID	low impact development
MBTA	Migratory Bird Treaty Act
MDNR	Maryland Department of Natural Resources
MDE	Maryland Department of the Environment
MILCON	military construction
MOA	Memorandum of Agreement

ACRONYMS and ABBREVIATIONS (cont'd)

MOU	Memorandum of Understanding
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAVFAC	Naval Facilities Command
NDW	Naval District Washington
NEPA	National Environment Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMIC	National Maritime Intelligence Center
NPDES	National Pollution Discharge Elimination System
NSA	Naval Support Activity
NSF	Naval Support Facility
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Operating Instruction
OSD	Office of the Secretary of Defense
PPA	Pollution Prevention Act
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RDT&E	Research Development Test and Evaluation
RPM	Remedial Project Manager
SECNAVINST	Secretary of the Navy Instruction
SWAP	State Wildlife Action Plan
SWPPP	Storm Water Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USNO	U.S. Naval Observatory
VDGIF	Virginia Department of Game and Inland Fisheries
WAP	Wildlife Action Plan

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1. OVERVIEW

A. Purpose

To facilitate the natural resources program, Naval District Washington (NDW) must prepare and implement an Integrated Natural Resources Management Plan (INRMP) encompassing Washington Navy Yard, Naval Support Facility (NSF) Potomac Annex, Naval Support Facility (NSF) Suitland, Naval Support Facility (NSF) Arlington, and Naval Support Facility (NSF) Naval Observatory. The purpose of the INRMP is to ensure consistency with the use of military installations to support military preparedness, while providing for (1) the conservation and rehabilitation of natural resources on military installations; (2) the sustainable multipurpose use of the resources including hunting, fishing, trapping, and non-consumptive uses; and (3) public access to military installations within safety and military security requirements (Sikes Act). The INRMP must also ensure that natural resources management practices comply with all pertinent laws and regulations and are in accordance with Navy policy to incorporate ecosystem management as the basis for planning and management.

B. Scope

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

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

This INRMP primarily concerns natural resources management of the undeveloped, natural areas at the five NDW installations, but also applies to natural resource issues in developed areas such as support, administrative, and recreational areas.

C. Goals and Objectives

This INRMP is a long-term planning document that guides implementation of the natural resources program to help ensure support for the installation mission, while protecting and enhancing natural resources and providing a variety of outdoor recreational opportunities for station personnel. Goals of the INRMP are to:

- Identify the responsible parties and stakeholders concerned with natural resources management;

- Describe the current and future military mission and its requirements and constraints on natural resources;
- State the policies, management philosophy, and objectives of natural resources management;
- Provide information regarding the existing biological and physical conditions and the desired future conditions of the installations and the surrounding area;
- Identify key natural resource management issues and concerns at the installations and in the surrounding area;
- Identify and describe projects and management actions required to meet the objectives of natural resources management while ensuring no net loss in the capability of installation lands to support the military mission; and
- Identify scheduling priorities and funding opportunities for the implementation of natural resources projects and management actions.

D. Responsibilities

The responsibility for the development, revision, and implementation of INRMPs is shared by several command elements. The roles and responsibilities for Navy natural resources management are described in Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1C and in the Navy guidance for INRMP development and implementation (DoN 2006b). A summary of responsibilities for natural resources management at NDW installations follows.

Chief of Naval Operations (CNO) is the Echelon I command and serves as the principle leader to provide policy, guidance, and resources for the development, revision, and implementation of INRMPs. All INRMP projects must be submitted to EPRWeb for CNO approval.

Commander, Navy Installations Command (CNIC) is the Echelon II command under CNO responsible for Navy-wide shore installation management. CNIC has overall shore installation management responsibility and authority as the budget submitting office for installation support and is the Navy point of contact for installation policy and program execution oversight (CNIC 2007). CNIC must ensure the programming of resources necessary to maintain and implement INRMPs; participate in the development and revision of INRMPs; and provide oversight for all natural resources program elements.

The responsibilities of the Commanding Officers for the NDW installations are to ensure preparation, completion, and implementation of an INRMP and to systematically apply conservation practices set forth in the plan. It is the respective Commanding Officer's responsibility to act as steward of installation natural resources and integrated natural resources requirements into the day-to-day decision-making process; involve appropriate operational and training commands in the INRMP review process to ensure no net loss of military mission; and endorse the INRMP via Commanding Officer signature.

As part of a Joint Basing initiative resulting from the 2005 Defense Base Realignment and Closure law (BRAC), Bolling Air Force Base (AFB) in Washington, D.C. will join with NSF Anacostia to become Joint Base Anacostia-Bolling; transition begins fall, 2009, with an initial operating capability projected for January 2010 and a final operating capability to commence in October 2010 (BRAC 2005). All of these installations are components of the NDW Public Works Department, rather than stand alone installations. As a result, environmental compliance and other support for these installations is provided by NDW for the region.

The NDW Natural Resources Manager is primarily responsible for implementing this INRMP and coordinating with other personnel at the installations. Some of the implementation responsibilities include identifying personnel, internal or external to the installation, with expertise to perform the work identified; identifying the appropriate funding source to accomplish the projects; and ensuring installation personnel are familiar with the contents of this INRMP. The Natural Resources Manager is also responsible for ensuring this plan is reviewed in coordination with the U.S. Fish and Wildlife Service (USFWS), the Maryland Department of Natural Resources (MDNR), the Virginia Department of Game and Inland Fisheries (VDGIF), and the District of Columbia Department of the Environment (DDOE), Fisheries & Wildlife Division. Part of the new infrastructure required for Joint Base Anacostia-Bolling will be the creation and implementation of an INRMP.

E. Authority

In accordance with Department of Defense Instruction (DoDI) 4715.3, OPNAVINST 5090.1C, Naval Facilities Procedural Manual 73 (NAVFAC P-73), and 16 U.S. Code (USC) §670a-f (Sikes Act), the Department of the Navy (DoN) is required to implement and maintain a balanced and integrated program for the management of natural resources.

F. Stewardship and Compliance

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

This INRMP identifies both stewardship and compliance projects that help meet natural resources management goals. However, funding priority will be given to projects that are required to meet compliance criteria. Stewardship efforts that rely on volunteer labor and have

the support of the military community or have available alternate funding sources are also likely to be implemented.

G. Review and Revision

This INRMP is a long-term planning document that requires periodic reviews of management goals and practices in order to provide the opportunity to incorporate new science and information as well as assess the performance of management actions. Navy policy states that the INRMP must be reviewed annually by the installation with the cooperation of the appropriate field-level offices of the USFWS and state fish and wildlife agencies. MDNR is the lead fish and wildlife agency in Maryland, VGDIF in Virginia, and DDOE in the District of Columbia. Annual reviews enable project tracking and assessment, and help facilitate adaptive management. These reviews may be accomplished via correspondence or in a meeting between appropriate parties. The annual review is to verify that:

- Current information on all conservation metrics is available;
- All "must fund" projects and activities have been budgeted for and implementation is on schedule;
- All natural resources positions are filled or are in the process of being filled;
- Projects and activities for the upcoming year have been identified and included in the INRMP (an updated project list does not necessitate revising the INRMP);
- All required coordination has occurred; and
- All significant changes to the installation's mission requirements or its natural resources have been identified.

This evaluation is facilitated by the web-based Metrics Builder tool on the Natural Resources Data Call Station website. The Metrics Builder provides the means to evaluate performance in seven areas: INRMP implementation, partnerships/cooperation and effectiveness, team adequacy, INRMP impact on the installation mission, status of federally listed species and critical habitat, ecosystem integrity, fish and wildlife management, and public use.

Use of the Metrics Builder to conduct the INRMP annual reviews also generates Navy conservation program metrics to measure effects of the conservation program on the installation mission and the status of the Navy relationship with the USFWS and state fish and wildlife agencies.

The Metrics Builder is available on the Data Call Station website: https://clients.emainc.com/dcs/navfac/index.asp

Additionally, the INRMP must be reviewed, and if necessary revised, at intervals of not more than five years. Significant changes to the installation's mission requirements or natural resources would warrant an INRMP revision.

Periodic assessment is a necessary part of the natural resources planning process that evaluates program status, measures progress, and identifies new management issues, concerns, goals, and

objectives. The natural resources planning framework, programs, issues, concerns, goals, and objectives presented in this INRMP are based on an assessment of previous programs.

H. Commitment of the U.S. Fish and Wildlife Service and State Wildlife Agencies

Under the Sikes Act, INRMPs are required to reflect mutual agreement with the USFWS and appropriate state agencies concerning the management of fish and wildlife. Such mutual agreement and cooperation will support the principles of ecosystem management by improving the management of ecosystems that cross federal, state, and private boundaries.

Per Sikes Act requirements, the USFWS, MDNR, VDGIF, and DDOE cooperate in the development and review of this INRMP as to operation and effect at least once every five years. In addition to the formal five-year review, Navy policy requires annual reviews be conducted in coordination with the Sikes Act partners.

I. Management Strategy

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

Employing ecosystem management will help maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations (DoDI 4715.3 1996).

The basic principles and guidelines of ecosystem management are to:

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

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

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2. CURRENT CONDITIONS AND USE

A. Installation Information

(1) General Description

The five NDW installations addressed in this INRMP are located in close proximity to the Washington, D.C. metropolis (Table 2-1; Figure 2-1). Specifically, the installations discussed in this INRMP are located in the District of Columbia, Virginia, and Maryland. The Washington Navy Yard, NSF Naval Observatory, and NSF Potomac Annex are located in Washington, D.C.; NSF Arlington is located in Arlington, Virginia; and NSF Suitland is located in Suitland, Maryland.

Table 2-1. Location and Size of NDW Installations

Installation	Address or Location	Size (acres)
NSF Potomac Annex	23rd and E Streets NW Washington, D.C.	11.91
NSF Naval Observatory	3450 Massachusetts Avenue NW Washington, D.C.	72.1
Washington Navy Yard	901 M Street SE Washington, D.C.	77.9
NSF Suitland	4251 Suitland Road Suitland, MD	42.35
NSF Arlington	701 S. Court House Road Arlington, VA	31.48

a. NSF Potomac Annex

NSF Potomac Annex, headquarters of the Naval Medical Command, is located on approximately 11.91 acres at 23rd and E Streets, in the Foggy Bottom neighborhood of Washington, D.C. The property overlooks the Capital Mall and lies just north of the Lincoln Memorial.

b. NSF Naval Observatory

NSF Naval Observatory, also known as U.S. Naval Observatory (USNO), is located in northwest Washington, D.C., bounded by Massachusetts Avenue, Observatory Circle, and Calvert Street. Wisconsin Avenue is located approximately 300 feet from the Observatory and runs parallel to the southwest side. Rock Creek National Park lays approximately one-quarter of a mile west of the Observatory. The site is circular and covers 72.1 acres with a radius of 1,000 feet.

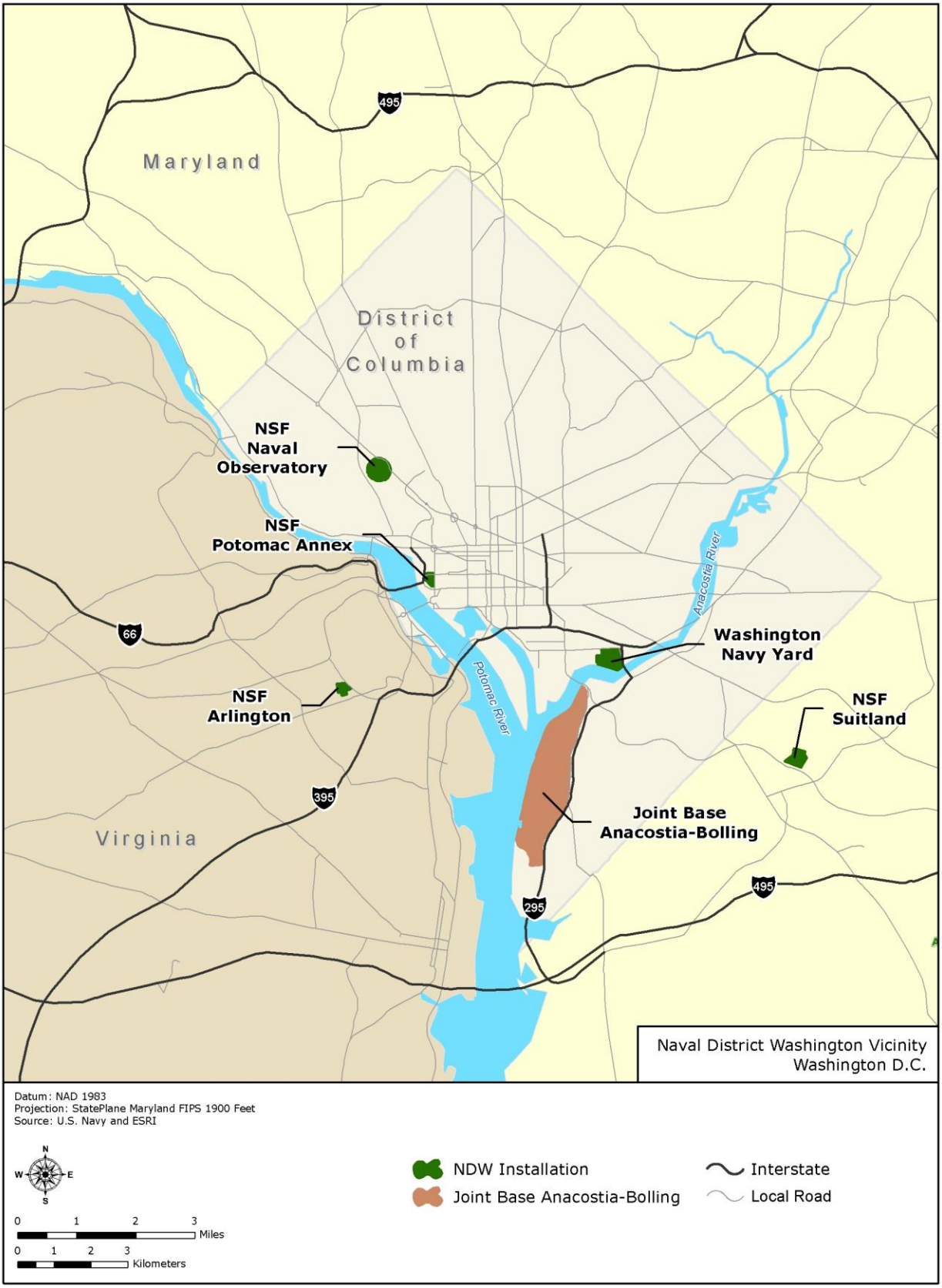

Figure 2-1. Location of NDW Installations

c. Washington Navy Yard

The Washington Navy Yard consists of approximately 77.9 acres of land located between 5th and 11th Streets in the southeast section of Washington, D.C. The installation is in an urban area surrounded by public facilities, parks, and rowhouses. The Anacostia River forms the southern boundary of the installation. The Washington Navy Yard encompasses a historic precinct that is listed as both a National Register Historic District on the National Register of Historic Places and as a National Historic Landmark District for its historical and architectural significance in American history.

d. NSF Suitland

NSF Suitland is headquarters to the National Maritime Intelligence Center and is located on approximately 42.35 acres of the 420-acre Suitland Federal Center in Prince Georges County, Maryland. Suitland Road forms the northern boundary of the Suitland Federal Center property, while the Suitland Parkway and Silver Hill Road form the southern and eastern boundaries, respectively. The western boundary of NSF Suitland lies adjacent to National Park Service land.

e. NSF Arlington

NSF Arlington is located between South Courthouse Road and Washington Boulevard in Arlington, Virginia. The site consists of 31.48 acres of land. Commercial, residential, and government buildings occupy surrounding properties.

(2) Military Mission

a. NSF Potomac Annex

The primary military mission of NSF Potomac Annex is to house the administrative headquarters of the Naval Medical Command and the Bureau of Medicine and Surgery (BUMED). The property also encompasses three Admirals' quarters and parking areas for employees.

b. NSF Naval Observatory

The mission of the USNO includes determining the position and motions of the earth, sun, moon, planets, stars, and other celestial objects; providing astronomical data; determining precise time; measuring the earth's rotation; and maintaining the Master Clock for the United States. Observatory astronomers formulate the theories and conduct the relevant research necessary to improve these mission goals. These astronomical and temporal data are essential for accurate navigation and support communications on earth and in space. A further mission at NSF Naval Observatory is to provide the official residence of the Vice President of the United States.

c. Washington Navy Yard

The Washington Navy Yard, functions as the primary support facilities for NDW. The Washington Navy Yard is comprised of offices, residences, museums, parks, parking, storage, and retail.

d. NSF Suitland

The mission of the National Maritime Intelligence Center is to provide products and services to meet Navy, DoD, and national maritime intelligence requirements. NSF Suitland provides headquarter facilities to support this mission.

e. NSF Arlington

NSF Arlington serves as the site for the Defense Information Systems Agency (DISA) headquarters. The property also encompasses a family-housing compound. The housing area includes residences for one Navy flag officer and for the senior enlisted personnel of the Navy, U. S. Marine Corps, and Coast Guard stationed in the Washington DC metropolitan area.

(3) Constraints

Due to the administrative functions of the NDW installations, natural resource management has a limited impact on the implementation of the military mission of these installations. Natural resources constraints to the military mission include surface waters and the 100 year floodplain. Cultural resources constraints include but is not limited to buildings, structures, districts, archeological sites, historic landscapes, and objects of significance in history that are eligible or included on the National Register of Historic Places. Other restrictions on mission and land use are due to operational, environmental, and safety constraints. Such restrictions include explosive arcs and installation restoration (IR) sites. There are limited or no outdoor operations and activities that would be expected to change the existing conditions of natural resources on or in the vicinity of the NDW installations. Additional constraints on mission-related opportunities at NDW installations could occur through adjacent land development and other types of encroachment in the areas surrounding the installations. NSF Suitland is the only installation with surface water constraints such as the stormwater management pond area (Figure 2-2).

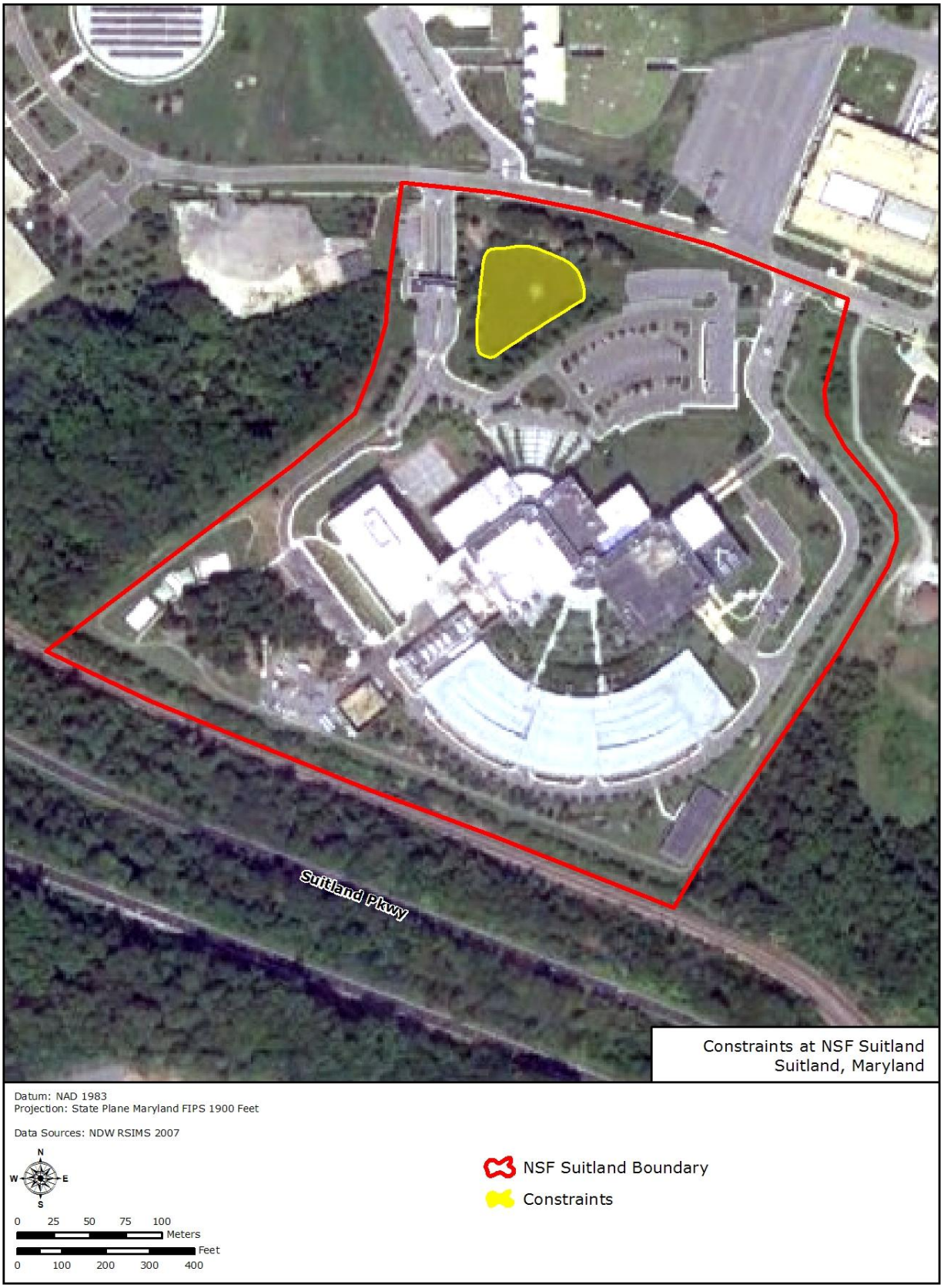

Figure 2-2. Constraints at NSF Suitland

(4) Opportunities

Areas with little or no restrictions on the military mission provide the best opportunities for mission growth and change. At NDW, these areas are largely restricted to undeveloped lands. However, the total area of undeveloped land at the NDW installations is minimal due to the urban setting of the installations. Encroachment up to the fence line creates undo pressure on the installation's ability to effectively manage natural resources. Challenges can arise from the diminishment of buffer areas, and in some cases, ensuing management decisions by an installation may be negatively perceived by the surrounding community, compounding time and effort involved in a resolution. Noise and safety issues are additional management concerns. Given the developed nature and current mission of the installations, any undeveloped land adjacent to the installations therefore provides a valuable buffer as regards noise, safety and natural resources. With the exception of natural areas available for recreational opportunities, such as bird watching, walking, etc., no other opportunities exist that support the military mission of these installations. The best potential opportunities to prevent future encroachment will involve partnering with adjacent municipalities and land owners to prevent the development of incompatible land uses before they become established. Partnerships offer another opportunity to develop positive public relations with the surrounding community and illustrate the Navy's commitment to environmental stewardship.

Figures 2-3 through 2-6 show areas of opportunities within the NDW installations. As there is open land adjacent to the areas of opportunities at NSF Suitland (Figure 2-5), potential encroachment partnering opportunities may exist. The majority of land at NSF Naval Observatory is depicted as an opportunity (Figure 2-4), however, mission specific constraints may require these areas to be left open. NSF Potomac Annex and NSF Arlington (Figures 2-3, 2-6) have little areas of opportunities; Washington Navy Yard has little to no areas of opportunity. These are urban installations with limited natural resources; buildings and impervious surfaces occupy the majority of the properties with natural areas primarily limited to maintained park areas and/or landscaped trees and shrubs near buildings and sidewalks.

Recreational opportunities exist at several of the installations. For example, NSF Naval Observatory provides tennis, volleyball and basketball courts, a picnic area, children's playground, horseshoe pit area, and jogging path. NSF Suitland installed an exercise trail through a sweetgum forest, providing opportunities for walking, picnic area, jogging, and bird watching. However, recreation is secondary to the mission and many natural resources-based recreational activities are both impractical and incompatible with mission safety requirements.

(5) Operations and Activities

a. NSF Potomac Annex

NSF Potomac Annex was originally constructed as the first U.S. Naval Observatory and has been in continuous use as a Navy facility since its inception in the 1800s. The old naval observatory building was used successively to house the U.S. Naval Museum of Hygiene (1894), the U.S. Naval Medical School (1902), and part of the U.S. Naval Hospital. The facility now houses the BUMED Headquarters. The mission of BUMED is to provide high quality, economical health care to active duty and retired Navy and Marine Corps personnel and their family members while supporting contingency, humanitarian, and joint operations around the world with highly trained, dedicated health care professionals adhering to the principle of Total Quality Leadership. Currently, NSF Potomac Annex primarily consists of office space, living quarters for the Surgeon General, and other non-industrial facilities. The headquarters of the United States Institute of Peace will also be located at NSF Potomac Annex. The institute is a nonpartisan, national institution that was established and funded by the U.S. Congress. Its goals are to help prevent and resolve violent international conflicts, promote post conflict stability and development, and increase peacebuilding capacity, tools, and intellectual capital worldwide.

b. NSF Naval Observatory

Today, the principal Research Development Test and Evaluation (RDT&E) activities at USNO include astrometry (precise locating of celestial objects) and time keeping. Three main telescopes are located at the installation with the bulk of astrometrics observations completed using a 6-in transit telescope. Cesium beam atomic clocks and hydrogen masers are used for time keeping services and the master clock, which provides the National Standard of Time for the United States, is housed at USNO. Tenant commands include the U.S. Naval Observatory, Oceanographer of the Navy, and the official home of the Vice President of the United States.

c. Washington Navy Yard

Washington Navy Yard consists of non-industrial facilities, mainly office space. This facility is one of the oldest navy facilities in the United States. Washington Navy Yard was used for shipbuilding in the early 1800s and between 1830 and 1945, the facility was used for ordnance research and manufacturing. The primary function of Washington Navy Yard shifted in the 1940s to administrative activities. Currently the Washington Navy Yard is used for administrative functions, a few training activities, and as a public historic center. Community and support facilities include a police station, credit union, post office, Navy Exchange, food services, indoor recreation facilities, medical clinic, chapel, fire station, and the Navy Museum Gift Shop. All NDW environmental issues are handled by the installation Public Works Environmental Department at the Washington Navy Yard.

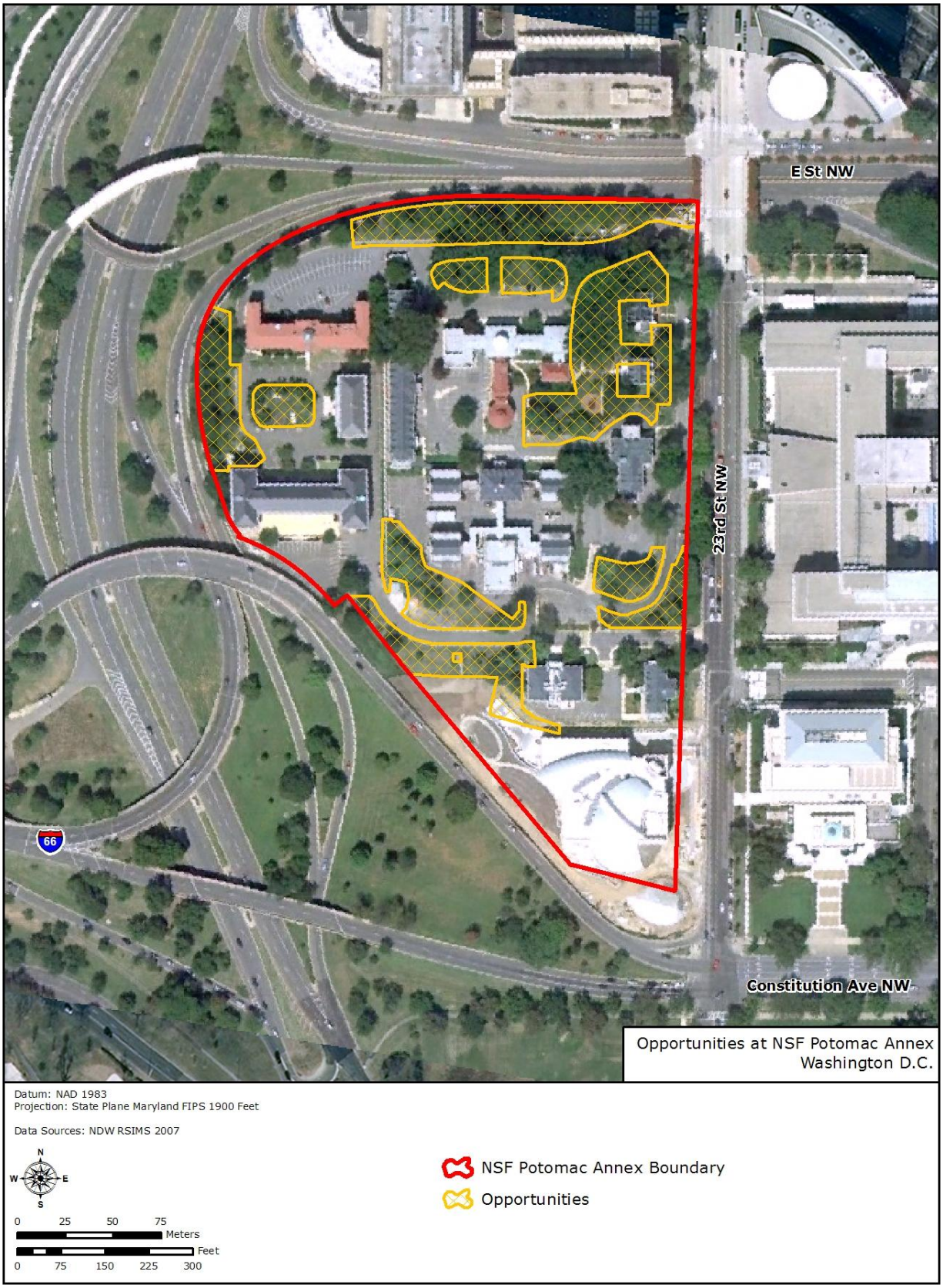

Figure 2-3. Opportunities at NSF Potomac Annex

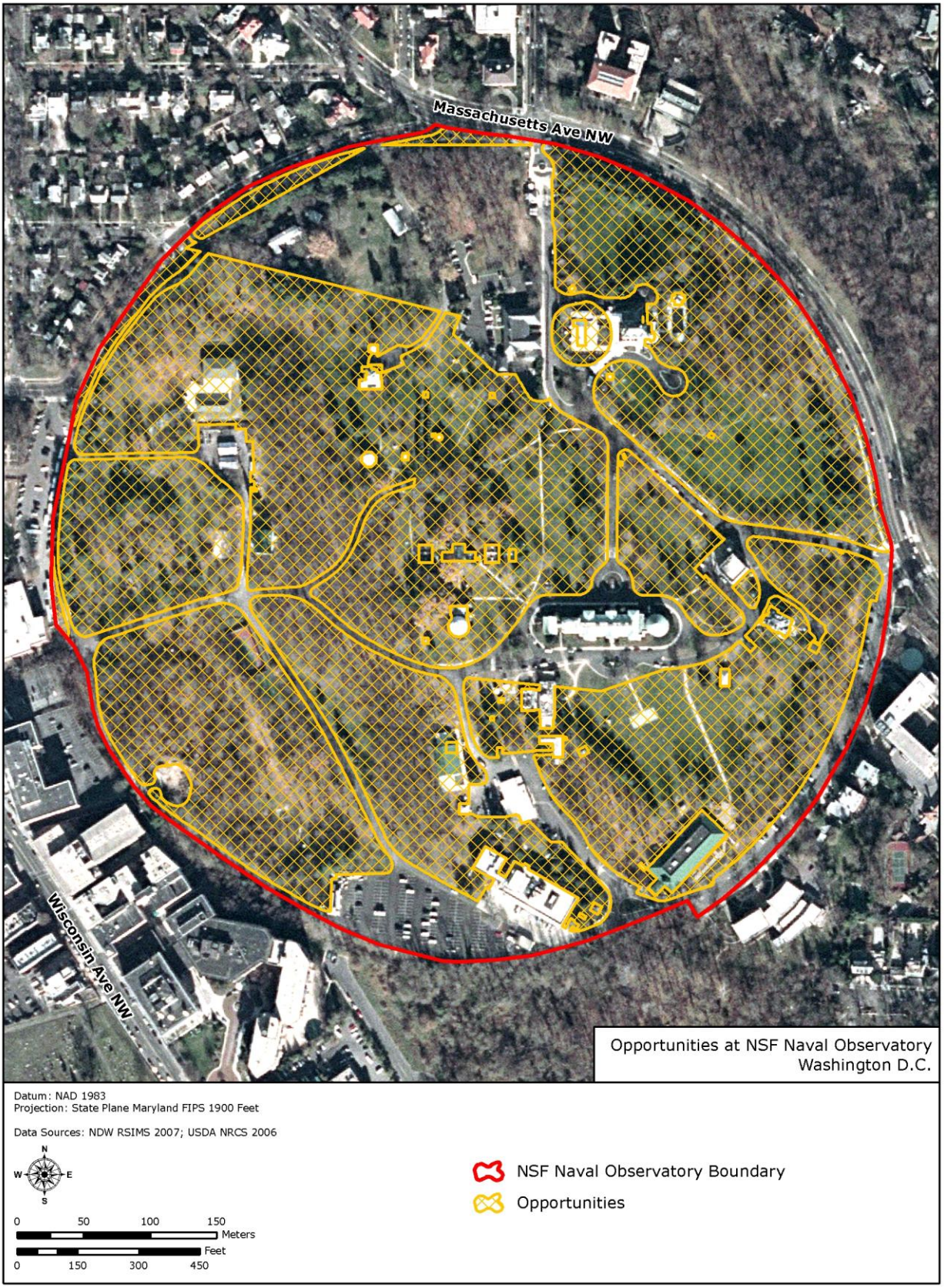

Figure 2-4. Opportunities at NSF Naval Observatory

Figure 2-5. Opportunities at NSF Suitland

Figure 2-6. Opportunities at NSF Arlington

d. NSF Suitland

The National Maritime Intelligence Center is involved in the collection, storage, and security of data related to naval operations. NSF Suitland is a high security facility and access is limited.

e. NSF Arlington

This 31.48-ac complex has 13 buildings that host both administrative commands and Navy housing.

(6) Historic Land Use and Installation History

a. NSF Potomac Annex

NSF Potomac Annex property was first acquired by the government in 1791. In the early 1800s, the property was intended as the site for a national university, but instead was used as a camp for soldiers until 1814. The property remained undeveloped until 1842, when it was chosen as the site for the Navy's Depot of Charts and Instruments. The original building was completed in 1844 and is now on the National Register of Historic Places. The Depot of Charts and Instruments was established in 1830. It expanded to become the USNO in 1854. The NSF Potomac Annex site eventually became undesirable for the USNO due to frequent night fogs that interfered with observations. The USNO was moved in 1893 to its present location.

NSF Potomac Annex was then occupied by the Naval Museum of Hygiene in 1894. The Naval Medical School and Washington Naval Hospital occupied the property after 1904. The hospital and medical school were transferred in 1937 to Bethesda, Maryland, and in 1942, the old hospital and classrooms at NSF Potomac Annex became offices for administrators of the BUMED.

b. NSF Naval Observatory

The USNO was established in 1830, as the Depot of Charts and Instruments, which maintained navigational charts, chronometers, and other navigational equipment for the Navy. The Depot of Charts and Instruments evolved and expanded to become the USNO in 1854, and continued expansion in the post-Civil War era. In 1893, the USNO moved to its present location, which was in the countryside at the time and provided better astronomical observing conditions. The official residence for the Superintendent of the USNO was completed in 1893 and designated "Quarters A". It was occupied by superintendents in command at USNO until 1928. In 1974, Quarters A was designated the official residence of the Vice President of the United States.

c. Washington Navy Yard

The Washington Navy Yard was originally established as a shipbuilding yard in 1799. It had become the largest shipbuilding installation in the country by 1812, but was burned down in 1814 to prevent the British from using its supplies and ships. The installation was expanded in 1886, when it was designated as the Naval Gun Factory. World War I brought further expansion

of the installation's industrial and experimentation facilities. By World War II, the Naval Gun Factory employed 25,000 people. Weapons development stopped by 1961 and the Naval Gun Factory was closed. The Washington Navy Yard then became an official administrative and supply center.

d. NSF Suitland

The land on which NSF Suitland sits was farmland prior to being converted and used as an airfield from 1938 until the federal government acquired the property in 1941. Several federal buildings, including the Federal Records Center and NSF Suitland currently occupy the property. The construction of the National Maritime Intelligence Center (NMIC) was completed in 1994.

e. NSF Arlington

NSF Arlington was originally established as the U.S. Naval Radio Station, which operated in this capacity from 1911 to 1956. In 1960, the Defense Communications Agency (DCA) moved onto the site. The DCA was succeeded by the DISA, which still occupies about 14 acres at the north end of the base.

(7) Regional Land Use

The District of Columbia belongs to the mid-Atlantic region of the United States, which also includes Maryland, Virginia, Delaware, West Virginia, and Pennsylvania (Figure 2-7). When viewed as part of the region, the District of Columbia occupies a comparatively small area of land. Therefore, it is important to view the District in the context of the larger geographical region. While the District of Columbia is considered an urban center with a large amount of developed land, there are multiple other land uses. The District of Columbia boasts more than 900 acres of city parks and more than 6,700 acres of national parkland. While it can be difficult for humans and wildlife to coexist within the borders of one city, the District of Columbia has an unexpectedly wide diversity of wildlife and habitats. The District of Columbia Office of Planning implements a Comprehensive Plan that includes a land use element (DC 1998). It identifies many elements of land use within the District of Columbia. The coexistence between humans and wildlife can improve and thrive with comprehensive strategic planning provided in the District of Columbia Wildlife Action Plan (DDOE 2006).

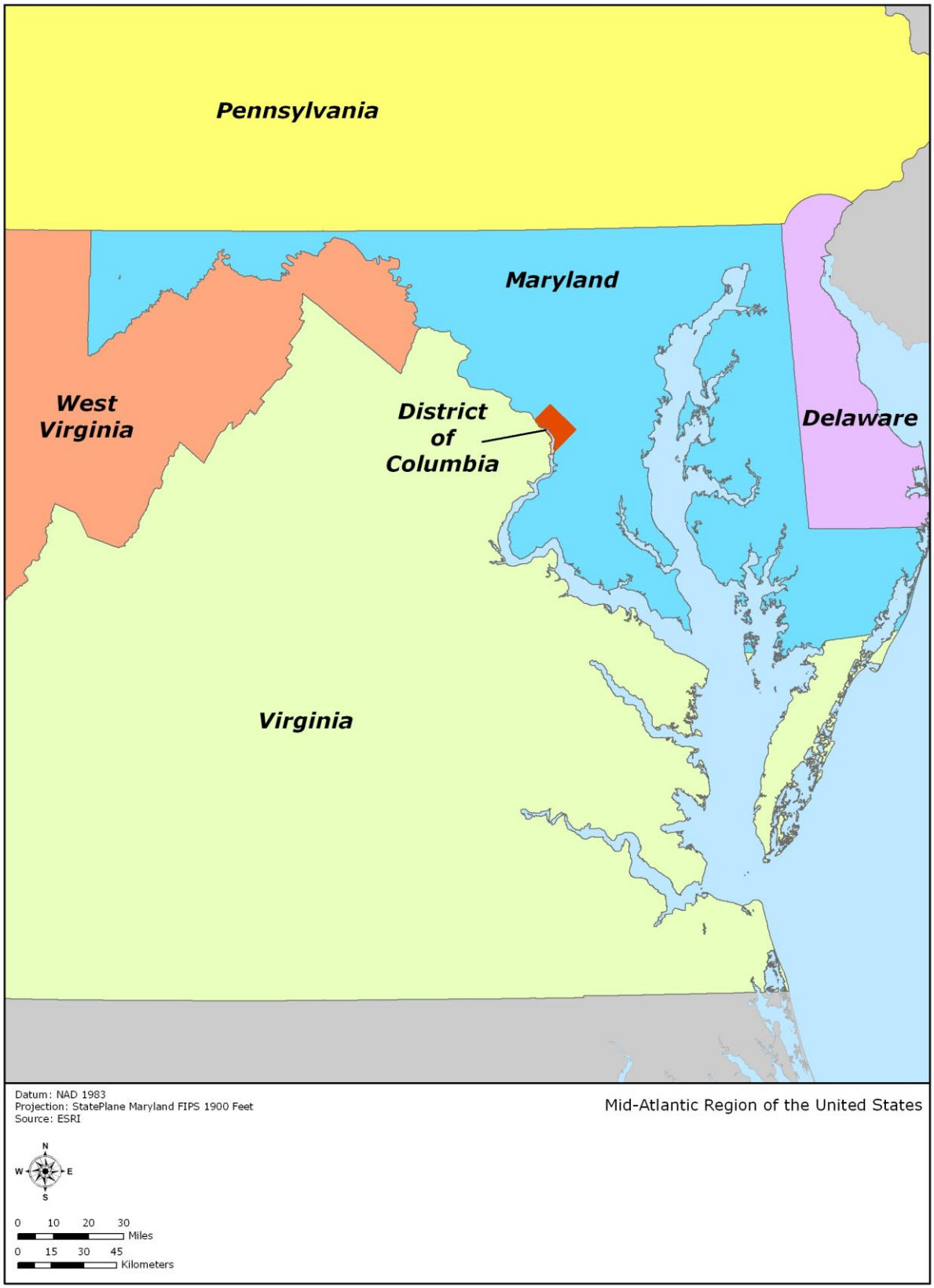

Figure 2-7. Mid-Atlantic Region of the United States

B. General Physical Environment

(1) Climate and Weather

NDW installations are influenced by a modified continental climate, characterized by hot summers and cold winters. Maximum average temperatures range from 43.8 degrees Farenheit (°F) to 88.6°F, while minimum average temperatures range from 25.2°F to 67.2°F. The region experiences a climatic shift of four seasons. Winds prevail from the northwest between the months of December and March and from the south between April and November (CustomWeather 2007).

Annual precipitation, which is equally distributed throughout the year, averages approximately 43 inches. Light or heavy rain may occur in the spring, summer, and fall seasons, while rain, sleet, freezing rain, or snow may fall during the winter. No more than a few inches of snow will typically accumulate and such events usually last only a few days (Table 2-2).

Table 2-2. Climate in the Vicinity of Washington, D.C.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ave. Max. Temp. (°F)	43.8	47.1	55.8	67.3	76.4	84.6	88.6	87.3	80.7	69.6	58.8	47.3
Ave. Min. Temp. (°F)	25.2	27.5	34.5	43.8	53.2	62.3	67.2	65.5	58.0	46.1	37.4	29.1
Ave. Total Precip. (inches)	3.19	2.90	3.74	3.31	3.99	3.97	4.28	4.56	3.77	3.16	3.24	3.23
Ave. Total Snowfall (inches)	5.5	4.9	2.0	0.1	0	0	0	0	0	0	0.6	2.2
Ave. Wind Speed (mph)	14	14	14	9	9	9	9	9	9	9	9	14
Ave. Wind Direction	NW	NW	NW	S	S	S	S	S	S	S	S	NW

Source: SERC 2007; Custom Weather 2007

(2) Topography, Geology, and Soils

The NDW installations are located in either of two physiographic provinces that characterize the topography and geology of Washington, D.C. and adjacent areas of Virginia and Maryland. NSF Potomac Annex, NSF Naval Observatory, and NSF Arlington are located in the Piedmont Plateau Province, while Washington Navy Yard and NSF Suitland lie in the Atlantic Coastal Plain Province.

The Piedmont and Coastal Plain provinces meet at the Fall Line that bisects the District of Columbia just east of Rock Creek Park. The Fall Line is the result of the interface between

crystalline rocks of the Piedmont Province and the unconsolidated Cretaceous and Tertiary sediments of the Coastal Plain Province. Great Falls, at the head of the Potomac River Fall Line, is an example of the dramatic changes in gradient that result along this interface. West of the Fall Line, the Piedmont region is characterized by rolling hills underlain by metamorphosed, igneous, and sedimentary rocks (USDA SCS 1976). The Atlantic Coastal Plain physiographic province, which developed from marine sediments, is composed of gently seaward-dipping beds of unconsolidated sand and clay with smaller amounts of underlying gravel and marl deposits. Elevations in the Coastal Plain increase in the westward direction from sea level in the east to approximately 200 ft above mean sea level in the west (Terwilliger and Tate 1995). Topography of NSF Potomac Annex, Washington Navy Yard, NSF Naval Observatory, and NSF Suitland is depicted in Figures 2-8 through 2-11. No topography GIS data was available for NSF Arlington.

In general, many of the soil series found at NDW installations include soil complexes that either have been recently altered or have an urban component. In the Washington D.C. area, urbanization and related development have altered most of the soils; approximately 19 percent of the soils have been undisturbed and are located mainly in parks (USDA SCS 1976). Information about soils was obtained from the 2004 Soil Survey Geographic database for the District of Columbia, published by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (USDA NRCS 2006). Spatial information for soils at NSF Suitland was not available. Soil series information for NSF Potomac Annex, NSF Naval Observatory, and Washington Navy Yard are presented in Table 2-3 and Figures 2-12 through 2-15.

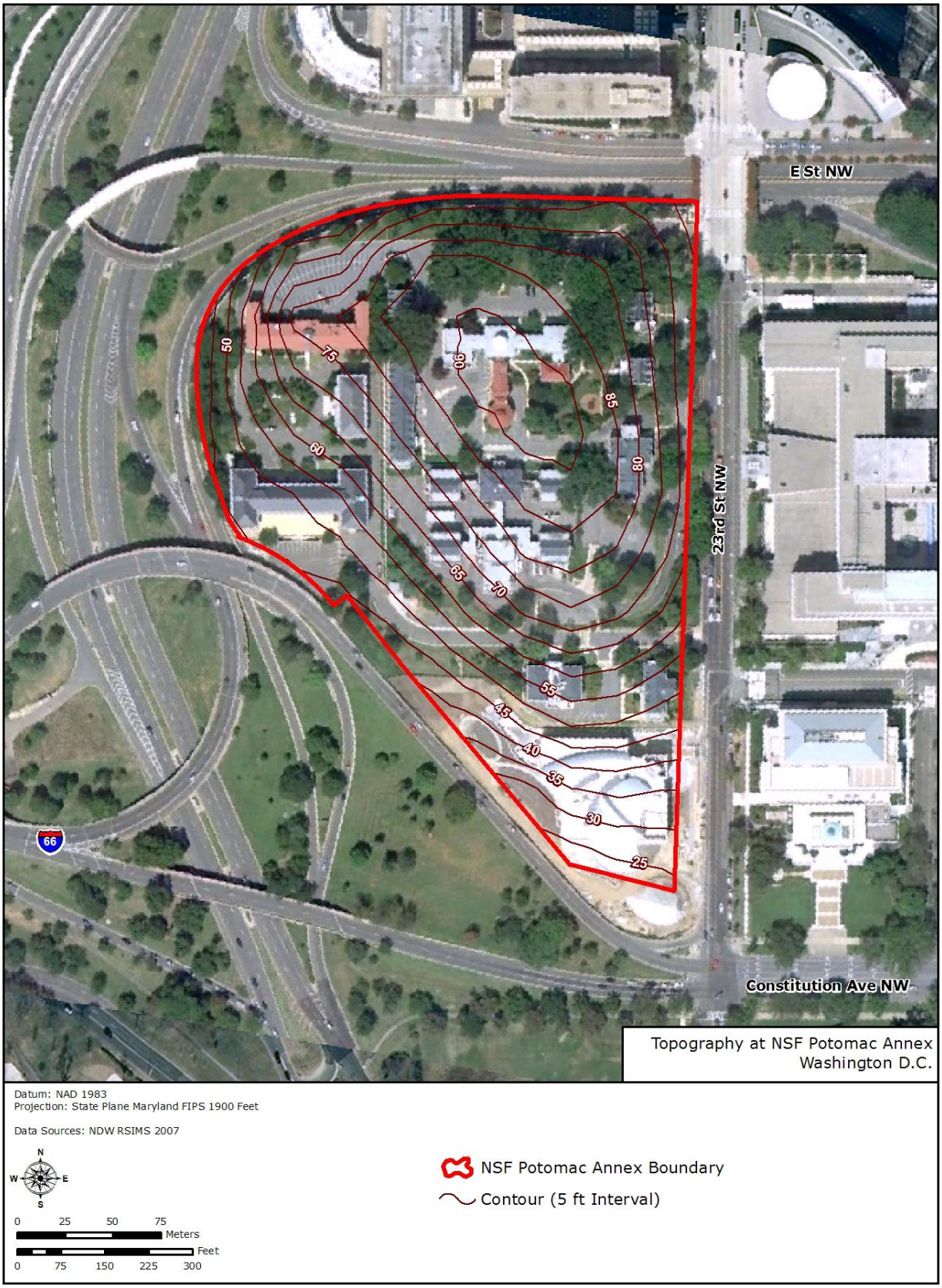

Figure 2-8. Topography at NSF Potomac Annex

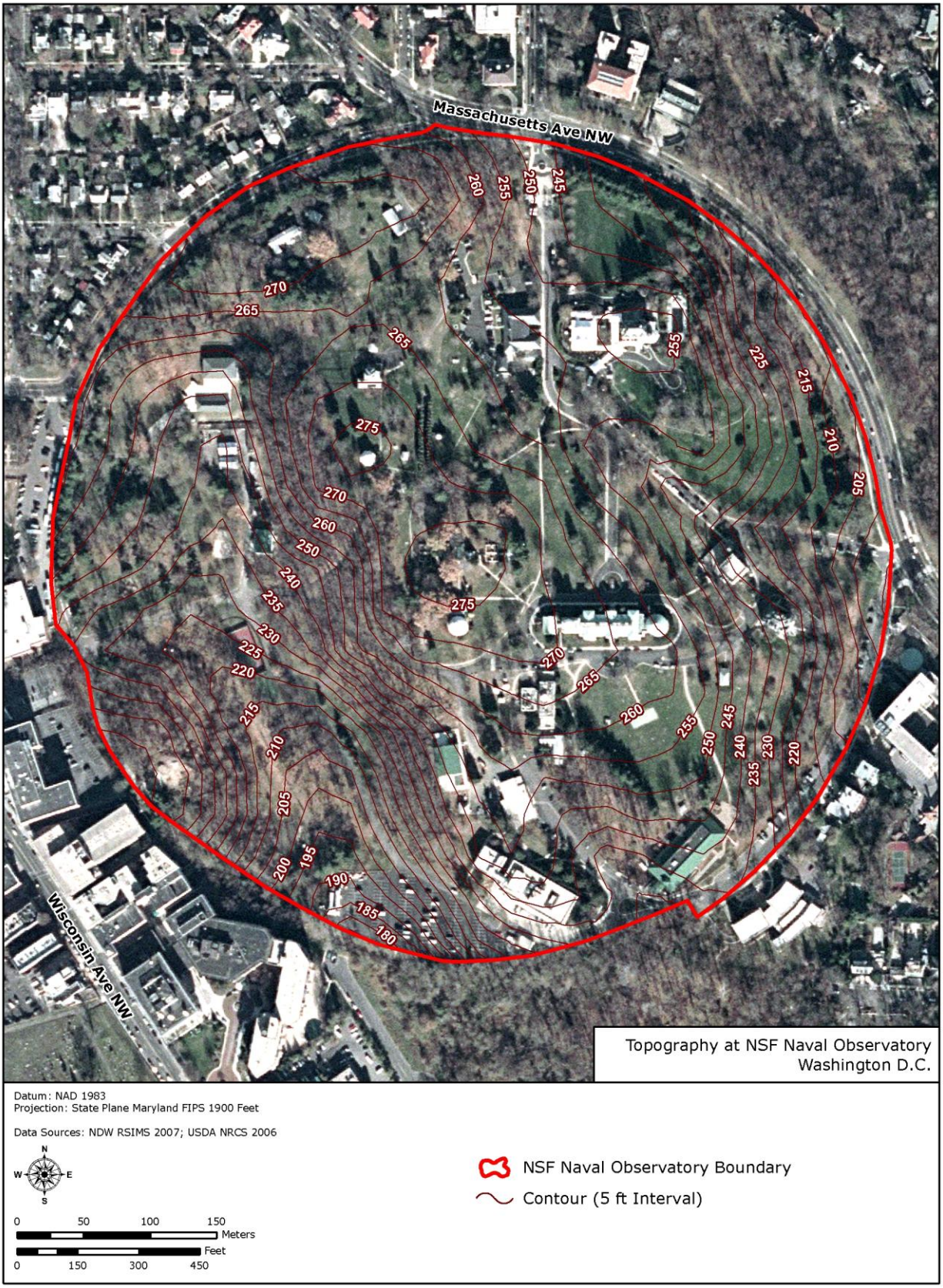

Figure 2-9. Topography at NSF Naval Observatory

Figure 2-10. Topography at Washington Navy Yard

Figure 2-11. Topography at NSF Suitland

Table 2-3. Soil Series and Descriptions for NDW Installations

Soil Series	Symbol	Description
Chillum		Soils are well-drained and deep. They formed in a thin mantle of wind-deposited silty material underlain by deposits of very hard sandy and gravelly material.
	CdB	Chillum-Urban Land Complex; 0-8 percent slopes
Christiana		This series consists of deep, well-drained soils with a silty clay or clay B horizon and a thick, red or variegated, clayey C horizon. They formed in a thin mantle of silty material over much older deposits of plastic clay.
	CfB	Christiana-Urban Land Complex; 15-40 percent slopes
Dunning		Dunning soils are deep and poorly drained to very poorly drained. They have a silty clay loam or silty clay B horizon and a thick, black or grayish, stratified C horizon.
	Dn	Dunning Soils; 0-3 percent slopes
Joppa		The Joppa series consists of loamy-skeletal, siliceous, mesic Typic Hapludults that are very deep and well-drained. They have a very gravelly sandy loam B horizon and a thick, very gravelly C horizon.
	JtB	Joppa gravelly sandy loam; 0-8 percent slopes
	JtC	Joppa gravelly sandy loam; 8-15 percent slopes
	JtD	Joppa gravelly sandy loam; 15-40 percent slopes
	JuB	Joppa-Urban Land Complex; 0-8 percent slopes
	JuC	Joppa-Urban Land Complex; 8-15 percent slopes
	JuD	Joppa-Urban Land Complex; 15-40 percent slopes
Melvin		The Melvin series consists of fine-silty, mixed, nonacid, mesic Typic Fluvaquents that are deep and poorly drained. They formed in recently deposited alluvium or dredged material on flood plains of the Anacostia and Potomac Rivers.
	Mp	Melvin silt loam; 0-2 percent slopes
Sassafras		Soils are moderately sloping and well-drained. They contain a gravelly sandy loam surface, a sandy loam subsurface, a sandy clay loam center, and a sandy loam lowest horizon.
	ScC	Sassafras gravelly sandy loam; 8-15 percent slopes
	SgB	Sassafras-Urban Land Complex; 0-8 percent slopes

Table 2-3. Soil Series and Descriptions for NDW Installations (cont'd.)

Soil Series	Symbol	Description
Udorthents		This soil consists of extremely heterogeneous fill material that has been placed on uplands, terraces, and floodplains. The source of fill varies, as does its thickness. Because these soils are so variable, an on-site investigation is necessary to determine the potential uses for these areas.
	U1	Udorthents
	U4	Udorthents, loamy
	U6	Udorthents, smoothed
	U8	Udorthents, sandy, smoothed
Urban Land		Urban Land soils are impervious surfaces covered with asphalt, concrete, or buildings.
	Ub	Urban Land
	UeC	Urban Land-Chillum Complex; 0-8 percent slopes
	UoC	Urban Land-Joppa Complex; 0-15 percent slopes
	4B	Urban Land-Sassafras-Neabsco Complex; 3-8 percent slopes
	12	Urban Land-Udorthents Complex; 2-15 percent slopes
Woodstown		Woodstown soils are deep and moderately well-drained located in upland areas. These soils formed in old sandy sediments containing moderate amounts of silt and clay.
	WpB	Woodstown-Urban Land Complex; 0-8 percent slopes

Source: DoN 2001; USDA NRCS 2007

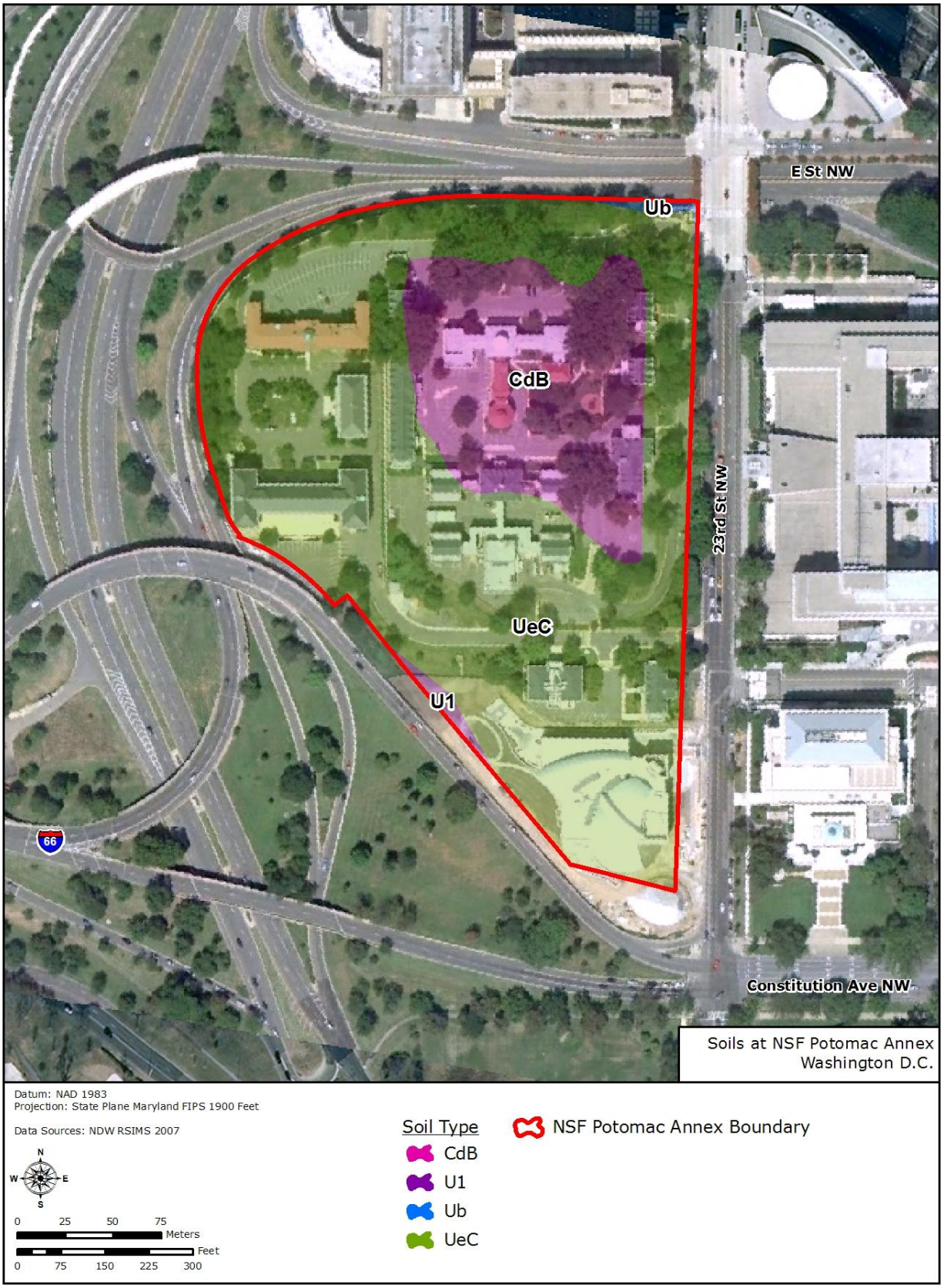

Figure 2-12. Soils at NSF Potomac Annex

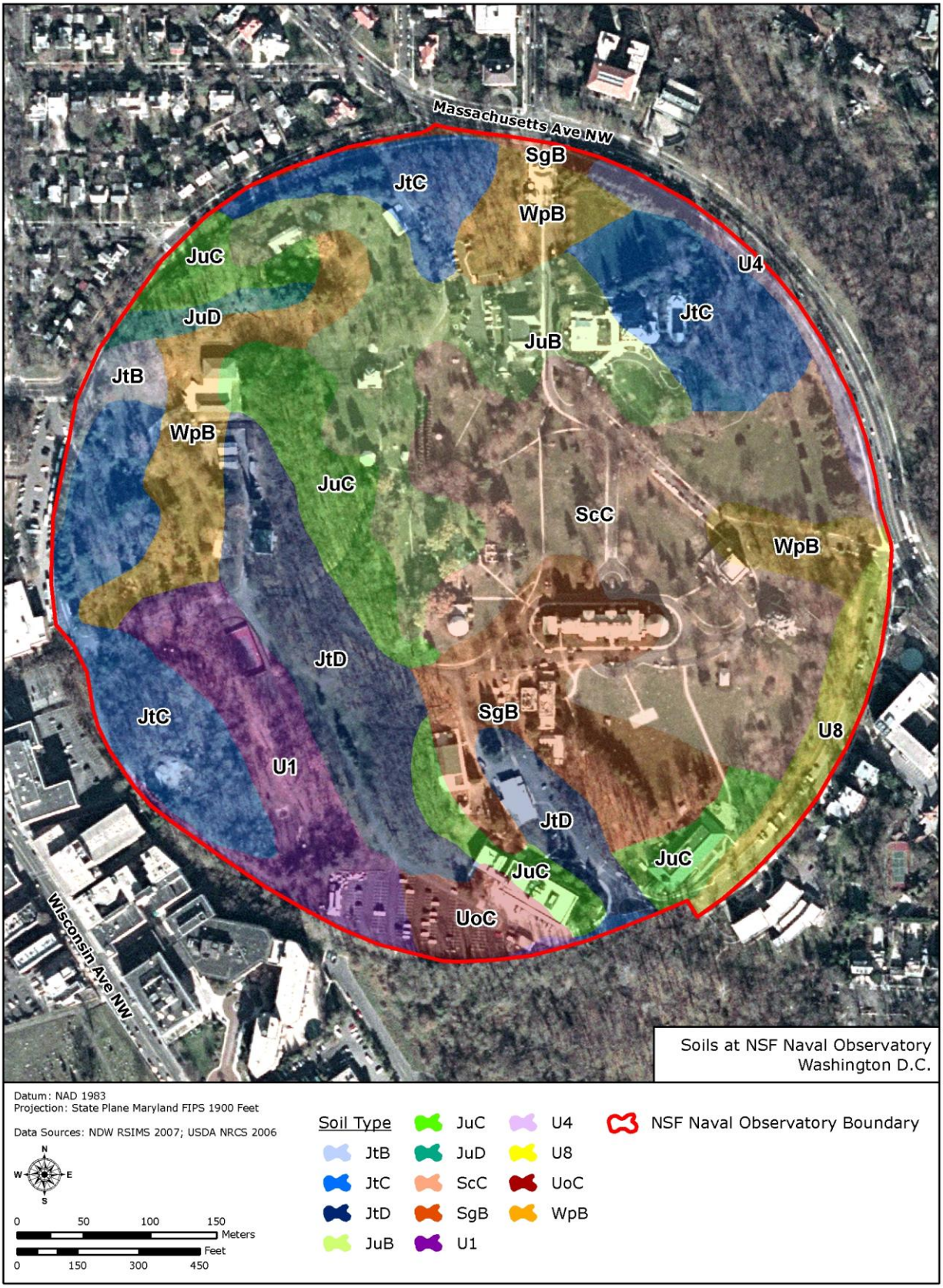

Figure 2-13. Soils at NSF Naval Observatory

Figure 2-14. Soils at Washington Navy Yard

Figure 2-15. Soils at NSF Arlington

(3) Hydrology and Aquatic Environment

a. Watersheds

The term watershed refers to the catchment area or drainage basin of a particular waterway. All NDW installations are located in the Middle Potomac-Anacostia-Occoquan Subbasin (hydrologic unit code 02070010; USDA NRCS 1994, USDA NCRS 1997; Figure 2-16). Specifically, NSF Potomac Annex and NSF Arlington is in the Pimmit Run-Potomac River watershed, NSF Naval Observatory is in the Rock Creek watershed, Washington Navy Yard is in the Anacostia River watershed, and NSF Suitland is in the Four Mile Run-Potomac River watershed (USDA NRCS 1994, USDA NCRS 1997; Figure 2-16). The Middle Potomac-Anacostia-Occoquan is part of the larger Potomac River Basin, which is the fourth largest watershed on the East Coast, encompassing portions of Pennsylvania, West Virginia, Virginia, Maryland, and Washington, D.C. The Potomac River eventually empties into the Chesapeake Bay, linking the Potomac watershed and the 64,000-square mile Chesapeake Bay watershed. The health of the Potomac River and the ecological integrity of the Chesapeake Bay are dependent on the health of river tributaries.

NDW installations contribute to watershed protection by following pollution prevention plans which address soil erosion control, spill prevention, pesticide and fertilizer use, and permitted stormwater discharges; providing federal consistency determinations to the state coastal zone management program; and coordination with Chesapeake Bay Protection Act agreements.

b. Surface Water

Surface waters in the District of Columbia drain to the Potomac River, which forms the southwestern boundary of the city. Rock Creek and the Anacostia River are the two largest tributaries to the Potomac at this point, although there are many small streams located throughout the city. Rock Creek is a swift-moving Piedmont stream that begins north of D.C. and flows southward into the Potomac near Georgetown. The Anacostia River begins 1.5 miles north of D.C. at the confluence of its northwest and northeast branches. The lower, tidal portion of the Anacostia joins the Potomac at Hains Point, two miles downstream from the Washington Navy Yard.

Most of the installations do not have significant surface waters within their boundaries, except for the Washington Navy Yard which is located on the banks of the Anacostia River. NSF Potomac Annex is located less than 1,000 feet east of the Potomac River. NSF Naval Observatory lies approximately a quarter-mile west of Rock Creek. NSF Suitland, situated inland, has a stormwater management pond and adjacent small streams (Figure 2-17).

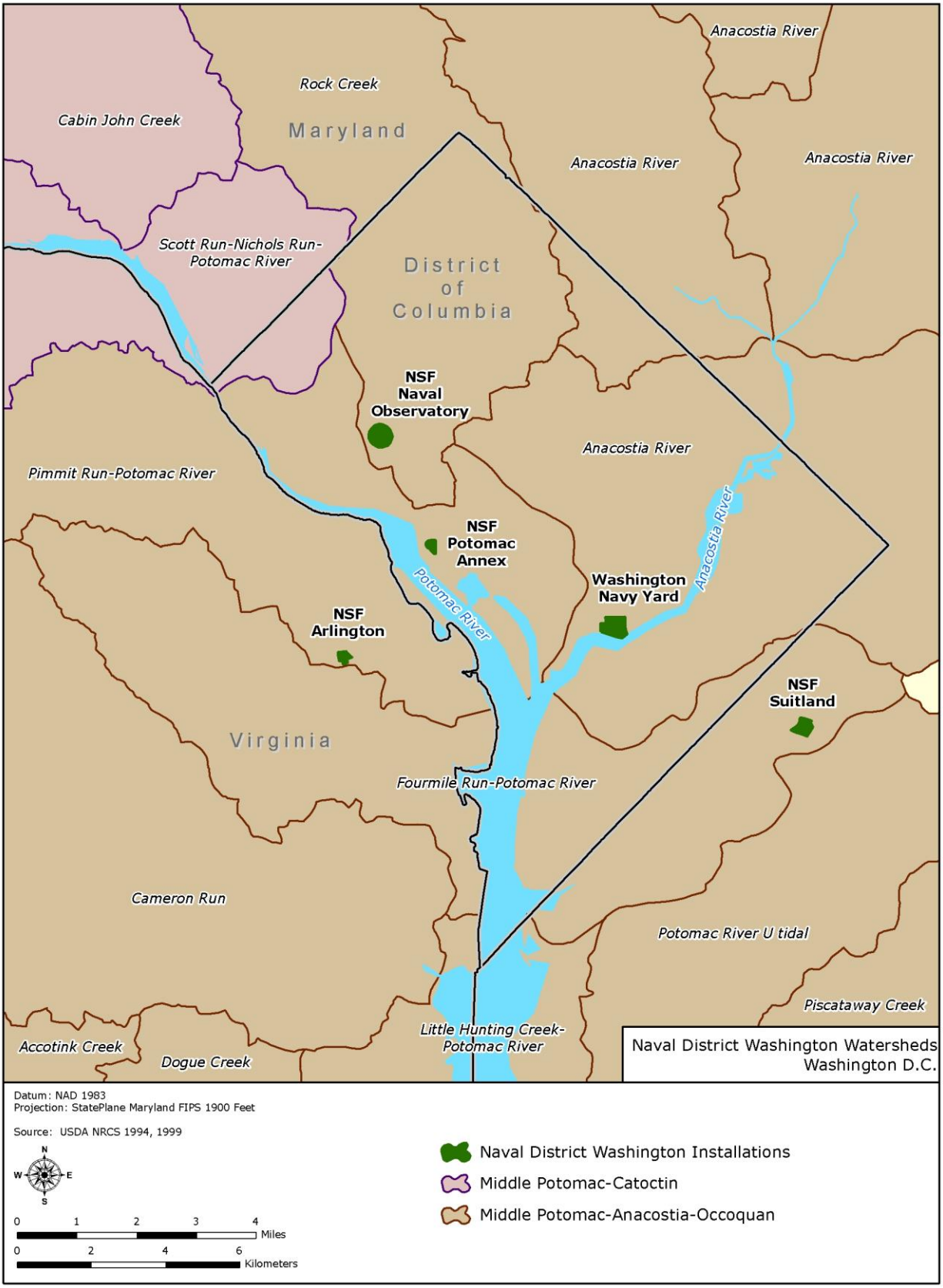

Figure 2-16. Location of NDW Installations in the Regional Watershed

Figure 2-17. Water Resources and Vegetation at NSF Suitland

c. Floodplains

Floodplains are defined as an area likely to be inundated by a flood with a particular degree of frequency. An area that has a one percent chance of flooding in any one year is referred to as the 100-year floodplain. This concept does not mean such a flood will occur only once in one hundred years. Whether or not it occurs in a given year has no bearing on the fact that there is still a one percent chance of a similar occurrence in the following year. Since floodplains can be mapped, the boundary of the 100-year floodplain is commonly used to identify areas where the risk of flooding is significant. Frequency of inundation depends on the climate, the material that makes up the banks of the stream, and the channel slope (Department of Regional Development and Environment Executive Secretariat for Economic and Social Affairs Organization of American States 1991).

Development within the 100-year floodplain is restricted through EO 11988 (42 Federal Register [FR] 26951), which requires federal agencies to avoid the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Floodplains management in relation to natural resource management at the NDW installations is described in more detail in Section 4.Q.

d. Groundwater

Maryland's aquifers provide water for approximately 30 percent of the state's population (USGS 2007b). Water from aquifers is also used for irrigation and industrial uses. Areas east of the Chesapeake Bay rely almost entirely on groundwater for their freshwater needs, while Washington D.C. and surrounding areas obtain most of their water from surface water sources.

The Piedmont and Blue Ridge crystalline aquifers are in the vicinity of NDW Installations (USGS 2007b). These aquifers are generally termed non-Coastal Plain aquifers (USGS 2007b). Non-Coastal Plain aquifers consist of consolidated sedimentary and crystalline rock. Well yields in these areas are generally small as they depend on the presence of open fractures in the rock. Bedrock is close to the surface around most of the installation allowing little opportunity for storage of groundwater.

C. General Biotic Environment

The District of Columbia is located between two ecoregions: the mid-Atlantic Piedmont and the mid- Atlantic Coastal Plain. The ecoregions divide the District in half diagonally along the fall line, with the Coastal Plain covering the southeastern half and the Piedmont covering the northwestern half. The District shares these ecoregions with the surrounding states of the mid-Atlantic region, including Maryland, Virginia, Pennsylvania, New Jersey and, in the case of the Coastal Plain, Delaware, making the District geographically similar to those states. This has

many important implications for conservation planning. Issues important to habitats within the District are also important to the surrounding states (DDOE 2006).

The mid-Atlantic Piedmont extends into Virginia, Maryland, southeastern Pennsylvania and northern New Jersey. It currently covers approximately 66,491 kilometers^2 in total. The region is bordered by the mid-Atlantic Coastal Plain to the east and the Appalachian Mountains to the west. Beginning at the fall line at 60 meters in elevation, the Piedmont extends west to the Blue Ridge and the Ridge and Valley regions of the Appalachian Mountains, reaching elevations of 300-600 meters. The topography of the Piedmont is higher, rolling and more rugged than the Coastal Plain and its soils are composed of erosion resistant igneous and metamorphic rock, rather than the sands and clays of the Coastal Plain (DDOE 2006).

The mid-Atlantic Coastal Plain extends into Virginia, Maryland, Delaware, Pennsylvania and New Jersey. It currently covers approximately 56,220 kilometers^2 in total. The region is bordered by the Atlantic Ocean to the east and the fall line to the west. From the west, rivers flow down from the Piedmont and mountains, including the Appalachian Mountains, where they slow down and release sediment onto the Coastal Plain. At this point, the low-lying plain reaches an elevation of less than 80 meters and is characterized by bays and tidal rivers, such as the Chesapeake Bay and Potomac River. The soils are primarily derived from the sediments deposited from the mountains and are slow draining, leading to the development of many types of expansive wetlands (DDOE 2006).

(1) Rare, Threatened and Endangered Species and Species of Concern

No formal survey for rare, threatened, and endangered species has been conducted at NSF Potomac Annex, Washington Navy Yard, NSF Suitland or NSF Arlington. In preparation for the 2001 INRMP, federal and state agencies were contacted regarding the presence of such species on the NDW installations (DoN 2001). Letters from the USFWS and MDNR indicate that there may have been historical (greater than 50 years ago) record of limited use, but no known current use (DoN 2001). A formal survey for rare, threatened, and endangered species and species of concern was planned to be conducted at NSF Naval Observatory in 1997 (DoN 2001), but if such a survey took place, the results have since been misplaced. Federally listed threatened and endangered species known to occur in Prince Georges County, Maryland, Arlington County, Virginia, and the District of Columbia are listed in Table 2-4.

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Table 2-4. Federally Listed Species Potentially Occurring in The Vicinity of NDW Installations

Type	Common Name	Scientific Name	Federal Status	State Status	Global / State Rank or Tier	County, State Listed	Nearest NDW Installation
Plant	Sandplain gerardia	*Agalinis acuta*	E	E	G1/S1	Prince Georges County, MD	NSF Suitland
Amphipod	Hay's spring amphipod	*Stygobromus hayi*	E	-	-	District of Columbia	NSF Potomac Annex, NSF Naval Observatory, [1]WNY
Beetle	American burying beetle	*Nicrophorus americanus*	E	-	-	District of Columbia	NSF Potomac Annex, NSF Naval Observatory, WNY
Bird	Eskimo curlew	*Numenius borealis*	E	-	-	District of Columbia	NSF Potomac Annex, NSF Naval Observatory, WNY
Mussel	Dwarf wedgemussel	*Alasmidonta heterodon*	E	-	-	District of Columbia	NSF Potomac Annex, NSF Naval Observatory, WNY
Plant	Sensitive joint-vetch	*Aeschynomene virginica*	T	E	G2/S1	Prince Georges County, MD	NSF Suitland
Plant	Small whorled pogonia	*Isotria medeoloides*	T	-	-	District of Columbia	NSF Potomac Annex, NSF Naval Observatory, WNY
Mussel	Brook floater	*Alasmidonta varicosa*	S	E	II	Arlington County, VA	NSF Arlington
Butterfly	Appalachian grizzled skipper	*Pyrgus wyandot*	S	T	I	Arlington County, VA	NSF Arlington

Table 2-4. Federally Listed Species Potentially Occurring in The Vicinity of NDW Installations (cont'd)

Type	Common Name	Scientific Name	Federal Status	State Status	Global / State Rank or Tier	County, State Listed	Nearest NDW Installation
Bird	Henslow's sparrow	*Ammodramus henslowii*	S	T	I	Arlington County, VA	NSF Arlington
Bird	Loggerhead shrike (migrant)	*Lanius ludovicianus migrans*	S	T	-	Arlington County, VA	NSF Arlington
Mussel	Yellow lance	*Elliptio lanceolata*	S	S	III	Arlington County, VA	NSF Arlington
Mussel	Yellow lampmussel	*Lampsilis cariosa*	S	S	III	Arlington County, VA	NSF Arlington
Butterfly	Regal fritillary	*Speyeria idalia idalia*	S	-	I	Arlington County, VA	NSF Arlington
Fish	Atlantic sturgeon	*Acipenser oxyrinchus*	S	S	II	Arlington County, VA	NSF Arlington
Bird	Cerulean warbler	*Dendroica cerulea*	S	-	II	Arlington County, VA	NSF Arlington
Butterfly	Persius duskywing butterfly	*Erynnis persius persius*	S	-	II	Arlington County, VA	NSF Arlington

[1] Washington Navy Yard
E = Endangered; S = Species of Concern; T = Threatened; G1/S1 = Highly Globally Rare/Highly State Rare; G2/S1 = Globally Rare/Highly State Rare; Tier I = Critical Conservation Need; Tier II = Very High Conservation Need; Tier III = High Conservation Need
Source: USFWS 2007, MDNR 2004, VGDIF 2007

(2) Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory 1987). Under the Cowardin system (Cowardin et al. 1979), wetlands are divided into five major systems: marine, estuarine, riverine, lacustrine, and palustrine. NDW installations are urban bases and no wetlands have been identified by either the Navy's natural resources geographic information system (GIS) or the USFWS National Wetlands Inventory, an online data source for wetlands information (USFWS 2006). A stormwater management pond occurs at NSF Suitland, but since it is a man-made system regulated and managed under the Stormwater and Pollution Prevention Program, it will not be discussed here.

(3) Fauna

While the District of Columbia is a very small geographic area of only 69 square miles, it is home to over 500 species of birds, fish, mammals, reptiles, and amphibians. The various habitats are part of an ecological system that is larger than the boundaries of the District of Columbia, giving it an important regional context. The District of Columbia belongs to the mid-Atlantic region of the United States, which also includes Maryland, Virginia, Delaware, West Virginia and Pennsylvania (see Figure 2-7,). When viewed as part of the region, the District of Columbia occupies a comparatively small area of land. Therefore, it is important to view the District in the context of the larger geographical region to gain a full understanding of the needs of shared species and habitats (DDOE 2006).

The availability of suitable habitat and diversity of habitats influence wildlife populations at NDW installations. Because of the urban surroundings, the potential for attracting wildlife is relatively low. However, many native and exotic species that have adapted to urban environments are frequently observed at NDW installations. These species include eastern gray squirrel (*Sciurus carolinensis*), mourning dove (*Zenaida macroura*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), American crow (*Corvus brachyrhynchos*), and house sparrow (*Passer domesticus*).

NSF Naval Observatory contains remnants of natural vegetation that provides habitat for wildlife, especially white-tailed deer (*Odocoileus virginianus*). In these areas, mammals such as beaver (*Castor canadensis*), raccoon (*Procyon lotor*), cottontail rabbit (*Sylvilagus floridanus*), and opossum (*Didelphis virginiana*) also occur. Woodchucks (*Marmota monax*) are particularly abundant at installations with large areas of open lawn, which is ideal habitat. Since birds have greater access to isolated urban forests, urban facilities are more likely to have a diversity of bird species. Regionally-common reptiles and amphibians may also be found, although the absence of wetlands and surface waters at most of the installations reduces this likelihood.

(4) Flora

The existing vegetation at the NDW installations is characteristic of urban environments, reflecting the historic land uses and landscaping choices that have altered and replaced natural plant communities. Although few natural areas remain at these installations, descriptions of regional plant communities in the physiographic areas suggest the types of vegetation that may have previously existed. Currently mapped vegetation, mainly landscape plantings, is depicted in Figures 2-17 through 2-20; for NSF Arlington there is no current data available in regards to mapped vegetation.

a. Piedmont Plateau

Historically, the dominant plant community of the Piedmont Plateau portion of Washington, D.C. was the oak-chestnut forest. White oak (*Quercus alba*), chestnut oak (*Quercus prinus*), northern red oak (*Quercus rubra*), and hickories (*Carya* spp.) are still the most dominant forest tree species, but the once dominant American chestnut (*Castanea dentata*) has been extirpated since the 1930s. Understory vegetation includes smaller trees such as flowering dogwood (*Cornus florida*) and red bud (*Cercis canadensis*); a shrub layer including mountain laurel (*Kalmia latifolia*) and rhododendron and azalea (*Rhododendron* spp.), an herbaceous layer of diverse perennial forbs, mosses, lichens, and clubmosses; and woody vines such as wild grape (*Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*) (Terwilliger and Tate 1995). Over the past two centuries, most of the native vegetation in Washington, D.C. and surrounding areas has been replaced by urban development (USDA SCS 1976).

b. Coastal Plain

The vegetation of the Coastal Plain portion of Washington, D.C. historically included many of the same forest species as the Piedmont area. Although the Coastal Plain has been urbanized, similar vegetation persists today in undeveloped areas. Pines such as Virginia pine (*Pinus virginiana*), shortleaf pine (*Pinus echinata*), and loblolly pine (*Pinus taeda*) are more abundant on the Coastal Plain, while black oak (*Quercus velutina*) replaces northern red oak as a dominant canopy tree. Understory species in Coastal Plain forests include American holly (*Ilex opaca*), flowering dogwood, eastern red cedar (*Juniperus virginiana*), common persimmon (*Diospyros virginiana*), and sassafras (*Sassafras albidum*) (USDA SCS 1976).

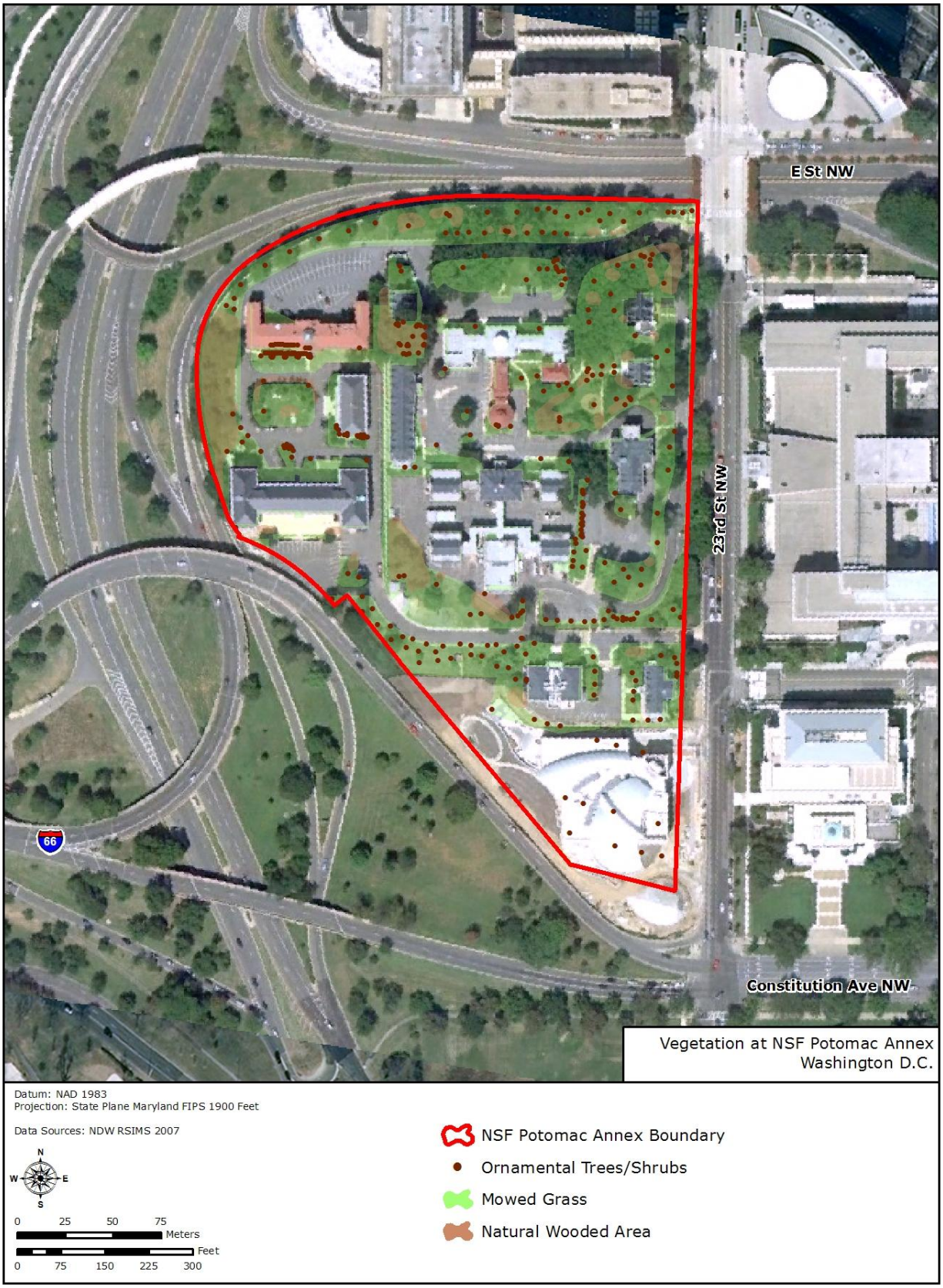

Figure 2-18. Vegetation at NSF Potomac Annex

Figure 2-19. Vegetation at NSF Naval Observatory

Figure 2-20. Vegetation at Washington Navy Yard

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3. ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

A. Supporting Sustainability of the Military Mission and the Natural Environment

(1) Military Mission and Sustainable Land Use

This INRMP provides management recommendations for sustainable land use that support the military mission by maintaining an environment in which personnel can work to provide the administrative functions for support of Navy activities. The primary land management practice needed to sustain some level of natural components on NDW installations is proper native landscaping.

(2) Defining Impact to the Military Mission

Implementation of this INRMP would enhance the environment that supports the military mission. There are no natural resources management activities in this INRMP required by regulation or recommended as stewardship actions that would negatively impact or constrain the military mission.

(3) Relationship to Other Plans

a. Stormwater Pollution Prevention Plan

The Consolidated Stormwater Pollution Prevention Plan (SWPPP) (DoN 2006a) identifies and maps potential pollutant sources that may contribute to the contamination of the stormwater discharges from permitted outfall drainage areas. Potential sources of pollutants include outdoor industrial activities and processing areas; material storage and handling areas; areas where hazardous material/hazardous waste/or petroleum, oil, and lubricant products are stored; construction and demolition sites; and land areas where chemicals are applied. The plan also describes stormwater management standards, stormwater management controls, and best management practices (BMPs) used at NDW installations to maintain and protect water quality. The SWPPP was developed as a requirement of federal and state water pollution control regulations. Whenever there is a change in design, construction, operation, or maintenance that has a significant effect on the potential for the discharge of pollutants to the waters of the state, the SWPPP must be amended. Of the five NDW installations, only the Washington Navy Yard is subject to the Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) permit requirements and is included in the SWPPP. The remaining facilities do not have NPDES permits and therefore do not require inclusion in the regional SWPPP.

b. Installation Restoration Program

The DoN Installation Restoration Program (IRP) is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) releases, Resource

Conservation and Recovery Act (RCRA), and releases under related provisions; considering risks and assessing impacts to human health and the environment, including impacts to endangered species, migratory birds, and biotic communities; and developing and selecting response actions when a release may result in an unacceptable risk to human health and the environment.

When appropriate, the regional or installation's natural resources management staff will help the IRP Remedial Project Manager (RPM) identify potential impacts to natural resources caused by the release of these contaminants. Regional or installation natural resources staff will also participate, as appropriate, in the IRP decision-making process by communicating natural resource issues on the installation to the RPM, attending Restoration Advisory Board (RAB) meetings, reviewing and commenting on IRP documents (e.g., Remedial Investigation, Ecological Risk Assessment), and ensuring that response actions, to the maximum extent practicable, are undertaken in a manner that minimizes impacts to natural resources on the installation. When appropriate, the regional or installation natural resources staff will make recommendations to the IRP RPM regarding cleanup strategies and site restoration. During initial monitoring protocols, the natural resources manager has the opportunity to recommend site restoration practices that are outlined within the INRMP. Examples include landfill caps restored to grasslands, excavation areas restored to wetland/pond areas, and treated water located to enhance a pond area.

No other information regarding the IRP is included in this INRMP, except for specific citation of or reference to the most up-to-date IRP program documents and their location.

c. Integrated Cultural Resources Management Plan

An Integrated Cultural Resources Management Plan (ICRMP) has been prepared for Naval District Washington (DoN 2004b) which covers a period of five years. Cultural resources are buildings, structures, districts, archeological sites, historic landscapes, architecture, Indian sacred sites, engineering or cultural to name a few, that are eligible or included on the National Register of Historic Places. The ICRMP is a useful resource that provides a review of pertinent federal laws and regulations, a summary of historic properties, and guidelines and standard operating procedures to direct current and future actions involving historic properties. Significant cultural resources have been identified at the Washington Navy Yard, NSF Naval Observatory, NSF Potomac Annex, and NSF Arlington. There are no cultural resources at NSF Suitland. Projects involving historic properties require the review and approval from the respective State Historic Preservation Office.

B. Natural Resources Consultation Requirements

A number of federal laws, including the ESA, MBTA, Magnuson-Stevens Fishery Conservation and Management Act (MSFMCA) and CWA, require consultation with a designated federal

regulatory agency such as USFWS, National Marine Fisheries Service (NMFS) or the U.S. Army Corps of Engineers (USACE) if a federal action has the potential to adversely impact a regulated resource.

(1) Endangered Species Act

Under Section 7 of the ESA, each federal agency must consult with the USFWS to ensure that any action it authorizes, funds, or carries out is not likely to threaten the continued existence of any threatened or endangered species or result in the destruction or adverse modification of habitat of such species. Federal agencies are required to consult with the USFWS if an action may affect a listed species. Federally listed threatened and endangered species known to occur in Prince Georges County, Maryland, Arlington County, Virginia, and the District of Columbia are listed in Table 2-4.

(2) Clean Water Act

Under Section 404 of the CWA, discharge of dredge and fill material into waters of the United States, including wetlands, is prohibited unless a permit is issued by the USACE. Military construction (MILCON) and other activities with the potential to disturb wetlands must be reviewed individually with regard to wetland impacts, and federal permits are sought as needed.

(3) Migratory Bird Treaty Act

The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. An exemption to the MBTA that allows incidental take of migratory birds by DoD during military readiness activities was finalized in February 2007 (Federal Register [FR] Vol. 72, No. 39). As directed by Section 315 of the 2003 National Defense Authorization Act, this rule authorizes such take, with limitations, that result from military readiness activities. If DoD determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.

(4) Magnuson-Stevens-Fishery Conservation and Management Act

The Magnuson-Stevens-Fishery Conservation and Management Act (MSFCMA) sets mandates for the NMFS, regional fishery management councils and federal action agencies to identify and protect important marine and anadromous fish habitat. The councils, with assistance from NMFS, are required to delineate essential fish habitat (EFH) in fishery management plans or fishery management plan amendments for all managed species. Authority to implement the MSFCMA is given to the Secretary of Commerce through the NMFS. The MSFCMA requires that the EFH be identified and described for each federally managed species. NMFS has

identified EFH in major estuaries, bays, and rivers along the northeastern coast of the United States. In the Potomac River, EFH has been designated for the following species:

- Windowpane flounder (*Scopthalmus aquosus*). EFH for juvenile and adult windowpane flounder includes bottom habitats with a substrate of mud or fine-grained sand (NOAA 1998).
- Bluefish (*Pomatomus saltatrix*). Bluefish is a schooling pelagic species and thus is not generally associated with bottom habitats. EFH for juvenile and adult bluefish includes the pelagic water column (NOAA 2007a).
- Summer flounder *(Paralicthys dentatus)*. EFH for juvenile and adult summer flounder includes the demersal (i.e., bottom) waters of the Potomac River (NOAA 2007c).
- King mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculates*), and cobia (*Rachycentron canadum*) are considered highly migratory species by NMFS and EFH has been designated for all life stages of these species in the Potomac River (NOAA 2007b).
- Red drum (*Sciaenops occelatus*). EFH for all life stages of red drum in the Potomac River includes tidal inlets and creeks, salt marshes, SAV, and unconsolidated bottom (i.e., soft sediments; NOAA 2007d).

Additionally, three skates have EFH designations in the Chesapeake Bay and associated inlets. Clearnose Skate *(Raja eglanteria*) has EFH designations for juvenile and adult in areas of the Chesapeake Bay and associated inlets with rocky or gravelly substrates and salinities greater than 22 parts per thousand (NOAA 2007e). EFH is also designated for the juvenile and adult stages of Little Skate (*Leucoraja erinacea*) and Winter Skate (*Leucoraja ocellata*), including sandy, gravelly, or mud substrates in the Chesapeake Bay and its tributaries (NOAA 2007e).

The MSFCMA requires federal agencies to consult with the NMFS on activities that may adversely affect EFH or when the NMFS independently learns of a federal activity that may adversely affect EFH. The MSFCMA defines an adverse effect as "any impact which reduces quality and/or quantity of EFH [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 Code of Federal Regulations [CFR] 600.810).

C. Planning for NEPA Compliance

NEPA of 1969, 42 USC §4232 et seq., requires all federal agencies take into consideration the potential environmental consequences of proposed actions in their decision-making process. The objectives of NEPA are to ensure that the government makes informed decisions and the public is included in the decision-making process and that all reasonable alternatives for an action are considered.

The Secretary of the Navy Instruction (SECNAVINST) 5090.6A and OPNAVINST 5090.1C establish Navy policy, procedures, and responsibilities for NEPA documentation for Navy

actions. It is Navy policy to initiate the NEPA processes at the earliest possible time to be an effective decision-making tool in the course of identifying a proposed action and to develop and carefully consider a reasonable range of alternatives for achieving the purpose of the proposed action.

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

NEPA is a procedural law that requires review and compliance with other laws. These include, but are not limited to, the: CAA, CWA, CZMA, National Historic Preservation Act (NHPA), Pollution Prevention Act (PPA), and ESA.

Per Section 102 of NEPA, all agencies of the federal government must address the following environmental planning requirements:

- Utilize a systematic, interdisciplinary approach to ensure the consideration of natural resources and the environment in planning and decision making;
- Prepare a detailed statement (i.e., an Environmental Impact Statement) for major federal actions significantly affecting the quality of the environment;
- Study, develop, and describe appropriate alternatives to actions that use or impact natural resources or the environment;
- Recognize the worldwide and long-range character or environmental problems; and
- Initiate and utilize ecological information in the planning and development of resource-oriented projects.

D. Beneficial Partnerships and Collaborative Resource Planning

The development of partnerships with federal and state resources agencies as well as local conservation and academic institutions assists in developing and implementing sound management practices. The following is a list of groups and agencies that may form significant partnerships with NDW installations.

- The USFWS provides assistance in matters that concern the conservation, protection, and management of fish and wildlife species.
- The Chesapeake Bay Ecological Services Field Office provides assistance in the management of invasive species.
- The VDGIF and MDNR Wildlife and Heritage Service provide assistance in matters that concern the conservation, protection, and management of fish and wildlife species in Virginia and Maryland.

- The MDNR Natural Heritage Program and the Virginia Department of Conservation, Division of Natural Heritage provide information and guidance related to rare, threatened, and endangered species information in Maryland and Virginia.

(1) Chesapeake Bay Agreement

Following a lengthy Environmental Protection Agency (EPA) study, the Chesapeake Bay Agreement (CBA) was originally signed in 1983 to fully address the extent, complexity, and sources of pollutants entering the bay (Chesapeake Bay Program [CBP] 2005). A new agreement was signed in 1987, with amendments enacted in 1992. The most recent CBA was signed on 28 June 2000. It is intended to guide efforts toward restoration of the Chesapeake Bay watershed until 2010.

In 1994, federal agencies committed to a broad series of goals in support of the Chesapeake Bay restoration. Specific categories of federal commitments included: focused watershed research, habitat restoration, reduction in nutrient and toxic discharges, and support of national service programs. On May of 2009, the President of the United States signed EO 13508, Chesapeake Bay Protection and Restoration. The purpose of the EO is to "protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed." The EO requires a renewed commitment to restore the Bay and charges the federal government to lead the effort. Habitat conservation commitments in this agreement were the impetus for current projects being planned or conducted at several NDW installations.

(2) Legacy Resource Management Program

In 1990, Congress established the Legacy Resource Management Program to provide financial assistance to installations working to preserve natural and cultural resources while supporting military readiness. A Legacy project may involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, and/or monitoring and predicting migratory patterns of birds and animals.

Three principles guide the Legacy program: stewardship, leadership, and partnership. Stewardship initiatives assist DoD in protecting resources for future generations. By embracing a leadership role as part of the program, the Department and individual installations serve as a model for knowledgeable and respectful use of natural and cultural resources within the community. Through partnerships, installation natural resource managers gain access to the knowledge and talents of individuals outside of DoD. Information including a guidebook, request for proposals, submission deadlines, and areas of emphasis can be found at https://www.dodlegacy.org/Legacy/intro/about.aspx.

E. Public Access and Outreach

(1) Public Access and Outdoor Recreation

The security requirements and type of activities performed at the NDW installations precludes public access and public opportunities for outdoor recreation.

(2) Public Outreach

Public outreach is limited to dissemination of press releases through the Office of Public Affairs associated with the NDW installations. Public service announcements are limited due to the security requirements and type of activities conducted at these installations.

F. Encroachment Partnering

The Defense Authorization Act (Title 10 USC 2684a) includes a provision that authorizes the execution of agreements with public and private partners to address the use or development of real property near installations to help limit encroachment and other constraints on military training and testing operations.

Encroachment is defined in the OPNAVINST 11010.40 as "Any non-Navy or Navy action planned or executed in the vicinity of a naval activity or operational area which inhibits, curtails, or possesses the potential to impede the performance of the mission of the naval activity." OPNAVINST 11010.40 provides details for development of Encroachment Action Plans, which identifies, quantifies, and provides mitigation strategies for the potential encroachment threats to an installation. These plans delineate short, mid, and long-term strategies to address encroachment threats at that installation. Encroachment partnering with allowable entities will help accomplish the Navy's goal of preservation and sustainment of conditions that are compatible with the mission and that achieve operational assurance.

Incompatible urban development could present NDW installations with a long-range threat to the military mission. Due to the intense accuracy of observational instruments at NSF Naval Observatory, surrounding development with its increased temperature and light pollution has posed a concern. A special overlay zoning district now protects the Observatory from encroachment and the Naval Observatory Precinct District Zone places a height limitation of 40 feet for surrounding buildings (DoN 1996).

G. State Comprehensive Wildlife Plans

State Wildlife Action Plans (SWAP in Maryland and Virginia; WAP in D.C.) are 10-year strategic plans that are required for continued funding through the State Wildlife Grant Program administered by the USFWS. The Maryland and Virginia SWAP and D.C. WAP were developed with extensive input from other federal and state agencies, nongovernmental

organizations, and private citizens. A DoD representative served as the Conservation Team Leader on the External Steering Committee, which acted as an advisory board to ensure that a wide range of resource conservation interests were addressed in the development and implementation of the Maryland and Virginia SWAP and D.C. WAP. Although the NDW installations are primarily urban environments, to the extent practicable, natural resources management at the NDW installations is in line with state wildlife goals and management guidelines. Listed species potentially occurring in the vicinity of NDW installations are included in Table 2-4.

(1) District of Columbia

The District of Columbia's WAP was prepared in 2006 by the DDOE Fisheries and Wildlife Division (DDOE 2006). The plan incorporates information on these elements:

- Distribution and abundance of fish and wildlife species and descriptions of key habitats;
- Problems facing species or habitats and conservation actions; and
- Monitoring plans, the review cycle, and public participation.

The WAP focuses on species and habitats of greatest conservation need in D.C.; however, it is also an action plan for the conservation of the District's wildlife. 148 species of wildlife have been identified as species of greatest conservation need, or 19 percent of the total wildlife species found in the District (DDOE 2006). Thirteen habitat types have been identified as priority habitats for conservation (DDOE 2006).

The District WAP is available online at: http://ddoe.dc.gov/ddoe/cwp/view,a,1210,q,494364,ddoeNav,%7C31007%7C.asp

(2) Maryland

The Maryland Comprehensive Wildlife Conservation Strategy, or SWAP, was developed and is implemented by the MDNR Wildlife and Heritage Service (MDNR 2005). The SWAP focuses on species and habitats of greatest conservation need in Maryland; however, it is also an action plan for the conservation of all of the state's wildlife. The 502 "at risk" wildlife species and 35 "key wildlife habitats" such as Carolina bays, tidal marshes, grasslands, and old growth forests are assessed, and threats, conservation actions, and research needs are recommended in this report. The SWAP identifies significant habitat threats, such as habitat fragmentation and loss, and outlines 24 statewide conservation actions.

The SWAP identified a large number of conservation actions to address problems facing Maryland's at risk species and key wildlife habitats. The general categories of conservation actions were coordination; education and outreach; enforcement; habitat management; land protection; planning;

The Maryland SWAP is available online at: http://dnr.maryland.gov/wildlife/divplan_wdcp.asp

regulations, policy, and law; and species management. Actions recommended in this INRMP are generally consistent with those put forth in the state SWAP.

Habitat management, land protection, and planning conservation actions directly addressed in this INRMP include the following:

- Protect wetlands from drainage, ditching, filling, water withdrawal, and other damaging practices that alter hydrology.
- Incorporate wetland and forest conservation actions into land use and land planning efforts.
- Develop habitat management guidelines for use by natural resources personnel.

(3) Virginia

The VDGIF developed the comprehensive wildlife conservation strategy, referred to as the SWAP for Virginia (VDGIF 2005). The SWAP focuses on species and habitats of greatest conservation need in Virginia; however, it is also an action plan for the conservation of all of Virginia's wildlife. Natural resources conservation is addressed in six ecoregions in Virginia: the Mid-Atlantic Coastal Plain, the Piedmont, the Blue Ridge and Valley, and the northern and southern Cumberlands. NDW installations lie within Mid-Atlantic Coastal Plain region.

The Virginia SWAP is available online at: http://bewildvirginia.org/wildlifeplan/

The plan identifies 925 species of greatest conservation need, which were derived from 13 lists of species of conservation concern including the USFWS and VDGIF protected species lists. The state plan stratifies the species into four tiers of relative conservation need: critical (Tier I), very high (Tier II), high (Tier III), and moderate (Tier IV), to allow for prioritization of threats facing species.

The SWAP identified a large number of conservation actions to address problems facing Virginia's species of greatest conservation need. The general categories of conservation actions were coordination; education and outreach; enforcement; habitat management; land protection; planning; regulations, policy, and law; and species management.

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4. PROGRAM ELEMENTS

A. Rare, Threatened, and Endangered Species Management

(1) Program Description

Under the mandates of the ESA, federal agencies must protect and conserve the habitats under their control. Federal agencies must also conserve listed species and ensure that agency actions do not jeopardize the continued existence of those species.

Rare, threatened, and endangered species surveys have not been conducted at NDW installations due to the lack of potential habitat supporting their occurrence. Federally listed threatened or endangered species or species of concern potentially occurring in the vicinity of NDW installations were presented in Table 2-4.

(2) Management Goals

The overall goal of this program element is to ensure compliance with the Endangered Species Act, the Bald and Golden Eagle Protection Act, applicable state regulations, and to protect and enhance rare species populations and their habitats. Management criteria for the program include avoiding impacts to rare, threatened, and endangered species and their habitat; maintaining existing population levels and habitat; and where feasible, increase populations and enhance habitat.

NDW natural resources professionals coordinate the planning, budget controls, and general administrative functions of the program. The USFWS, DDOE, VDGIF, and the MDNR Wildlife and Heritage Division provide guidance on rare species management issues and projects. The program ensures compliance with the following federal and state laws and DoD and Navy policies: Endangered Species Act of 1973 (16 USC 1531-1544, 87 Stat. 884) as amended, Bald and Golden Eagle Protection Act (16 USC 688-688d, 54 Stat. 250) as amended, Maryland Endangered Species of Fish Conservation Act (4-2A-01 et seq.) and Maryland Nongame and Endangered Species Conservation Act (10-2A-01 et seq.), and OPNAVINST 5090.1C Environmental and Natural Resources Program Manual.

B. Wetlands Management

There are no natural wetlands on any of the NDW installations. NSF Suitland has a stormwater management pond that may provide landing and loafing areas for geese, which may become a nuisance. Nuisance wildlife management is discussed in Section 4.C.4.

C. Wildlife Management

Wildlife management at NDW installations is concerned with the conservation of fish and wildlife resources and promotion of biodiversity. NDW installations are highly developed urban

bases that have been emphasizing the reorganization of operations within existing structures (DoN 1996). If in the future there is an increase in development, land conversion or degradation could impact existing wildlife resources.

(1) Program Description

The availability of suitable habitat and diversity of habitats influence wildlife populations at NDW installations. The majority of the land at the NDW installations is developed as urban and the potential for attracting a diversity of wildlife is relatively low. However, many native and exotic species that have adapted to urban environments have been observed at the NDW Installations.

(2) Management Goals

The overall goal of the program is to manage wildlife resources to maintain and enhance ecosystem functions and values in a manner that is consistent with the military mission. NDW natural resources staff coordinates daily planning, budget controls, and general administrative functions of the program. The USFWS, DDOE, VDGIF and the MDNR are cooperating agencies and provide guidance on management issues and projects.

Management goals for the program include:

- Maintain healthy fish and wildlife populations that are capable of supporting non consumptive uses;
- Maintain and enhance biodiversity;
- Use ecosystem management practices to achieve program goals; and
- Ensure that wildlife populations do not conflict with the military mission.

(3) Urban Wildlife

Because of the high level of development at NDW installations, the conservation and enhancement of the remaining natural habitats is important to protecting the installations' wildlife resources. Conservation efforts that focus on maintaining a diversity of forested habitats that provide year-round food and cover (coniferous stands) as well as seasonal food and cover (deciduous stands) would provide the greatest benefits for wildlife. Providing supplemental habitat in urban areas is another management action that can enhance wildlife habitat at the installation.

Avian species are more likely to inhabit remnant forest patches surrounded by urban or developed land and thus abundance and diversity may be higher than that of mammals or herpetofauna. NDW installations are located within the Atlantic Flyway, which is a major migration route for migratory birds along the U.S. East Coast. Large numbers of birds are found in this corridor during the spring and fall migration periods.

(4) Nuisance Animal Management

Nuisance situations occur when wildlife populations, including feral animals, exceed human expectations. Effective control measures must be based on economical, ecological, and sociological considerations to ensure that actions are justified, environmentally safe, and in the best interest of the public. Nuisance animals generally include birds, rodents, snakes, feral cats, and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

Nuisance wildlife at the NDW installations includes rock dove, groundhogs, feral cats, and rats. These species may cause safety hazards to people, property, and even other wildlife. They are not protected by federal or state laws; however, special permits may be required to trap, transport, or otherwise control these animals. Other nuisance wildlife at the NDW installations includes beavers, deer, and geese. These species are classified as game species in the State of Maryland and Virginia and are therefore protected species with established hunting or trapping seasons. The Public Works department contracts licensed pest controllers to perform nuisance wildlife control at NDW installations.

References for managing nuisance animals:
1. OPNAVINST 5090.1C
2. OPNAVINST 6250.4A

Additionally, in 2002 the CNO provided a Policy Letter Preventing Feral Cat and Dog Populations on Navy Property to clarify the application of SECNAVINST 6401-1A (Veterinary Health Services) to feral animal populations, and to outline pet management measures for installations to manage their feral animal populations (Appendix 5A).

There are many ways to reduce the abundance of nuisance animals. The Armed Forces Pest Management Board has compiled guidelines for controlling nuisance animals for DoD installations. For example, the Technical Information Memorandum No. 37 provides specific guidance for proper management of feral cats. These guidelines provide useful techniques for managing nuisance populations; however, many of these methods cannot be used due to the urban nature of the NDW installations. To help a nuisance animal program succeed, an educational program for all employees should be implemented prior to taking any management actions.

(5) Integrated Pest Management

Solutions for pest management, whether focused on insects or nuisance animals, are best identified in an integrated pest management plan (IPMP). Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term exclusion of pests and the damage they cause through techniques such as biological control, habitat manipulation, modification of cultural practices, and education of installation personnel. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. The integrated aspect of IPM means that individual management decisions

are not isolated, but take into account all aspects of the existing and potential pest situation in relation to the overall installation operation. Instead of focusing on how to eradicate pests, IPM considers pest biology and all of the feasible preventive and curative options. IPM requires integrating the best available options in a complementary way to create an overall management plan that is efficient, effective, and sustainable. Cultural practices such as sanitation and habitat management are often the first line of defense in preventing pest problems.

The goal of an IPMP is to make decisions that produce economically and environmentally optimum results. These decisions are based on research whose goal is to fully comprehend the pest's biology, as well as management techniques and decisions that have been used on these nuisance species in the past. An IPMP was prepared in 2004 (DoN 2004) that outlines in-house and contractor responsibilities and includes pest management sheets for several pests frequently encountered. Each NDW installation maintains at least one Pest Management Program, including general and Flag Housing pest control and grounds maintenance (DoN 2004).

(6) Native Pollinators

Two-thirds of wild plants depend on animal pollinators and without them, many plants cannot reproduce sexually (ODUSD no date). Reproductive loss in plant communities could result in the disruption of community function and lead to habitat degradation (ODUSD no date). Additionally, a 2006 National Research Council report warned of a looming pollinator crisis and called for better long-term monitoring of all animal pollinators, not just honeybees (Holden 2006).

Promoting biodiversity and restoring degraded lands is an important responsibility of the DoD. Removal of invasive species and establishment or restoration of native plant communities and associated pollinators are key steps to increasing biodiversity and should be encouraged at NDW installations with available natural resources.

D. Woodland Community Management

(1) Program Description

The woodland communities at NDW installations are relatively small with little or no potential for commercial forest management. Therefore, forest management at NDW installations primarily concerns urban forest and woodland community management. Although forest resources are not managed for timber production, they do provide a number of social, environmental, and economic benefits to the base. Specific benefits provided by urban forests and woodland communities include watershed protection, wildlife habitat, visual buffers, and recreational opportunities for installation personnel. The primary objectives of woodland community management are to maintain safe conditions for installation personnel, to maintain ecological communities that contribute to the overall ecosystem functions, and improve the appearance of the installation through the preservation of existing natural and landscaped areas.

(2) Management Goals

The overall goal of woodland community management is to employ ecosystem management techniques to promote healthy and diverse woodland areas at NDW installations. Management criteria for the program include:

- Sustain unfragmented woodland habitat for existing wildlife
- Sustain ecological values and function of the woodland community landscape
- Protect real property investments for the installation

(3) Urban Forestry

The objective of urban forestry is to optimize the social benefits of forested areas based on aesthetic, environmental, planning, and wildlife considerations, while reconciling these objectives to the needs of people, buildings, and other structures that typically coexist with urban forested land. Regularly scheduled management is needed to minimize safety hazards and sustain the urban forest on NDW installations.

There are no large, contiguous tracts of forest land on NDW installations that would require typical forestry practices such as thinning, harvesting, and regeneration. The forested areas on these installations are small, isolated groups of trees ranging in size from less than an acre to approximately ten acres. Nonetheless, urban forestry practices are necessary to maintain these trees for their value in providing shade, outdoor recreation, parkland, and wildlife habitats.

Urban forestry practices often focus on establishing standard tree and shrub maintenance. Implicit in these standards is the goal of preventing unnecessary damage to trees and shrubs from construction or grounds maintenance activities. Implementing standard grounds maintenance practices that address protection of existing trees and shrubs can help achieve this goal.

Although commercial forestry is not an objective of forest management at NDW installations; urban forest management is necessary to maintain these resources for their value in providing shade, outdoor recreation, parkland, and wildlife habitats. Navy policies on urban forests, as stated in NAVFAC P-73, Real Estate Procedural Manual and the Natural Resources Management Procedural Manual, require consideration of both forest and landscape trees in all planning decisions.

Urban forestry planning involves selecting plants and trees that are suited to the particular site conditions or regional climate, planting trees or shrubs appropriate distances from buildings, and using proper pruning techniques. A prime concern in such landscape planning is the potential for tree and utility conflicts, involving both existing and proposed facilities.

In 2009, an urban forest management plan was developed for NSF Naval Observatory (Klavon 2009). The focus of the plan was to survey the ecological health of the forest, the safety of USNO personnel, and to provide an overall USNO composite recommendation for managing the

grounds. The location of all trees (determined as 12" caliper at 4'6" approximate diameter at breast height) occurring in the built area, including landscaped trees, were recorded with a Global Positioning System (GPS) and included in the installation GIS. Tree species and condition were also included in the GIS database. Maintaining and updating the urban forest and landscaping data layer through periodic surveys is important to ensure proper management of forest health and productivity, forest management activities, and scheduling annual tree care costs. Implementation of the urban forest management plan is key for successful forest management at NSF Naval Observatory that may be coordinated between the Public Works facilities division and the Natural Resources Manager. Urban forest survey updates should include hazard tree locations, new tree planting areas and species, and forest disease and pest infestations.

E. Vegetation Management

(1) Program Description

Grounds maintenance is conducted on improved areas at NDW installations. The primary focus of the program is to promote biodiversity and minimize the use of energy, water, fertilizer, and herbicides for grounds maintenance activities. Vegetation management at NDW installations emphasizes the use of low maintenance, native species for landscaping. Grounds maintenance is closely linked with Pest Management, Fish and Wildlife, Urban Forest Management, Wetland (and Watershed) Management, and Invasive Species Management and directed by the NDW Regional Landscape Management Plan (DoN 2003).

(2) Management Goals

Direct or collateral benefits of landscaping include the earmarking of recreational areas (turf), control or directing of pedestrian traffic (turf and shrubs), prevention of erosion (turf and shrubs), and provisional shade for buildings and parking lots (trees). Landscape plantings also provide refuge for desirable (and sometimes undesirable) wildlife. All these factors have a direct impact on the quality of life, and, by extension, quality of the work experience on these installations.

Ongoing maintenance of these landscaping elements will preserve the aesthetics and visual resources of NDW installations. Proper landscape maintenance also provides long-term benefits and reduces the installation's overall maintenance costs.

(3) Management Guidelines

The following guidance and regulations apply to managing and/or maintaining landscaping at NDW installations:

- Environmental Conservation Program (DoDI 4715.3);
- President's Executive Memorandum on Environmentally Beneficial Landscaping (EO 50737) (April 1994); and the

- President's Executive Order on Greening the Government through Leadership in Environmental Management (EO 13148) (April 2000).

In support of EO 50737, the Navy issued guidance on using and selecting native plants on Navy lands. Under EO 50737, federal agencies are directed to do the following when cost effective and practicable.

- Use regionally native plants for landscaping.
- Design and use construction practices that minimize adverse effects on the natural habitat.
- Prevent pollution by reducing fertilizers and pesticides, using integrated pest management techniques, recycling green waste, and minimizing runoff.
- Implement water-efficient practices such as the use of mulches, efficient irrigation systems, recycled or reclaimed water for irrigation, and selecting and siting of plants in a manner that conserves water and controls soil erosion.
- 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.

The goals of EO 13148 include use of environmentally and economically beneficial landscaping to reduce adverse impacts to the natural environment. Each agency shall incorporate this guidance into landscaping programs, policies, and practices.

(4) Bayscapes

The Alliance for the Chesapeake Bay and the USFWS developed the Bayscapes Program to promote environmentally beneficial landscaping practices in the Chesapeake Bay region. By endorsing and cooperating with this program, NDW installations have an opportunity to create a more natural and environmentally beneficial landscape, provide food and shelter for wildlife, improve air and water quality within the Chesapeake Bay Watershed, and reduce long-term landscape maintenance costs. Important objectives of beneficial landscaping promoted by the Bayscapes Program, are to increase water efficiency, reduce ground maintenance requirements, and reduce the dependency on chemical fertilizers. Reducing the area of mowed lawn by increasing the use of native trees, shrubs, and ground covers; proper use of mulch; maintaining lawn grass at a height of approximately three inches; and restricting mowing during dry periods are the primary methods of meeting these objectives. Replacing flowering annuals with native perennials is another method to reduce long-term maintenance requirements.

F. Migratory Birds Management

(1) Program Description

Migratory birds are a large, diverse group of birds that utilize breeding grounds in the United States and Canada, and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean.

(2) Management Goals

The goals of migratory bird management at NDW installations are to support the conservation of migratory birds through habitat conservation and enhancement and to avoid the incidental take of migratory birds through military readiness actions in accordance with the MBTA to the greatest extent practicable.

The MBTA, 16 USC 703-712 is the primary legislation in the United States enacted to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. As of March 1, 2010, 1007 species were included on the list of migratory birds (FR Vol. 75, 9282-9314). Non-native species such as house sparrows, European starlings, rock dove, and mute swans (*Cygnus olor*) are not protected by the MBTA. Further, the resident Canada goose population has grown significantly throughout the United States during the past several decades and Canada geese are now considered a nuisance in many places. As a result, in 2006, the USFWS revised regulations allowing the removal of Canada geese at airports, in agricultural areas, and in other areas where they are causing conflicts with human populations.

An exemption to the MBTA allowing for the incidental take of migratory birds by DoD during military readiness activities was finalized in February 2007 (FR Vol. 72, No. 39). As directed by Section 315 of the 2003 National Defense Authorization Act, this rule authorizes such take, with limitations, that result from military readiness activities. If DoD determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.

Military readiness activities include all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness does not include: the routine operation of installation operating support functions, such as: administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; MWR activities; shops; mess halls; the operation of industrial activities; or, the construction or demolition of facilities listed above (72 FR 8931). During annual INRMP reviews, the Navy must report any migratory bird conservation measures that have been

implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

Additional protection for migratory birds on federal properties is provided by EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. This EO stresses incorporating bird conservation principles in agency management plans and requires federal agencies to enter into an MOU on migratory birds with the USFWS. In accordance with the MBTA and EO 13186, NDW installations employ operational and conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

G. Invasive Species Management

(1) Program Description

Invasive species are typically alien plants or animals that have been intentionally or accidentally introduced by human activity into a region in which they did not evolve. Unlike many exotic species, invasive species can result in a variety of negative impacts. They become agricultural pests, infest lawns as weeds, displace native plant species, reduce wildlife habitat, and alter ecosystem processes. The economic costs of invasive species include loss of recreational land value, clogging of important waterways, and increased costs in maintaining open powerline rights-of-way and were estimated by researchers at Cornell University to be $138 billion per year nationally (USGS 2007). Additionally, because of their ability to alter natural ecosystems and diminish the abundance or survival of native species, invasive species are recognized as a leading threat to natural ecosystems and biodiversity, as well as a leading cause of species becoming threatened and endangered. It is estimated that 42 percent of the species protected by the Endangered Species Act are at risk primarily because of nonnative, invasive species (Pimental et al. 2005) and invasive plants are the top threat to wildlife habitat in the District of Columbia (Pfaffko 2007).

(2) Management Goals

The overall goal of invasive species management is to protect ecosystems and native plant and animal species from invasive species through compliance with EO 13112. The EO requires that federal agencies coordinate complimentary, cost-effective activities concerning invasive species with existing organizations addressing invasive species. The Federal Interagency Committee for the Management of Noxious and Exotic Weeds, The Nature Conservancy, and the Maryland Natural Heritage Program may be available to provide guidance on invasive species management issues and projects.

The Federal Noxious Weed Act of 1974 and the President's EO on Invasive Species (EO 13112) provide for the control of noxious plants on lands under the control or jurisdiction of the federal government. The law allows poisonous plants and noxious weeds to be controlled or destroyed

in an approved manner when the plants interfere with the safe and efficient use of the land, endanger the health and welfare of personnel, or infest adjacent property.

EO 13112, Invasive Species, was issued in February 1999 to identify actions which may affect the status of invasive species. Subject to the availability of appropriations and to the extent practicable and permitted by law, each federal agency shall use relevant programs and authorities to: prevent the introduction of invasive species; detect and control such species in a cost-effective manner; monitor invasive species populations; provide for restoration of native habitats that have been invaded; conduct research on invasive species to prevent introduction and for sound control; and promote public education on invasive species.

(3) Inventory

A thorough inventory of invasive species has not been conducted at NDW installations to date with the exception of NSF Naval Observatory. A Native and Invasive Plant Species Survey and Management Plan is being developed for NSF Naval Observatory to be completed in 2010. To comply with EO 13112, a formal survey for invasive species should be conducted at NDW installations. Regularly monitoring for new populations of invasive and noxious weed species allows for early control of infestations, since management efforts are more effective when population sizes are small. NDW installations are highly developed, urban bases with large edge-to-area ratios, rendering these areas highly vulnerable to invasion by exotic species.

An annual reconnaissance survey should be conducted to identify the presence of exotic or invasive species and to recommend control actions. Early control of these species would minimize maintenance costs and adverse effects on native species.

(4) Invasive Plant Control

Nonnative species are considered by some experts to be the second most important threat to biodiversity, after habitat destruction (Randall 1996; Pimm and Gilpin 1989). Invasive plants have characteristics that permit them to rapidly invade new areas and out-compete native plants for light, water, and nutrients. Some of these characteristics are: early maturation; profuse reproduction by seeds and/or vegetative structures; long seed life in the soil; seed dormancy which ensures periodic germination and prevents seedlings from sprouting during unfavorable conditions; adaptations for spread with crop seeds, by natural agents, and by humans; production of biological toxins that suppress the growth of other plants; prickles, spines, or thorns that can cause physical injury and repel animals; ability to parasitize other plants; seeds that are the same size and shape as crop seeds, which makes cleaning difficult; roots or rhizomes (tough horizontal shoots) with large food reserves; ability to survive and produce seeds under adverse environmental conditions; and high photosynthetic rates.

In accordance with EO 13112, NDW installations will control populations of invasive plants in a cost-effective and environmentally sound manner. When practicable, control efforts will be

coordinated with other local or regional control programs. A variety of controls measures will be employed based on species-specific and site-specific requirements. In some cases, a combination of control measures may be appropriate. Various options for invasive plant control are discussed below.

a. Avoidance

Several avoidance measures are already in place at NDW installations and include prohibiting the use of invasive plants for landscaping or other purposes, implementing BMPs to minimize land disturbances that promote invasion, and re-vegetating disturbed areas with native species. Avoidance will remain the preferred measure of control.

b. Mechanical Controls

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

c. Biological Controls

Biological controls typically involve the introduction of a species (biological control agent) that feeds on or impedes the growth of the target invasive plant. The science of biological controls has made significant advances in recent years, but effective and approved methods are currently limited. Where applicable, this method can be very cost effective and avoids potential impacts associated with chemical and mechanical controls. However, many biological control agents are non native species, which raises additional concerns. Biological control measures may be used at NDW installations when they are determined to be the most appropriate measure available. Use of biological controls will be limited to those agents that are USDA-approved and for which NEPA documentation already exists.

d. Chemical Controls

Herbicide application can be a very effective means of controlling invasive plants. However, herbicides have the potential to impact nontarget plants as well as fish and wildlife resources. However, when appropriately used, non persistent herbicides can be the most appropriate control measure for many circumstances. Selective glyphosate-based herbicide application, in combination with mechanical methods and/or controlled burning, is an effective method for

many common invasive plants. In accordance with DoD pest management guidelines and the NDW Pest Management Plan (DoN 2004), herbicide use to control invasive plants will be limited to the extent possible. All herbicide use will be conducted in accordance with the Pest Management Plan and a DoD-certified applicator (or equivalent) will perform all applications. Only licensed herbicides will be utilized in accordance with their approved uses. Herbicides used to control wetland or aquatic plants must be licensed for use in wetlands.

H. Land Management

(1) Program Description

The Land Management Program provides the foundation for the conservation of all other natural resources components, and serves as the basic land use and conservation management guide. Sound land and water management practices that conserve soil and water are paramount to the overall natural resources conservation program. Soil and water resources form the basis for supporting the remaining components of the system. Consequently, every effort is made to ensure this foundation is protected from man-induced and natural impacts. The program is applicable to the entire installation and has significant interaction with grounds maintenance/vegetation management, wetlands management, urban forest management, and fish and wildlife management, as well as other environmental compliance program elements.

(2) Management Goals

The goals of land management at NDW installations are to provide the basic requirements for natural resources and to ensure these resources will be sustained in perpetuity. Objectives of land management include:

- Conservation, development, management, and maintenance of all natural resources in accordance with proven scientific methods, procedures, and techniques;
- Protection of the real estate from depreciation by implementing appropriate land use practices;
- Reduction or elimination of any contribution of pollution through waste disposal or erosion and sedimentation;
- Improvement of the appearance of NDW installations through incorporating adaptive management practices of the natural terrain and vegetation;
- Compliance with all applicable federal and state laws and regulations that mandate soil and water conservation;
- Improvement of the general health of the forest ecosystem while maintaining ecological balance;
- Protection of known Rare, Threatened, and Endangered species and critical habitat; and
- Direct the natural development of the forest ecosystem to provide a variety of renewable resources and benefits.

(3) Erosion and Sediment Control

Minimizing the effects of erosion and sedimentation is a primary goal of land management at the NDW installations. Protection of the soil resources from erosive action maintains fertility, the integrity of the vegetative community it supports, and the quality of surface waters. NDW has implemented a regulation prohibiting off-road vehicle parking, enforcement of which has provided erosion and sediment control. The dig permit process that is enforced by the Public Works Department for any project requiring excavation has also helped with enforcing proper erosion and sediment controls. The Maryland Department of the Environment requires action proponents to submit erosion, sediment, and storm water permits for earth disturbances of greater than 5,000 square feet or greater than 100 cubic yards to the Water Management Administration for review and approval. The District Department of the Environment Watershed Protection Division requires action proponents to submit an erosion and sediment control plan for 50 square feet of land disturbance and a stormwater management plan for 5,000 square feet of land disturbance. Land disturbance of equal to or greater than 2,500 square feet requires a stormwater discharge permit from the Virginia Department of Conservation and Recreation.

A basic knowledge of soils and their potentials, limitations, and restrictions for certain uses is a prerequisite to effectively handle soil-and water-related problems. BMPs for watershed protection that are in use at NDW installations include:

- Building on site stormwater retention ponds that encourage deposition of suspended sediments and allow infiltration of storm runoff;
- Steering development to impervious soils and leaving porous soils free to infiltrate water;
- Preserving the floodplain and natural drainage systems;
- Use of grassed ditches rather than curbs and gutters; and
- Use of vegetative buffers along streams.
- Use of low impact development (LID) to maintain and restore predevelopment hydrology (Appendix 5B).

Most of these practices are already in place and NDW installations uses grassed ditches for drainage swales. These drainage swales are valuable habitat for aquatic plant and animal species. Mowing along several drainage swales has ceased and are reverting to scrub shrub habitat. These areas should be monitored for invasive species and control measures should be implemented when necessary.

I. Agricultural Out Leasing

There are no agricultural out leasing operations or opportunities at the five NDW installations covered in this INRMP.

J. Geographic Information Systems Management

Geographic data and information are an integral part of natural resources and environmental protection and planning at the NDW installations. All GIS information is collected and maintained in coordination with the Natural Resources Office at NDW.

Naval Facilities Engineering Command (NAVFAC) created the GeoReadiness Repository to provide geospatial information relative to the Navy's Real Property Inventory to support functional areas including facilities management, environmental management, antiterrorism/force protection, base development/planning, regional planning, and range management. The GeoReadiness Repository, completed in 2004, provides a single source of authoritative strategic-level geospatial data for Class I (land) and Class II (facilities) properties (Carlen and Bason 2004). The GeoReadiness Repository enforces the Spatial Data Standards for Facilities, Infrastructure, and Environment. The GeoReadiness Repository provides a corporate resource for sharing existing data at the Regional level and was not designed to replace current GIS management at NDW installations. The NAVFAC GeoReadiness website provides an interactive mapping tool for registered Navy personnel and is available at https://portal.navfac.navy.mil. The GeoReadiness Repository is what feeds the Regional Shore Installation System (RSIMS) which is a portal-based facilities management tool used by many Navy personnel. RSIMS can also be accessed using the NAVFAC portal.

K. Outdoor Recreation

(1) Program Description

Outdoor recreation is defined by OPNAVINST 5090.1C as any program, activity, or opportunity dependent on the natural environment. Outdoor recreation at NDW installations include exercise activities, such as walking, jogging, and bicycling; sport activities such as baseball/softball, tennis, and volleyball; and pavilion areas for picnics and gatherings. Developed or constructed facilities, such as golf courses, tennis courts, riding stables, lodging facilities, boat-launching ramps, and marinas are generally not included in this definition of outdoor recreation and not discussed in this INRMP. Morale, Welfare, and Recreation has responsibility for regulating and managing many of the organized outdoor recreational facilities. Due to the urban nature and relatively small size of the installations, there are no consumptive uses (i.e., hunting or fishing) of the natural resources at NDW installations. Bird watching is the main non-consumptive natural resources based recreational activity at NDW installations.

(2) Management Goals

It is Navy policy to provide outdoor educational and recreational opportunities appropriate to the mission and the resources of Navy installations. The primary goals of outdoor recreation management at the NDW installations are to:

- Provide outdoor recreational opportunities for station personnel, their dependents, and the military community to the maximum extent possible within the constraints of the military mission and capability of the natural resources; and
- Foster understanding and awareness of the environment through educational conservation programs.

L. BASH

Each installation with flight activity must develop a Bird-Aircraft Strike Hazard (BASH) plan that lists responsibilities and procedures for bird control. Current Navy instructions implementing aspects of the BASH program include OPNAVINST 3750.6R, OPNAVINST 5090.1C, and NAVFAC Procedural Manual P-73. OPNAVINST 3750.6R (Chapter 4) outlines the procedures for submitting hazard reports for bird and animal strikes; the preferred method is through the Navy Safety Center Website at http://www.safetycenter.navy.mil/aviation/operations/bash/default.htm. OPNAVINST 5090.1C (Chapter 22) outlines the responsibilities of the natural resource manager to prepare and implement BASH plans as an integral part of the INRMP for installations with flight activity. The NAVFAC P-73 Manual provides guidance for the natural resource manager in developing a BASH program.

The BASH Guidance Package developed by the Naval Safety Center is included in Appendix 6. This document includes information on developing a BASH plan, discusses active controls, and provides a base self-inspection checklist. None of the five NDW installations covered under this INRMP are subject to BASH requirements.

M. Wildland Fire Management

The urban environment of the NDW installations precludes the development of a wildfire management plan; all fire management is handled through base and local management agencies.

N. Conservation Law Enforcement

The lack of hunting and fishing opportunities at the NDW installations precludes the establishment of separate conservation law enforcement; all law enforcement is handled through base and local management agencies.

O. Training of Natural Resources Personnel

If natural resources personnel don't already have professional certifications there is no requirement to obtain them. However, if natural resources personnel currently have professional certifications they will be supported to maintain these certifications.

A list of core competencies has been developed by the Commander Navy Region Mid-Atlantic (CNRMA) Training Program Coordinator to ensure natural resources personnel are adequately trained in resources management. There are three phases of core competencies. Phase I training is required for new media managers; Phase II training is appropriate for existing media managers; Phase III training is required for compliance Environmental Protection Specialists conducting inspections at NDW installations; and Phase IV training is required for general storefront compliance (A. Simmons, email communication). The following is a list of courses available for natural resources personnel. A course identification number (CIN) is given for Navy environmental courses. Other information given includes locations or course providers.

PHASE I - New Media Managers

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

B. Navy Occupational Safety and Health Courses
   1. Spill Management Team Training, CIN: A-493-0088/5637

C. Other Government Offerings
   1. Joint Permit Application (USACE)
   2. Range Master Certification (annual)
   3. CNO/NAVFAC Natural Resources Managers Meeting

D. Public Offerings
   1. National Military Fish Wildlife Association Conference (March, annual)
   2. Invasive Species Control
   3. Fish and Wildlife Law Enforcement (annual)

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

PHASE II – Existing Media Manager

A. Civil Engineering Corps Officer's School Courses
   1. Ecological Risk Assessment, CIN: A-4A-0081

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

B. Public Offerings/Courses

1. Wetlands Regulations (Wetland Training Institute)
2. Wetlands Delineation & Practicum (Wetland Training Institute)
3. 404 Permitting (USACE)
5. Joint Permit Application (USACE)
6. CZMA/Chesapeake Bay Act/Coastal Consistency Determinations
7. GIS (Louisiana State University School of Forestry, continual)
8. Invasive Species (NMFWA) continual
9. NMFWA Conference (March, annual)
10. CNO/NAVFAC NR Managers Meeting (December, annual)
11. Fish & Wildlife Law Enforcement Refresher (NMFWA continual)
12. Coastal Ecology/Shoreline Stabilization (Virginia Institute of Marine Science, continual)
13. Forestry Wetlands Permitting
14. Wetlands Construction/Mitigation
15. Society of American Foresters Conference (continual)
16. Southeast Deer Workshop (continual)
17. VDGIF Workshops – various-wildlife, game management, habitat management
18. Gap Analysis (USGS)
19. NAVFAC sponsored courses
20. CNO/NAVFAC Natural Resources Managers Meeting (December, annual)

PHASE III – Storefront Compliance Technicians

A. In House Media Manager Training Checklist
B. General Wetlands/Permit Awareness

PHASE IV – Storefront Compliance Requirements

A. Environmental Awareness
   1. Provided by media managers (video)
   2. Excerpts from OPNAVINST 5090.1C CH 22 (e.g., wetlands, permits)

P. Coastal/Marine Management

(1) Program Description

EO 12088, Federal Compliance with Pollution Control Standards, and the CWA require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In accordance with these requirements, NDW installations must

obtain all appropriate federal, state, and local certifications and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, and stormwater management programs for any action that may impact water quality.

(2) Coastal Zone Management Act and Chesapeake Bay Critical Area

The CZMA encourages states to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats. Although federal lands and actions are exempt from state law jurisdiction, the CZMA requires activities on federal lands that are reasonably likely to affect use of lands or waters, or natural resources of the coastal zone beyond the boundaries of the federal property, to be consistent to the maximum extent practicable with the enforceable policies of the state's coastal zone management or watershed protection program.

The Chesapeake Bay Critical Area Act regulates all lands under tidal influence of the Bay, its tributaries, adjacent wetlands, and a 1,000-foot inland buffer (MDE 2004). Although there are no Coastal Zone Management Program requirements in the District of Columbia (USACE 2007), the DDOE Watershed Protection Division works with several regional agencies and organizations, such as the Environmental Protection Agency, Chesapeake Bay Program, the Interstate Commission on the Potomac River Basin, and the Metropolitan Washington Council of Governments to address shared environmental concerns (DDOE 2007).

(3) Stormwater Management and Pollution Prevention

An important component of any stormwater management program is non-point source pollution control. Some primary constituents of non-point source pollution include sediments, nutrients, and organic and toxic substances. At NDW installations, non-point source pollutants originate as sediments from disturbed areas, fertilizer runoff from lawns, and automobile fluids, and other pollutants that wash from roadways during rainfall. The Navy considers abatement of nonpoint source pollution to be a top priority and NDW installations have developed a nonpoint source management strategy in the Consolidated SWPPP (DoN 2006a). The major thrust of this strategy is to cooperate closely with the EPA's Nonpoint Source Management Program and responsible state and local agencies. Nonpoint source pollution programs are administered by the following state agencies: Virginia Department of Conservation and Recreation Division of Soil and Water Conservation, Maryland Department of the Environment (MDE), and the District of Columbia Department of the Environment Watershed Protection Division. The NDW natural resources management program plans for containment of pollutants on the installation and dissipates their effects through bioremediation, thus benefiting soil and water conservation through the containment of environmental contaminants from stormwater.

A consolidated SWPPP was prepared for Naval Facilities Washington that included Washington Navy Yard and NSF Anacostia (DoN 2006a). Of the five NDW installations covered under this INRMP, only Washington Navy Yard is subject to NPDES permit requirements and has a SWPPP. The Washington Navy Yard's plan was developed in accordance with 40 CFR 112 and the purpose is "to meet the requirements of the NPDES permit by establishing policy, responsibilities, procedures, and technical guidance to eliminate pollutants in stormwater runoff" (DoN 2006a). Related plans include the 1994, 1996, and 2000 Illicit Discharge Study, the 2000 Hazardous Substance Spill Contingency Plan, and the 2003 Oil Spill Prevention Control and Countermeasures Plan.

The SWPPP identifies areas that have a high potential for soil erosion, and identifies stabilization measures that can be employed to limit erosion (DoN 2006a). However, since the topography is fairly level and most of the land at Washington Navy Yard is covered with impervious surfaces, very little soil is exposed to erosion and no recommendations were outlined (DoN 2006a).

In addition, the Navy has promoted a policy of LID for stormwater management that sets a goal of no net increase in stormwater volume and sediment or nutrient loading from major renovation and construction projects. In order to support this goal, as well as reduce reliance on conventional stormwater collection systems and treatment options, this policy directs that LID be considered in the design for all projects that have a stormwater management element. New construction results in loss of natural vegetation cover and drainage capacity and increased stormwater runoff. Conventional stormwater collection and conveyance systems and stormwater treatment options do not and cannot replicate natural systems, thus increasing the volume and flow of stormwater as well as sediment and nutrient loadings to streams, wetlands, and other receiving waters. Therefore, LID techniques offer a suite of BMPs that maintain or restore pre-development hydrology by utilizing strategies that infiltrate, filter, store, evaporate, and/or retain runoff close to its source. Further, LID mitigates the adverse effects to water quality in a cost-effective manner.

Q. Floodplains Management

(1) Program Description

A "100-year flood" or "100-year floodplain" describes an event or an area subject to a 1% probability of a certain size flood occurring in any given year. This concept does not mean such a flood will occur only once in one hundred years. Whether or not it occurs in a given year has no bearing on the fact that there is still a 1% chance of a similar occurrence in the following year. Since floodplains can be mapped, the boundary of the 100-year flood is commonly used to identify areas where the risk of flooding is significant. Frequency of inundation depends on the climate, the material that makes up the banks of the stream, and the channel slope (OAS 1991). The USACE regulates discharges of dredged or fill materials within 100-year floodplains. Few USACE Nationwide Permits are available for this purpose and almost all of these require

notification to the District Engineer. Floodplains receive additional protection through EO 11988, Floodplain Management, which instructs federal agencies to restore and preserve floodplains and to reduce the risk of flood-related loss by not building there. If floodplain disturbance is unavoidable, appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken.

(2) Management Goals

The goal of managing floodplains at NDW installations is to ensure the avoidance, protection, and restoration of floodplains in accordance with the CWA, EO 11988, and the Chesapeake Bay Agreement to the greatest extent practicable.

(3) Management Practices

Washington Navy Yard is the only NDW installation covered in this INRMP that is located within a 100-year floodplain. Roughly half of Washington Navy Yard lies within the 100-year floodplain of the Potomac River (Figure 4-1). NSF Potomac Annex lies on a hill and is therefore outside of the 100-year floodplain of the Potomac River. NSF Naval Observatory and NSF Suitland are not situated directly on a river and therefore have no floodplains mapped. Land use changes proposed in the 100-year floodplain are reviewed through the NEPA documentation process.

R. Other Leases

Not Applicable.

Figure 4-1. Floodplains at Washington Navy Yard

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5. IMPLEMENTATION

A. Preparing Descriptions

During development of this INRMP, the working group members have defined goals, identified legal drivers, and collaborated to develop natural resources management objectives at NDW installations. A list of projects necessary to meet these goals and objectives were also developed. Detailed prescriptions including management actions, cost estimates, funding classification, and an implementation schedule are in Appendix 1 and a tabular list of projects is in Appendix 2.

The INRMP is considered implemented if the installation:

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

B. Achieving No Net Loss

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

C. Use of Cooperative Agreements

A Cooperative Agreement is used to acquire goods or services to accomplish a public purpose of support or stimulation authorized by federal statute. Use of cooperative agreements requires substantial involvement between the federal agency and recipient during performance of the activity. Sikes Act Cooperative agreements may be used to accomplish work identified in the INRMP and may be entered into with states, local governments, nongovernmental organizations, and individuals to provide for the maintenance and improvement of natural resources or to benefit natural resources research on DoD installations. Cooperative Agreements authorized by the Sikes Act are not subject to the provisions of the Federal Grant and Cooperative Agreement Act, but must comply with the procedural requirements of the DoD Grant and Cooperative Agreement Regulations. Funds approved for a particular fiscal year must be obligated to cover the costs of goods and services provided under a Cooperative Agreement within an 18-month period beginning in that fiscal year in accordance with the Sikes Act. However, the expiration of funds is dependent upon the type of funds issued. For example, Operations and Maintenance funds expire five (5) years from the fiscal year in which they were appropriated. Therefore, multi-year Cooperative Agreements may be awarded under the Sikes Act in situations where

monitoring, surveying, or resource management plan development will continue for multiple years. Using cooperative agreements to accomplish projects is an efficient means to implement INRMPs and can be administered through the NAVFAC Washington office.

D. Funding

The Office of Management and Budget (OMB) and the EPA require federal agencies to classify natural resources projects based in part on compliance requirements. DoDI 4715.3, Enclosure 4, provides detailed guidance on programming and budgeting natural resources projects. The priority classifications (Class 0 through Class III) are summarized below.

Class 0: Recurring Natural Resources Conservation Management Requirements. Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing the DoD conservation program. Recurring costs consist of manpower, training, supplies, hazardous waste disposal, recycling activities, permits, fees, testing and monitoring and/or sampling and analysis, reporting and record keeping, maintenance of environmental conservation equipment, and compliance self-assessments.

Class I: Current Compliance. Includes projects and activities needed because an installation is currently out of compliance; has a signed compliance agreement; has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, presidential EOs, or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission.

Class II: Maintenance Requirements. Includes projects and activities not currently out of compliance but which will be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.

Class III: Enhancement Actions Beyond Compliance. Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

An additional Navy funding classification consists of four Environmental Readiness Levels (ERLs). Environmental Readiness Level 4 are "must fund" conservation requirements that are required to meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including Executive Orders. Specifically, Environmental Readiness Level 4:

- Supports all actions specifically required by law, regulation or Executive Order (DoD Class I and II requirements);
- Supports all DoD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, reporting and record keeping;

- Supports recurring administrative, personnel and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DoD Class 0);
- Supports DoD policy requirement to comply with overseas Final Governing Standards and Overseas Environmental Baseline guidance Document; and
- Supports minimum feasible Navy executive agent responsibilities, participation in Office of the Secretary of Defense (OSD) sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

Environmental Readiness Level 3:

- Supports all capabilities provided by ERL4;
- Supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts;
- Supports proactive involvement in the legislative and regulatory process to identity and mitigate requirements that will impose excessive costs or restrictions on operations and training; and
- Supports proactive initiatives critical to the protection of Navy operational readiness.

Environmental Readiness Level 2:

- Supports all capabilities provided under ERL3;
- Supports enhanced proactive initiatives critical to the protection of Navy operational readiness;
- Supports all Navy and DoD policy requirements; and
- Supports investments in pollution reduction, compliance enhancement, energy conservation and cost reduction.

Environmental Readiness Level 1:

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

An additional assessment level is assigned to projects to assist in recognizing appropriate funding sources in environmental program requirements exhibit. The following descriptions of Navy Assessment Levels are summarized from the Navy Environmental Requirements Guidebook (CNO 2003). Navy Level 1 requirements are those prescribed by federal or state laws, regulations, and EOs; Level 1 requirements include OMB/EPA Class 0, I, or II projects and ongoing efforts. Navy Level 2 requirements are derived from DoD or Navy policy; Level 3

requirements are for pending regulation; Level 4 requirements meet future requirements; and Level 5 requirements are leadership initiatives.

All conservation, compliance, and stewardship projects must be entered into the Environmental Projects Request (EPR)-website. CNO N45 is the final authority for designating the appropriate Environmental Readiness Level. A list of proposed projects necessary to implement this INRMP, implementation schedule, funding level, and proposed funding source is in Appendix 1. All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341 et seq.).

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Appendix 1

Project Descriptions

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RARE, THREATENED, AND ENDANGERED SPECIES MANAGEMENT

Project Title

Conduct Rare, Threatened, and Endangered Species Surveys at NSF Naval Observatory

Project Description

Conduct seasonal rare animal species surveys for a period of one year for species identified as having a high probability of occurring. Update existing survey data and GIS layers for rare, threatened, and endangered species. This information is necessary to maintain a current status of the INRMP. Information will also enable NDW natural resources staff to develop management plans if necessary and conduct habitat enhancement projects.

Impact to Mission

Federal agencies are required to ensure that their actions will not adversely impact endangered species. Updates to past surveys to substantiate the presence or absence of listed species are necessary to ensure compliance and population health. Monitoring or follow-up surveys of endangered species are also necessary to review military actions to determine effect on species populations so that actions can be modified to prevent taking or harming of these species.

Regulatory Drivers: ESA, Sikes Act, OPNAVINST 5090.1 C

Implementation Schedule: 2011

Priority: OMB/EPA Class I, ERL 4, Navy Level 1

Funding Sources: O&MN

Cost Estimate: $52,000

INVASIVE SPECIES MANAGEMENT

Project Title

Invasive Species Control

Project Description

Control target invasive species (identified through invasive species survey and management plan) and prevent the further spread and degradation of natural habitats on the stations. Invasive species are manageable if control efforts are undertaken early and management efforts maintained. Replace invasive species with native species in areas where they were providing landscaping, habitat, or other functions at all NDW installations.

Impact to Mission

Invasive/nuisance species compete for habitat with native/endemic species and, in many cases, take over the habitat and change or alter the ecosystem. The result is a decrease in wildlife habitat and decreased habitat for rare, threatened, and endangered species. Failure to implement this project would put NDW installations in noncompliance with EO 13122. Federal agencies are required to identify invasive species currently existing on federal lands, and to ensure that no new invasive species are introduced onto federal lands. In addition, federal agencies are to ensure that invasive species will not impact federally listed threatened or endangered species.

Regulatory Drivers:	Sikes Act; EO 11987, Exotic Organisms; EO 13112, Invasive Species; 32 CFR 190, Natural Resources Management Program; DoDI 4715.3 Environmental Conservation Program; OPNAVINST 5090.1C
Implementation Schedule:	Annual
Priority:	OMB/EPA Class III, ERL 3, Navy Level 3
Funding Sources:	O&MN
Cost Estimate:	$10,000-18,000 per year

FISH AND WILDLIFE MANAGEMENT

Project Title

Deer Population Survey and Management Plan at NSF Naval Observatory

Project Description

Conduct white-tailed deer population survey to determine population numbers, areas used, and impacts to the natural resources at U.S. Naval Observatory. Estimating deer abundance can be done through direct (spotlight counts or camera surveys) or indirect measurements (deer sightings per kilometer walked on foot or abundance of fecal pellet groups).

Due to the urban setting of the U.S. Naval Observatory and the security of some areas of the installation, abundance of fecal pellet groups would likely be the most efficient survey method if done in-house (see Appendix 10 for more information). Following the deer population survey, incorporate results into a management plan that addresses damage to natural resources at the installation and methods of control. Alternative methods of control will be outlined, and one will be selected as the recommended alternative. USDA Wildlife Services may be contacted to provide this service as they provide leadership and expertise in resolving such wildlife conflicts.

Impact to Mission

Overpopulation of deer leads to destruction of forest habitat for other wildlife use as well as damage or destruction of landscape plantings and potential increase of deer-vehicle collisions. Additionally, deer disease and mortality could cause a health and safety issue for installation employees.

Regulatory Drivers:	Sikes Act; 32 CFR Part 190, DoD Natural Resources Management Program; OPNAVINST 5090.1C, Environmental and Natural Resources Program Manual
Implementation Schedule:	2012
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$35,000

OUTDOOR RECREATION

Project Title

Interpretive Trail at NSF Naval Observatory

Project Description

Construct an interpretive trail through forested areas at NSF Naval Observatory. Design and install interpretive signs describing the flora and fauna found at the site.

Impact to Mission

Providing sustainable multipurpose use of natural resources, including nonconsumptive uses is required by the Sikes Act. As hunting is not compatible with the resources available at NSF Naval Observatory, environmental education and awareness provide the primary sustainable multipurpose use of natural resources. Environmental education also performs an important service for the military community at NSF Naval Observatory by providing opportunities for installation personnel to experience and learn about natural resources, which will increase awareness and respect for the environment.

Regulatory Drivers:	OPNAVINST 5090.1C; DoDI 4715.3, Environmental Conservation Program; 32 CFR 190, Natural Resources Management Program; Sikes Act
Implementation Schedule:	2013
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$30,000

MIGRATORY BIRD MANAGEMENT

Project Title

Migratory and Breeding Bird Survey

Project Description

Conduct baseline seasonal bird surveys to determine use by migrating, breeding, and wintering birds in each habitat type (open grasslands, upland hardwood forest, pine forest, bottomland hardwood forest etc.) at NDW installations. Migratory bird surveys should be conducted in late April and late September, breeding bird surveys in late May, and winter surveys in December or January.

Impact to Mission

Federal agencies are required to ensure that their actions will not adversely impact migratory birds. The Sikes Act further requires baseline data be obtained for fish and wildlife species on military installations. Bird surveys are required to substantiate the presence or absence of migratory species are necessary to ensure compliance and population health. Failure to implement this project would put NDW installations in noncompliance with the MBTA and Sikes Act.

Regulatory Drivers:	OPNAVINST 5090.1C; DoDI 4715.3, Environmental Conservation Program; 32 CFR 190, Natural Resources Management Program; Sikes Act; MBTA
Implementation Schedule:	2012
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$30,000

LAND MANAGEMENT

Project Title

Stormwater Management Pond Improvement at NSF Naval Observatory

Project Description

Improve the vegetation and habitat at NSF Naval Observatory stormwater management ponds. Planning considerations, design criteria, and a native plant guide for stormwater management areas in the mid-Atlantic is included in the Virginia Stormwater Management Handbook.

Impact to Mission

NSF Naval Observatory contains a mixture of dry and wet stormwater management ponds, as well as grassed swales to control stormwater runoff. Biological processes occurring in stormwater management ponds may be enhanced by using vegetation .

Regulatory Drivers:	CWA, Sikes Act
Implementation Schedule:	2014
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$13,604, depending on number and extent of plantings/improvements

LAND MANAGEMENT

Project Title

Stormwater Management Pond Improvement at NSF Suitland

Project Description

Improve the vegetation and habitat at NSF Suitland stormwater management pond. Planning considerations, design criteria, and a native plant guide for stormwater management areas in the mid-Atlantic is included in the Virginia Stormwater Management Handbook (VDCR 1999).

Impact to Mission

NSF Suitland contains a wet stormwater management pond, as well as grassed swales to control stormwater runoff. Biological processes occurring in stormwater management ponds may be enhanced by using vegetation (VDCR 1999).

Regulatory Drivers:	CWA, Sikes Act
Implementation Schedule:	2014
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$9,000, depending on number and extent of plantings/improvements

LAND MANAGEMENT

Project Title

Interior Land Erosion Control at NSF Naval Observatory

Project Description

Conduct a formal site survey and assess erosion conditions within the 72 acres, with focus along the perimeter of the U.S. Naval Observatory. Identify areas for restoration and enhancement. This may include designing bank stabilization measures throughout USNO as defined in the USNO Urban Forest Management Plan of 2009. The goal is to implement non-invasive, and low cost options to restore the integrity of these sites.

Impact to Mission

Areas throughout USNO are eroding which damages and threatens the landscape integrity currently present. Going unnoticed, erosion is a major safety concern to adjacent vehicular parking and pedestrian activities. During a major rainfall event, with loosened soils the potential for multiple trees to fall is possible. Failure to implement this project will put USNO in noncompliance with the Sikes Act, CWA, and EO 13508.

Regulatory Drivers:	CWA, Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration)
Implementation Schedule:	2011
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$55,000

LAND MANAGEMENT

Project Title

Forest/Waterway Enhancement

Project Description

Conduct a formal fence line to fence line survey and assess all waterways, and forests within the region to identify areas for restoration and enhancement. The end result of this effort may include creating wetlands, restoring stream banks, creating oyster reefs, planting submerged aquatic vegetation, and large scale forest replanting.

Impact to Mission

Failure to implement this project will put NDW installations in noncompliance with EO 13508. Wetlands, forests, fields, streams and underwater grasses in the Chesapeake watershed provide thousands of species of plants, fish and wildlife with the places they need to find food and shelter. These habitats play an important role in maintaining wildlife conservation.

Regulatory Drivers:	CWA, Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration)
Implementation Schedule:	2014
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$60,000, depending on number and extent of plantings/improvements

FISH & WILDLIFE MANAGEMENT

Project Title

Bat Population Survey at NSF Naval Observatory

Project Description

The decline in pollinators threatens plant biodiversity and conversely, losing plant biodiversity may contribute to pollinator decline. This project will inventory bat populations at NSF Naval Observatory and assess the distribution and impacts of the white nosed syndrome.

Impact to Mission

Failure to implement this project would put NSF Naval Observatory in noncompliance with the Sikes Act. The effort to promote biodiversity is an important responsibility of the DoD.

Regulatory Drivers:	Sikes Act, Natural Resources Management Program, OPNAVINST 5090.1C.
Implementation Schedule:	2014
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$33,468

FISH & WILDLIFE MANAGEMENT

Project Title

Insect Pollinator and Plant Survey

Project Description

As native plant communities are in decline, so too are their pollinators. The decline of native pollinator populations is linked to fragmentation of native plant populations and competition with alien invasive species. Native pollinators are critical members of the ecological community. This project will identify important plant resources and pollinator habitat at all NDW installations. The inventory will pay attention to occurrences of rare or specialist pollinator species, their life cycle and habitat requirements.

Impact to Mission

Failure to implement this project would put NDW installations in noncompliance with EO 13112. Invasive/nuisance species compete for habitat will native/endemic species and, in many cases, take over the habitat and change or alter the ecosystem. The result is a decrease in wildlife habitat and decrease habitat for rare, threatened, or endangered species.

Regulatory Drivers:	Sikes Act; EO 11987: Exotic Organisms; EO13112: Invasive Species; 32 CFR 190, Natural Resources Management Program, OPNAVINST 5090.1C.
Implementation Schedule:	2014
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$29,408

FISH & WILDLIFE MANAGEMENT

Project Title

Amphibian and Reptile Survey

Project Description

The project will map the distribution of all amphibians and reptiles collectively known as "herpetofauna" or "herps" at all NDW installations for a period of three years. Species of greatest concern will include snakes, salamanders, lizards, frogs and toads. This survey will also document habitat loss, introduced species, and associated environmental pollution that is threatening their survival. Information gained will help establish a baseline for future efforts to detect change in basewide distributions as well as to promote conservation actions.

Impact to Mission

Worldwide declines in herp populations have been occurring at an accelerated rate over the past twenty years, threatening many species with extinction. Understanding patterns of change at a installation wide scale is necessary for land managers to make informed decisions of land usage while providing conservation measures to the herptofauna populations.

Regulatory Drivers:	Sikes Act; ESA; Natural Resources Management Program, OPNAVINST 5090.1C.
Implementation Schedule:	2013-2015
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$15,000 per year

FISH AND WILDLIFE MANAGEMENT

Project Title

Resident Canada Goose Management

Project Description

Manage resident Canada goose populations warranting control from a safety and health perspective at NSF Suitland. Contract with Wildlife Services, USDA APHIS to remove birds during flightless period in late June and donate to needy organizations.

Impact to Mission

Resident Canada geese represent a potential safety hazard, water quality impacts, and public relations (i.e., don't shoo the birds off-site and cause a problem for a neighbor).

Regulatory Drivers:	Sikes Act, EO 13112 (Invasive Species Management), OPNAVINST 5090.1C
***Implementation Schedule*:**	as needed
Priority:	OMB/EPA Class II, ERL4, Navy Level 1
***Funding Sources*:**	O&MN
***Cost Estimate*:**	$7,000 per year

COMMUNITY OUTREACH

Project Title

Invasive Species Removal and Native Planting as an Outreach Activity at NSF Naval Observatory

Project Description

Control target invasive species and prevent the further spread and degradation of natural habitats on the stations. Invasive species are manageable if control efforts are undertaken early and management efforts are maintained. Replace invasive species with native species in areas where they were providing landscaping, habitat, or other functions. This project will be implemented as an Earth Day activity in April. This public outreach program will educate base personnel and the public about natural resources and the impacts of non-native plants.

Impact to Mission

Failure to implement this project would put NSF Naval Observatory in noncompliance with EO13112 and other regulatory laws associated to this project. Invasive/nuisance species compete for habitat with native/endemic species and, in many cases, take over the habitat and change or alter the ecosystem. The result is a decrease in wildlife habitat and habitat for rare, threatened, and endangered species.

Regulatory Drivers:	EO 11987 Exotic Organisms, EO 13112 Invasive Species, OPNAVINST 5090.1C; DoDI 4715.3, Environmental Conservation Program; 32 CFR 190, Natural Resources Management Program; Sikes Act
Implementation Schedule:	Annual
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$5,000

COMMUNITY OUTREACH

Project Title

Invasive Species Removal and Native Planting as an Outreach Activity at the Washington Navy Yard

Project Description

Control target invasive species and prevent the further spread and degradation of natural habitats on the stations. Invasive species are manageable if control efforts are undertaken early and management efforts maintained. Replace invasive species with native species in areas where they were providing landscaping, habitat, or other functions. This project will be implemented as an Earth Day activity in April. This public outreach program will educate base personnel and the public about natural resources and the impacts of non-native plants.

Impact to Mission

Failure to implement this project would put WNY in noncompliance with EO 13112 and other regulatory laws. Invasive/nuisance species compete for habitat with native/endemic species and, in many cases, take over the habitat and change or alter the ecosystem. The result is a decrease in wildlife habitat and habitat for rare, threatened, and endangered species.

Regulatory Drivers:	EO 11987 Exotic Organisms, EO 13112 Invasive Species, OPNAVINST 5090.1C; DoDI 4715.3, Environmental Conservation Program; 32 CFR 190, Natural Resources Management Program; Sikes Act
Implementation Schedule:	Annual
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$7,619

COMMUNITY OUTREACH

Project Title

Invasive Species Removal and Native Planting as an Outreach Activity at NSF Arlington

Project Description

Control target invasive species and prevent the further spread and degradation of natural habitats on the stations. Invasive species are manageable if control efforts are undertaken early and management efforts maintained. Replace invasive species with native species in areas where they were providing landscaping, habitat, or other functions. This project will be implemented as an Earth Day activity in April. This public outreach program will educate base personnel and the public about natural resources and the impacts of non-native plants.

Impact to Mission

Failure to implement this project would put NSF Arlington in noncompliance with EO 13112 and other regulatory laws. Invasive/nuisance species compete for habitat with native/endemic species and, in many cases, take over the habitat and change or alter the ecosystem. The result is a decrease in wildlife habitat and habitat for rare, threatened, and endangered species.

Regulatory Drivers:	EO 11987 Exotic Organisms, EO 13112 Invasive Species, OPNAVINST 5090.1C; DoDI 4715.3, Environmental Conservation Program; 32 CFR 190, Natural Resources Management Program; Sikes Act
Implementation Schedule:	Annual
Priority:	OMB/EPA Class III, ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$3,000

URBAN FOREST MANAGEMENT

Project Title

Implement NSF Naval Observatory Urban Forest Management Plan

Project Description

Remove hazard or injured trees as identified in the 2009 Urban Forest Inventory and Management Plan that may result in injury or property damage. Replace all removed trees with native species respectively. Follow proper planting guidelines. Plant additional native tree and shrub plantings along the forest/urban interface to enhance edge habitat as recommended.

Impact to Mission

The installation has extremely old trees whose health needs was assessed in 2009, so future hazards can be eliminated Failure to implement this project may result in an increased incidence of hazard trees that may become a safety issue.

Regulatory Drivers:	32 CFR 190, Natural Resources Management Program; DoDI 4715.3 Environmental Conservation Program; OPNAVINST 5090.1C
Implementation Schedule:	Annual
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$15,000-$25,000 per year

URBAN FOREST MANAGEMENT

Project Title

Urban Tree Management Plan at the Washington Navy Yard

Project Description

Assess the health of all trees (12" caliper at 4'6" Diameter Breast Height) and provide recommendations for their care and removal at the Washington Navy Yard. Install a tree id/tag number to each tree for identification purposes using the formal scientific name and common name. It also must determine whether some of the trees can be deemed 'champion trees'. Once study is complete, remaining funds will be used to implement the recommendations for the removal and placement of trees. Follow proper planting guidelines.

Impact to Mission

The installation has extremely old trees whose health needs to be assessed so future hazards can be eliminated. Failure to implement this project may result in an increased incidence of hazard trees that may become a safety issue.

Regulatory Drivers:	32 CFR 190, Natural Resources Management Program; DoDI 4715.3 Environmental Conservation Program; OPNAVINST 5090.1C
Implementation Schedule:	2013
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$45,000

WATERSHED MANAGEMENT

Project Title

Watershed Improvement Plan/Facility Implementation Plan

Project Description

The new management goals for restoring the Chesapeake Bay will most likely be communicated to NDW/NAVFAC Washington by State-developed Watershed Improvement Plans (WIPs). The WIPs may require each installation to develop a Facility Implementation Plan (FIP) showing the forward path toward meeting the EO 13508 strategic goals.

Impact to Mission

Federal agencies are required to ensure that their actions will not adversely impact the Chesapeake Bay and its watershed. This project will support EO 13508.

Regulatory Drivers:	Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration); CWA
Implementation Schedule:	2013
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$125,000

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Appendix 2

List of Projects

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Project Description	Implementation Schedule (FY)	Prime Legal Driver/ Initiative	Class, ERL, Navy Level	Cost Estimate ($)	Funding Source	Date Completed
Rare, Threatened, and Endangered Species Management						
Conduct Rare, Threatened, and Endangered Species Surveys at NSF Naval Observatory	2011	A, B, J	1, 4, 1	52.000	O&MN	
Fish and Wildlife Management						
Deer Population Survey and Management Plan at NSF Naval Observatory	2012	B, I, J	3, 2, 5	35,000	O&MN	
Bat Population Survey at NSF Naval Observatory	2014	B, J	3, 2, 5	33,468	O&MN	
Insect Pollinator and Plant Survey	2014	B, G, H, I, J	3, 2, 5	29,408	O&MN	
Amphibian and Reptile Survey	2013-2015	A, B, J	3, 2, 5	15,000 per yr	O&MN	
Resident Canada Goose Management	As needed	B, J	2, 4, 1	7,000 per yr	O&MN	
Invasive Species Management						
Invasive Species Control	Annual	B, G, H, I, J, K	1, 4, 1	10,000 – 18,000/yr	O&MN	
Community Outreach						
Invasive Species Removal and Native Planting as an Outreach Activity at NSF Naval Observatory	Annual	B, G, H, I, J, K	3, 1, 5	5,000/yr	O&MN	
Invasive Species Removal and Native Planting as an Outreach Activity at the Washington Navy Yard	Annual	B, G, H, I, J, K	3, 1, 5	7, 619/yr	O&MN	
Invasive Species Removal and Native Planting as an Outreach Activity at NSF Arlington	Annual	B, G, H, I, J, K	3, 1, 5	3,000/yr	O&MN	
Outdoor Recreation						
Interpretive Trail at NSF Naval Observatory	2013	B, I, J, K	3, 1, 5	30,000	O&MN	
Migratory Bird Management						

Migratory and Breeding Bird Survey	2012	B, D, I, J, K	3,1,5	30,000	O&MN	
Land Management						
Stormwater Management Pond Improvement at NSF Naval Observatory	2014	C, B	3, 1, 5	13,604	O&MN	
Stormwater Management Pond Improvement at NSF Suitland	2014	C, B	3, 1, 5	9, 000	O&MN	
Interior Land Erosion Control at NSF Naval Observatory	2011	B, C, M	3, 1, 5	55,000	O&MN	
Forest/Waterway Enhancement	2014	B, C, M	3, 1, 5	60,000	O&MN	
Urban Forest Management						
Implement NSF Naval Observatory Urban Forest Management Plan	Annual	I, J, K	3, 2, 5	15,000-25,000 per year	O&MN	
Urban Tree Management Plan at the Washington Navy Yard	2013	I, J, K	3, 2, 5	45,000	O&MN	
Watershed Management						
Watershed Improvement Plan/Facility Implementation Plan	2013	B, C, M	3, 2, 5	125,000	O&MN	

A – Endangered Species Act, as amended; B – Sikes Act, as amended; C – Clean Water Act, as amended; D – Migratory Bird Treaty Act, as amended; E – Coastal Zone Management Act, as amended; F – EO 11990 (Protection of Wetlands); G – EO 13112 (Invasive Species); H – EO 11987 (Exotic Organisms); I – 32 CFR Part 190 (DoD Natural Resources Management Program); J – OPNAVINST 5090.1B/C (Environmental and Natural Resources Program Manual; K – DoD Instruction 4715.3 (Environmental Conservation Program; L – OPNAVINST 3750.6R (Naval Aviation Safety Program); M – EO 13508 (Chesapeake Bay Protection and Restoration); O&MN – Operations and Maintenance, Navy

Appendix 3

Species Lists

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Known Fish Species in the Anacostia River

Species	Scientific Name
Striped Bass	*Morone saxatilis*
White Perch	*Morone americana*
Largemouth Bass	*Micropteurs salmoides*
Smallmouth Bass	*Micropterus dolomieu*
Channel Catfish	*Ictalurus punctatus*
White Catfish	*Ameriurus catus*
Brown Bullhead	*Ameriurus nebulosus*
Yellow Bullhead	*Ameriurus natalis*
Alewife	*Alosa pseudoharengus*
Blueback Herring	*Alosa aestivalis*
American Shad	*Alosa sapidissima*
Hickory Shad	*Alosa mediocris*
Yellow Perch	*Perca flavescens*
Walleye	*Stizostedion vetreum*
Quillback Carpsucker	*Carpoides cyprinus*
Golden Redhorse	*Moxostoma erythrurum*
Carp	*Cypeinus carpio*
Goldfish	*Carassius auratus*
Silvery Minnow	*Hybognathus regius*
Golden Shiner	*Notemigonus crysoleucas*
Spottail Shiner	*Notropis hudsonius*
Spotfin Shiner	*Cyprinella spiloptera*
Atlantic Silverside	*Menidia menidia*
Tessellated Darter	*Etheostoma olmstedi*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Redbreast Sunfish	*Lepomis auritis*
Punpkinseed	*Lepomis gibbosus*
Mummichog	*Fundulus heteroclitus*
Banded Killifish	*Fundulus diaphanous*
American Eel	*Anguilla rostrata*
Gizzard Shad	*Dorosoma cepedianum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Longnose Gar	*Lepisosteus osseus*
Creek Chubsucker	*Erimyzon oblongus*
Blue Catfish	*Ictalurus farcatus*
Common Shiner	*Luxilus comutus*
Bay Anchovy	*Anchoa mitchilli*
White Sucker	*Catastormus commersoni*
Black Crappie	*Pomoxis nagromaculatus*
Green Sunfish	*Lepomis cyanellus*
Atlantic Menhaden	*Brevoortia tyrannus*
Needle Fish	*Stongylura marina*
Bluntnose Minnow	*Pimephales notatus*
Shortnose Gar	*Lepisosteus platostomus*

Known Fish Species in the Anacostia River (cont'd)

Species	Scientific Name
Swallowtail Shiner	*Notropis procne*
White Crappie	*Pomoxis annularis*
Northern Hogsucker	*Hypentelium nigricans*
Bridle Shiner	*Notropis bifrenatus*
Sea Lamprey	*Petromyxon marinus*
Black Bullhead	*Ameriurus melas*

Source: DoN 2007

Fish Species found at the confluence of the Anacostia and Potomac Rivers (including Hains Point and Washington Ship Canal)

Common Name	Scientific Name	Species of Greatest Conservation Need
Alewife Herring	*Alosa pseudoharengus*	Species in need of conservation as identified by the District of Columbia Wildlife Action Plan
American Eel	*Anguilla rostrata*	Species in need of conservation as identified by the District of Columbia Wildlife Action Plan
Atlantic Menhaden	*Brevoortia tyrannus*	
Atlantic Silverside	*Menidia menidia*	
Black Crappie	*Pomoxis nigromaculatus*	
Blue Catfish	*Ictalurus furcatus*	
Blueback Herring	*Alosa aestivalis*	Species in need of conservation as identified by the District of Columbia Wildlife Action Plan
Bluegill Sunfish	*Lepomis macrochirus*	
Brown Bullhead	*Ameiurus nebulosus*	
Channel Catfish	*Ictalurus punctatus*	
Common Carp	*Cyprinus carpio*	
Gizzard Shad	*Dorosoma cepedianum*	
Golden Redhorse	*Moxostoma erythrurum*	
Golden Shiner	*Notemigonus crysoleucas*	
Goldfish	*Carassius auratus*	
Hickory Shad	*Alosa mediocris*	Species in need of conservation as identified by the District of Columbia Wildlife Action Plan
Largemouth Bass	*Micropterus salmoides*	
Pumpkinseed Sunfish	*Lepomis gibbosus*	
Redbreast Sunfish	*Lepomis auritus*	
Redear Sunfish	*Lepomis microlophus*	
Rock Bass	*Ambloplites rupestris*	
Silvery Minnow	*Hybognathus nuchalis*	
Smallmouth Bass	*Micropterus salmoides*	
Spotfin Shiner	*Cyprinella spiloptera*	
Spottail Shiner	*Notropis hudsonius*	
Striped Bass	*Morone saxatilis*	
Tessellated Darter	*Etheostoma olmstedi*	
White Crappie	*Pomoxis annularis*	
White Perch	*Morone americana*	
White Sucker	*Catostomus commersonii*	
Yellow Perch	*Perca flavescens*	
Warmouth	*Chaenobryttus gulosus*	Species in need of conservation as identified by the District of Columbia Wildlife Action Plan

Source: Email Communication, Sylvia Whitworth, Wildlife Management Branch, Fisheries and Wildlife Division, District Department of the Environment, February 13, 2009.

Known Bird Species in the Lower Anacostia River Watershed

Species	Scientific Name
Podicipediformes	
Red-necked Grebe	*Podiceps grisegena*
Horned Grebe	*Podiceps auritus*
Pelecaniformes	
Double Crested Cormorant	*Phalacrocorax auritus*
Ciconiiformes	
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Little Blue Heron	*Egretta caerulea*
Green Heron	*Butorides virescens*
Black-Crowned Night Heron	*Nycticorax nycticorax*
Turkey Vulture	*Cathartes aura*
Anseriformes	
Canada Goose	*Branta canadensis*
Snow Goose	*Chen caerulescens*
Wood Duck	*Aix sponsa*
Green-winged Teal	*Anas crecca*
American Black Duck	*Anas rubripes*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Blue-winged Teal	*Anas discors*
Canvasback	*Aythya valisineria*
Ring-necked Duck	*Aythya collaris*
Bufflehead	*Bucephala albeola*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergas merganser*
Ruddy Duck	*Oxyura jamaicensis*
Falconiformes	
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Shapr-shinned Hawk	*Accipiter striatus*
Cooper’s Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falcon sparverius*

Known Bird Species in the Lower Anacostia River Watershed (cont'd)

Species	Scientific Name
Charadriiformes	
Peregrine Falcon	*Falcon mexicanus*
Killdeer	*Charadrius vociferous*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Spotted Sandpiper	*Actitis macularia*
Semi-palmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Pectoral Sandpiper	*Calidris melanotos*
Common Snipe	*Gallinago gallinago*
Laughing Gull	*Larus atricilla*
Ring-billed Gull	*Larus delawarensis*
Herring Gull	*Larus argentatus*
Great Black-backed Gull	*Larus marinus*
Lesser Black-backed Gull	*Larus fuscus*
Caspian Tern	*Stema caspia*
Forster's Tern	*Stema forsteri*
Least Tern	*Stema antillarum*
Columbiformes	
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
Cuculiformes	
Yellow-billed Cuckoo	*Coccyzus americanus*
Apodiformes	
Chimney Swift	*Chaetura vauxi*
Ruby-throated Hummingbird	*Archilochus colubris*
Coraciiformes	
Belted Kingfisher	*Ceryle alcyon*
Piciformes	
Red-bellied Woodpecker	*Melanerpes carolinus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Passeriformes	
Eastern Wood Peewee	*Contopus virens*
Alder Flycatcher	*Enpidonax alnorum*
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*
Easstern Kingbird	*Tyannus tyannus*
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Barn Swallow	*Hirundo rustica*

Known Bird Species in the Lower Anacostia River Watershed (cont'd)

Species	Scientific Name
Passeriformes (cont'd)	
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Fish Crow	*Corvus ossifragus*
Carolina Chickadee	*Poecile carolinensis*
Tufted Titmouse	*Baeolophus bicolor*
Brown Creeper	*Certhia americana*
Carolina Wren	*Thryothorus ludovicianus*
House Wren	*Toglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Blue-grey Gnatcatcher	*Polioptila caerulea*
Eastern Bluebird	*Sialia sialis*
Veery	*Catharus fuscescens*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylocichla mustelina*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
Cedar Waxwing	*Bombycilla cedrorum*
European Starling	*Sturnus vulgaris*
White-eyed Vireo	*Vireo griseus*
Warbling Vireo	*Vireo gilvus*
Red-eyed Vireo	*Vireo olivaceus*
Northern Parula	*Parula americana*
Yellow Warbler	*Dendroica petechia*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Magnolia Warbler	*Dendroica magnolia*
Cape May Warbler	*Dendroica tigrina*
Black-throated Blue Warbler	*Dendroica caerulescens*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Green Warbler	*Dendroica virens*
Blackburnian Warbler	*Dendroica fusca*
Palm Warbler	*Dendroica palmarum*
Blackpoll Warbler	*Dendroica striata*
Black-and-white Warbler	*Mniotilta varia*
American Redstart	*Myioborus pictus*
Northern Waterthrush	*Seiurus noveboracensis*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Canada Warbler	*Wilsonia canadensis*
Scarlet Tanager	*Piranga olivacea*
Northern Cardinal	*Cardinalis cardinalis*

Known Bird Species in the Lower Anacostia River Watershed (cont'd)

Species	Scientific Name
Passeriformes (cont'd)	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Blue Grosbeak	*Guiraca caerulea*
Indigo Bunting	*Passenrina cyanea*
Field Sparrow	*Spizella pusilla*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Swamp Sparrow	*Melospiza Georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
Dark-eyed Junco	*Junco hyemalis*
Red-winged Blackbird	*Agelaius phoeniceus*
Rusty Blackbird	*Euphagus carolinus*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
Orchard Oriole	*Icterus spurious*
Baltimore Oriole	*Icterus galbula*
Purple Finch	*Carpodacus purpureus*
House Finch	*Carpodacus mexicanus*
American Goldfinch	*Carduelis tristis*
House Sparrow	*Passer domesticus*

Source: DoN 2007

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
GREBES AND CORMORANT						
Common Loon	*Gavia immer*	O?		O?	O?	
Double-crested Cormorant	*Phalacrocorax auritus*	O	U	U	O	
Eared Grebe	*Podiceps nigricollis*	O		O?	O?	
Horned Grebe	*Podiceps auritus*	O		O?	O?	
Pied-billed Grebe	*Podilymbus podiceps*	O		O?	O	
Red-necked Grebe	*Podiceps grisegena*	O?		O?	O	
HERONS						
American Bittern	*Botaurus lentiginosus*	O		O?		
Black-crowned Night-Heron	*Nycticorax nycticorax*	O	U	O	O	Po
Cattle Egret	*Bubulcus ibis*	O				
Great Blue Heron	*Ardea herodias*	U	C	C	U	Po
Great Egret	*Ardea alba*	O	O	O		
Green Heron	*Butorides virescens*	O	O	O		Po
Little Blue Heron	*Egretta caerulea*	O?	O	O?		
VULTURES						
Black Vulture	*Coragyps atratus*	O?	O?	O	O?	
Turkey Vulture	*Cathartes aura*	O	O	O	O?	
WATERFOWL						
American Black Duck	*Anas rubripes*	O	O?	O	O	Po
American Wigeon	*Anas americana*	O?		O	O?	
Blue-winged Teal	*Anas discors*	O	O?	O?		
Bufflehead	*Bucephala albeola*	O?		O	O	
Canada Goose	*Branta canadensis*	C	C	C	C	Co
Common Goldeneye	*Bucephala clangula*	O?		O?	O	
Common Merganser	*Mergus merganser*	O?		O?	O	
Greater White-fronted Goose	*Anser albifrons*	O?		O?	O	

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
Green-winged Teal	*Anas crecca*	O		O?	O	
Hooded Merganser	*Lophodytes cucullatus*	O?		O	O	
Lesser Scaup	*Aythya affinis*	O?		O?	O	
Long-tailed Duck	*Clangula hyemalis*	O?		O	O	
Mallard	*Anas platyrhynchos*	C	C	U	U	Co
Northern Pintail	*Anas acuta*	O?		O?	O	
Ruddy Duck	*Oxyura jamaicensis*	O		O	O	
Tundra Swan	*Cygnus columbianus*	O?*		O?*	O*	
Wood Duck	*Aix sponsa*	O	O	O	O	Po
HAWKS						
American Kestrel	*Falco sparverius*	O	O	O	O	Po
Bald Eagle	*Haliaeetus leucocephalus*	O	O	O	O	
Cooper's Hawk	*Accipiter cooperii*	O?	O	O	O	
Northern Harrier	*Circus cyaneus*	O?	O?	O	O	
Osprey	*Pandion haliaetus*	O	O	O		Co
Peregrine Falcon	*Falco peregrinus*	O	O?	O	O?	
Red-shouldered Hawk	*Buteo lineatus*	O	O?	O	O	Po
Red-tailed Hawk	*Buteo jamaicensis*	O	O?	O	O	Po
Sharp-shinned Hawk	*Accipiter striatus*	O?		O	O?	
QUAIL						
Northern Bobwhite	*Colinus virginianus*	O?	O	O?	O?	Po
RAIL, MOORHEN AND COOT						
American Coot	*Fulica americana*	O		O?	O	
Common Moorhen	*Gallinula chloropus*	O	O?	O?		Po
King Rail	*Rallus elegans*	O?	O?	O?		Po
Sora	*Porzana carolina*	O?	O?	O?		Po
Virginia Rail	*Rallus limicola*	O?	O?	O?		Po

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
SHOREBIRDS						
American Golden-Plover	*Pluvialis dominica*			O		
American Woodcock	*Scolopax minor*	O?	O?	O?	O?	Po
Common Snipe	*Gallinago gallinago*	O		O?	O	
Dunlin	*Calidris alpina*	O?	O?	O		
Greater Yellowlegs	*Tringa melanoleuca*	O	O	O	O?	
Killdeer	*Charadrius vociferus*	U	U	U	O	Co
Least Sandpiper	*Calidris minutilla*	O	O	O		
Lesser Yellowlegs	*Tringa flavipes*	O	O	O		
Pectoral Sandpiper	*Calidris melanotos*	O	O?	O		
Sanderling	*Calidris alba*	O?	O?	O		
Semipalmated Plover	*Charadrius semipalmatus*	O	O?	O?		
Semipalmated Sandpiper	*Calidris pusilla*	O	O	O		
Solitary Sandpiper	*Tringa solitaria*	O	O	O		
Spotted Sandpiper	*Actitis macularia*	O	O	O		
Stilt Sandpiper	*Calidris himantipus*	O	O	O?		
White-rumped Sandpiper	*Calidris fuscicollis*	O	O?	O?		
Willet	*Catoptrophorus semipalmatus*		O			
GULLS AND TERNS						
Bonaparte's Gull	*Larus philadelphia*	O		O?	O?	
Caspian Tern	*Sterna caspia*	O	O	O		
Forster's Tern	*Sterna forsteri*	O	O	O		
Franklin's Gull	*Larus pipixcan*		O	O?		
Great Black-backed Gull	*Larus marinus*	O	O	O	U	
Herring Gull	*Larus argentatus*	O	O	O	C	
Laughing Gull	*Larus atricilla*	O	O	C	O	
Least Tern	*Sterna antillarum*		O			

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
Lesser Black-backed Gull	*Larus fuscus*	O?		O	O	
Ring-billed Gull	*Larus delawarensis*	U	C	C	C	
DOVES						
Mourning Dove	*Zenaida macroura*	U	U	O	O	Pr
Rock Dove	*Columba livia*	C	C	C	C	Pr
CUCKOO AND OWLS						
Barred Owl	*Strix varia*	O?	O?	O	O?	
Eastern Screech-Owl	*Otus asio*	O?	O?	O?	O?	Po
Yellow-billed Cuckoo	*Coccyzus americanus*	O		O?		
SWIFT, HUMMINGBIRD AND KINGFISHER						
Belted Kingfisher	*Ceryle alcyon*	O	O	O	O	Po
Chimney Swift	*Chaetura pelagica*	C	C	U		
Ruby-throated Hummingbird	*Archilochus colubris*	O?	O	O?		Po
WOODPECKERS						
Downy Woodpecker	*Picoides pubescens*	U	U	U	U	Pr
Hairy Woodpecker	*Picoides villosus*	O?	O?	O	O?	
Northern Flicker	*Colaptes auratus*	U	O	U	O	Po
Pileated Woodpecker	*Dryocopus pileatus*	O?	O?	O	O?	
Red-bellied Woodpecker	*Melanerpes carolinus*	O	O	O?	O	Po
Yellow-bellied Sapsucker	*Sphyrapicus varius*	O?		O?	O	
FLYCATCHERS						
Acadian Flycatcher	*Empidonax virescens*	O?	O?	O?		Po
Eastern Kingbird	*Tyrannus tyrannus*	C	C	O		Pr
Eastern Phoebe	*Sayornis phoebe*	O	O	O	O?	Pr
Eastern Wood-Pewee	*Contopus virens*	O	O?	O?		Po
Great Crested Flycatcher	*Myiarchus crinitus*	O	O?	O?		Po
Willow Flycatcher	*Empidonax traillii*	O	O	O?		Co

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
VIREOS						
Blue-headed Vireo	*Vireo solitarius*	O		O?		
Red-eyed Vireo	*Vireo olivaceus*	C	U	U?		Pr
Warbling Vireo	*Vireo gilvus*	U	U	O		Pr
White-eyed Vireo	*Vireo griseus*	O	O?	O		Po
JAY AND CROWS						
American Crow	*Corvus brachyrhynchos*	C	C	C	C	Co
Blue Jay	*Cyanocitta cristata*	U	O?	U	O	Po
Fish Crow	*Corvus ossifragus*	U	U	U	C	Pr
LARK AND SWALLOWS						
Bank Swallow	*Riparia riparia*	O	O?	O?		
Barn Swallow	*Hirundo rustica*	U	C	O?		Pr
Cliff Swallow	*Petrochelidon pyrrhonota*	O	O?	O?		Po
Horned Lark	*Eremophila alpestris*	O?		O?	O?	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	U	U	O?		Pr
Purple Martin	*Progne subis*	O	O?			
Tree Swallow	*Tachycineta bicolor*	O	O?	O?		
CHICKADEE, TITMOUSE, NUTHATCH AND CREEPER						
Brown Creeper	*Catharus ustulatus*	O?		O?	O?	
Carolina Chickadee	*Poecile carolinensis*	U	U	U	U	Co
Tufted Titmouse	*Baeolophus bicolor*	U	U	U?	U	Pr
White-breasted Nuthatch	*Sitta carolinensis*	O?	O?	O?	O?	Po
WRENS						
Carolina Wren	*Thryothorus ludovicianus*	C	C	C	C	Co
House Wren	*Troglodytes aedon*	U	U	O	O	Pr
Marsh Wren	*Cistothorus palustris*	O	O?	O?	O?	Po

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
Winter Wren	*Troglodytes troglodytes*	O?		O	O?	
KINGLETS AND GNATCATCHER						
Blue-gray Gnatcatcher	*Polioptila caerulea*	U	O	O		Po
Golden-crowned Kinglet	*Regulus satrapa*	O?		O	O?	
Ruby-crowned Kinglet	*Regulus calendula*	O		O	O	
THRUSHES						
American Robin	*Turdus migratorius*	C	C	U	U	Co
Eastern Bluebird	*Sialia sialis*	O	O	O	O	Pr
Gray-cheeked Thrush	*Catharus minimus*	O		O?		
Hermit Thrush	*Catharus guttatus*	O?		O?	O?	
Swainson's Thrush	*Catharus ustulatus*	U		O?		
Veery	*Catharus fuscescens*	O	O?	O?		
Wood Thrush	*Hylocichla mustelina*	O	O	O?		Po
MOCKINGBIRDS AND THRASHER						
Brown Thrasher	*Toxostoma rufum*	O	O	O	O?	Pr
Gray Catbird	*Dumetella carolinensis*	C	C	C	O	Co
Northern Mockingbird	*Mimus polyglottos*	C	C	U	U	Co
STARLING, PIPIT AND WAXWING						
American Pipit	*Anthus rubescens*	O		O?	O	
Cedar Waxwing	*Bombycilla cedrorum*	U	O	O	O	Po
European Starling	*Sturnus vulgaris*	C	C	C	C	Co
WARBLERS						
American Redstart	*Setophaga ruticilla*	O	O?	O		
Bay-breasted Warbler	*Dendroica castanea*	O		O?		
Blackpoll Warbler	*Dendroica striata*	C		O		
Black-throated Blue Warbler	*Dendroica caerulescens*	O	O?	O?		
Black-throated Green Warbler	*Dendroica virens*	O		O		

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
Blue-winged Warbler	*Vermivora pinus*	O	O?	O?		
Canada Warbler	*Wilsonia canadensis*	O	O?	O?		
Chestnut-sided Warbler	*Dendroica pensylvanica*	O	O?	O?		
Common Yellowthroat	*Geothlypis trichas*	C	O	O?	O	Pr
Magnolia Warbler	*Dendroica magnolia*	O	O?	O		
Nashville Warbler	*Vermivora ruficapilla*	O		O		
Northern Parula	*Parula americana*	O	O?	O?		Po
Northern Waterthrush	*Seiurus noveboracensis*	U	O?	O?		
Ovenbird	*Seiurus aurocapillus*	O	O?	O?		
Palm Warbler	*Dendroica palmarum*	O?		O	O	
Prairie Warbler	*Dendroica discolor*	O	O?	O?		
Prothonotary Warbler	*Protonotaria citrea*	O	O	O?		Po
Yellow Warbler	*Dendroica petechia*	C	U	O?		Co
Yellow-breasted Chat	*Icteria virens*	U	O?	O?		Po
Yellow-rumped Warbler	*Dendroica coronata*	U		O	O	
TANAGER						
Scarlet Tanager	*Piranga olivacea*	U	O?	O?		Po
TOWHEE AND SPARROWS						
American Tree Sparrow	*Spizella arborea*	O?			O	
Chipping Sparrow	*Spizella passerina*	O	O	O?	O?	Po
Dark-eyed Junco	*Junco hyemalis*	O		O	O	
Eastern Towhee	*Pipilo erythrophthalmus*	O	O?	O	O	Po
Field Sparrow	*Spizella pusilla*	O	O?	O	O	Po
Fox Sparrow	*Passerella iliaca*	O?		O?	O	
Savannah Sparrow	*Passerculus sandwichensis*	O		O	O?	
Song Sparrow	*Melospiza melodia*	C	C	C	U	Co
Swamp Sparrow	*Melospiza georgiana*	O?		O	O	

Bird Species in the Middle Potomac River Watershed

Species	Scientific Name	Seasonal Abundance				Breeding Status
		Spring	Summer	Fall	Winter	
White-crowned Sparrow	*Zonotrichia leucophrys*	O?		O	O?	
White-throated Sparrow	*Zonotrichia albicollis*	U		U	U	
CARDINAL, GROSBEAKS, BUNTING AND DICKCISSEL						
Blue Grosbeak	*Guiraca caerulea*	U	O?	O?		Po
Dickcissel	*Spiza americana*	O		O?		
Indigo Bunting	*Passerina cyanea*	C	U	O?		Co
Northern Cardinal	*Cardinalis cardinalis*	C	C	C	U	Co
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	O		O?		
BLACKBIRDS AND ORIOLES						
Baltimore Oriole	*Icterus galbula*	C	U	O?		Co
Bobolink	*Dolichonyx oryzivorus*	O	O?	O?		
Brown-headed Cowbird	*Molothrus ater*	U	U	O?	O	Pr
Common Grackle	*Quiscalus quiscula*	C	C	U	O?	Co
Eastern Meadowlark	*Sturnella magna*	O	O?	O	O?	Po
Orchard Oriole	*Icterus spurius*	U	U			Co
Red-winged Blackbird	*Agelaius phoeniceus*	C	U	U	U	Pr
Rusty Blackbird	*Euphagus carolinus*	O?		O	O?	
FINCHES						
American Goldfinch	*Carduelis tristis*	U	C	U	U	Pr
Evening Grosbeak	*Coccothraustes vespertinus*	O		O?	O?	
House Finch	*Carpodacus mexicanus*	U	C	O	O	Pr
Pine Siskin	*Carduelis pinus*	O?		O	O?	
Purple Finch	*Carpodacus purpureus*	O?		O?	O?	
OLD WORLD SPARROW						
House Sparrow	*Passer domesticus*	C	C	C	U	Co

Key: **Seasons:**	**Abundance:**	**Breeding Status:**
Spring = March-May	C = common	Co = confirmed
Summer = June-August	U = uncommon	Pr = probable
Fall = September-November	O = occasional	Po = possible
Winter = December-February	? = not documented	
	* = flyover	

Source: Dawson and Gough 2002

Appendix 4

Research Requirements

Research requirements are projects that would be nice to do but there is no legal obligation to support. The concept behind this appendix is to allow the installation or other entities (ex. Strategic Environmental Research and Development Program) to quickly assess if there are any projects ready to implement if funding becomes available. The following projects have been identified as those that would be useful in the management of natural resources at all NDW installations.

VEGETATION MANAGEMENT

Project Title

Native Pollinator Demonstration Project

Project Description

Improve the biodiversity and increase pollinator resources at NDW installations with available resources. An example of a Native Plant & Pollinator Demonstration Project is provided in the following resource.

Office of the Deputy Under Secretary of Defense, Installations and Environment (ODUSD). No Date. Native Pollinator & Native Plant Demonstration Project. Available at https://www.denix.osd.mil/portal/page/portal/content/environment/NR/conservation/Wildlife/NATIVE_POLLINATOR_NATIVE_PLANT_DEMO.PDF.

Impact to Mission

Providing sustainable multipurpose use of natural resources, including nonconsumptive uses is required by the Sikes Act. The Sikes Act further requires baseline data be obtained for fish and wildlife species on military installations. Environmental education and awareness provide the primary sustainable multipurpose use of natural resources. Environmental education also performs an important service for the military community by providing opportunities for installation personnel to experience and learn about natural resources, which will increase awareness and respect for the environment.

Regulatory Drivers: OPNAVINST 5090.1C; Sikes Act

Implementation Schedule:

Priority: OMB/EPA Class III, ERL 1, Navy Level 5

Funding Sources: O&MN

Cost Estimate: $25,000-$50,000 depending on extent of pre-project surveys and habitat restoration.

FISH AND WILDLIFE MANAGEMENT

Project Title

Feral Cat Survey at Washington Navy Yard

Project Description

Conduct a survey to determine presence of feral cats at Washington Navy Yard. DoD Technical Information Memorandum No. 37 provides specific guidance for proper management of feral cats.

Impact to Mission

Feral cats are transmitters and reservoirs of various diseases and parasites to domestic and wild animals, and to humans (Witmer et al. 2005).

Regulatory Drivers: DoD Pest Management Program (DoD DIR 4150.7 [OPNAVINST 5090.1C]); and OPNAVINST 6250.4A.

Implementation Schedule:

Priority: OMB/EPA Class III, ERL 2, Navy Level 5

Funding Sources: O&MN

Cost Estimate: $5,000-$10,000 depending on survey methodology

FISH AND WILDLIFE MANAGEMENT

Project Title

Wildlife Vulnerability Assessment

Project Description

Conduct research on the factors limiting species abundance such as predation rates, reproductive success, contamination, habitat loss, and prey availability towards birds, amphibians, and mammals.

Impact to Mission

Habitat loss as a result of poor water quality, land use and predation are examples of limiting factors that have caused a decrease in wildlife population. This project will support EO 13508.

Regulatory Drivers:	Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration); EO 13112 (Invasive Species); EO 11987 (Exotic Organisms)
Implementation Schedule:	
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$15,000-$25,000 depending on research methodology

HABITAT MANAGEMENT

Project Title

Pond Health Assessment at NDW installations

Project Description

Conduct research on the health of the ponds including the vegetation at NSF Suitland and NSF Naval Observatory. Identify any effects of the use of mosquito control practices to animals such as herps, fish and invertebrates. Identify pollutants that are being filtered before entering a waterway. Provide recommendations for prioritizing for conservation.

Impact to Mission

Clean water is one of the most precious resources to people, plants, wildlife and habitats**.** It is vital to have water that is not polluted to support aquatic life. Habitat research activities that protect and restore living resources and water quality are important actions needed to protect the Chesapeake Bay and its watershed. Federal agencies are required to ensure that their actions will not adversely impact the Chesapeake Bay and its watershed.

Regulatory Drivers:	DoD Pest Management Program (DoD DIR 4150.7 [OPNAVINST 5090.1C]); and OPNAVINST 6250.4A, EO 13508 (Chesapeake Bay Protection and Restoration); CWA
Implementation Schedule:	
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$30,000-$40,000 depending on research methodology

HABITAT MANAGEMENT

Project Title

Hydrology and Habitat Study at all NDW Installations

Project Description

Conduct research on hydrologic changes resulting from construction activities, residential development, drainage, ditching, and other damaging practices that may alter hydrology and impact habitat. Restore those water habitats that are in poor condition to support priority species.

Impact to Mission

Streams provide thousands of species of plants, fish and wildlife with the place they need to find food, shelter, and area for reproduction**.** Federal agencies are required to ensure that their actions will not adversely impact the Chesapeake Bay and its watershed. This project will support EO 13508.

Regulatory Drivers:	Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration); CWA
Implementation Schedule:	
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$30,000-$40,000 depending on research methodology

HABITAT MANAGEMENT

Project Title

The effects of Invasive Species and Deer Overbrowsing at all NDW Installations

Project Description

Conduct research on the effects of invasive species, the use of spraying and deer overbrowsing on GCN species especially amphibians, reptiles, invertebrates and birds.

Impact to Mission

Habitat loss as a result of poor water quality, land use, climate change, invasive species and other human activities is a threat towards sustaining wildlife. Federal agencies are required to ensure that their actions will not adversely impact the Chesapeake Bay and its watershed. This project will support EO 13508.

Regulatory Drivers:	Sikes Act, EO 13508 (Chesapeake Bay Protection and Restoration); EO 13112 (Invasive Species); EO 11987 (Exotic Organisms)
Implementation Schedule:	
Priority:	OMB/EPA Class III, ERL 2, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	$20,000-$30,000 depending on research methodology

Appendix 5

Department of the Navy Memoranda

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Appendix 5A

Feral Cat Policy

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N456M/1U595820
10 JAN 2002

From: Chief of Naval Operations

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

Ref: (a) SECNAVINST 6401-1A, of 16 Aug 94, Veterinary Health Services
(b) AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States
(c) OPNAVINST 6250.4B, dtd 27 Aug. 1998, Pest Management Programs
(d) Executive Order 13112 of 3 Feb 1999, Invasive Species

1. This letter clarifies the application of reference (a) regarding the prevention of free roaming (also called wild, feral or stray) cat and dog populations on Navy installations. The objective is to prevent injury or disease to Navy personnel, and eliminate adverse impacts on native wildlife. It requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations. Free roaming cats and dogs pose a potential public health threat to personnel on Navy installations, and they pose a threat to wildlife including endangered species and migratory birds.

2. Existing policy at Paragraph 4-2c(4) of reference (a) states "Dogs, cats, and other privately-owned or stray animals will not be permitted to run at large on military reservations." Consistent with this policy, Navy commands must ensure the humane capture and removal of free roaming cats and dogs. Consistent with this requirement, Trap/Neuter/Release (TNR) programs will no longer be established on Navy land. All existing TNR programs on Navy land must be terminated no later than 1 January 2003.

3. Responsible pet ownership is a key factor in eliminating free roaming cat and dog populations. In consultation with supporting Army Veterinary Office, installations shall implement appropriate pet management measures to preclude establishment

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

of feral cat/dog populations, including, but not limited to the following:

Require installation residents to keep and feed pet animals indoors or under close supervision when outdoors (such as on leash and collar or other physical control device - cage, fenced yard etc.).

Encourage neutering or spaying of cats and dogs before they reach reproductive age (exceptions to this policy can be made on a case by case basis as determined by the Installation Commander).

Require routine vaccinations of cats and dogs for rabies and other diseases as required by federal, state and local laws and ordnances. A current vaccination record is required at time of registration of pets.

Require microchipping registration (or other system of pet identification approved by supporting veterinary office) of all pet cats and dogs brought onto installations. Installation residents must register cats and dogs and have pets wear registration or identification tags at all times.

Prohibit the feeding of feral animals on the installation.

Provide educational materials to pet owners regarding installation regulations and general pet management.

Enforce prohibition of abandonment of animals on installations.

Comply with all humane and animal control regulations at the federal, state and local level (and their equivalents in host nation countries).

Navy installations in Europe that do not have a supporting veterinary office contact 100th Medical Detachment (VA HQ) (011) 49-622-177-2868; for all other locations that do not have a supporting veterinary office the POC is the VETCOM HQ, Commander (210) 221-6522.

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

4. Effective prevention, management and elimination of feral cat and dog populations requires close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel to develop and implement an effective and humane program. Reference (b) provides information for preventing free roaming cat populations on military installations. General pest management guidelines are detailed in reference (c). Every effort should be made to work with other federal, state and local agencies to support reference (a) and reference (d) by eliminating free roaming cat and dog populations on Navy land. Navy commands should work with local animal control agencies to determine the best approach for the ultimate disposition of the captured animals. Every effort should be made, if practical, to find homes for adoptable feral cats and dogs.

5. My point of contact on this issue is Mr. Joe Cook, CNO N456M, at (703) 602-5335, or DSN 332-5335.

William G. Mattheis

WILLIAM G. MATTHEIS
Deputy Director, Environmental Protection, Safety and Occupational Health Division

Distribution:
CINCLANTFLT (N465)
CINCPACFLT (N465)
COMNAVRESFOR (01E, N46)
CNR (91)
CNET (44)
COMNAVSECGRU (N443)
COMNAVTELCOM (N451)
BUMED (NEGC-EPWR)
COMNAVAIRSYSCOM (AIR.OY)
COMSPAWARSYSCOM (07-1)
COMNAVSUPSYSCOM (4A2, 421)
COMNAVSEASYSCOM (SEA 00T)
COMNAVFACENGCOM (ENV, 09)
CINCUSNAVEUR (N4, N76)
COMSC (N00EP)
COMNAVMETOCCOM (N13)

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULTIONS ON NAVY PROPERTY

Distribution:
CHBUMED (NEHC-EPWR)
DIRSSP (SP20161)
ONI (411)

Copy to:
OASN (I&E)
OAGC (I&E)
CNO, N44, N46, 09BF
CMC, LFL
COMNAVREG MIDLANT
COMNAVREG SE
NTC GREAT LAKES
COMNAVRESFOR
COMNAVREG SW
COMNAVREG PEARL HARBOR
COMNAVMARIANAS
COMNAVREG NW
CNFJ
CNFK
PACNAVFACENGCOM PEARL HARBOR HI (CODE 23)
LANTNAVFACENGCOM NORFOLK VA (CODE 2032)
SOUTHWESTNAVFACENGCOM SAN DIEGO CA (CODE 03EN)
SOUTHNAVFACENGCON CHARLESTON SC (CODE 064)
ENDFLDACT NE PHILADELPHIA PA (CODE 18)
ENGFLDACT WEST SAN BRUNO CA (CODE 053)
ENGFLDACT CHES WASHINGTON DC (CODE 20E)
ENGFLDACT NW POULSBO WA (CODE 05EC4)
CO PWC GREAT LAKES
CO PWC GUAM
CO PWC JACKSONVILLE
CO PWC NORFOLK
CO PWC PEARL HARBOR
CO PWC PENSACOLA
CO PWC SAN DIEGO
CO PWC SAN FRANSICO BAY
CO PWC WASHINGTON DC
CO PWC YOKOSUKA
CO CBC PORT HUENEME
CO CBC GULFPORT
OESO
MESO
DODVSA/OTSG (Chief Animal Medicine)

Appendix 5B

Low Impact Development (LID) Policy

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DEPARTMENT OF THE NAVY
THE ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

MEMORANDUM FOR DEPUTY CHIEF OF NAVAL OPERATIONS
(FLEET READINESS AND LOGISTICS)
DEPUTY COMMANDANT OF THE MARINE CORPS
(INSTALLATIONS AND LOGISTICS)

SUBJECT: Department of the Navy Low Impact Development (LID) Policy for Storm Water Management

References: (a) 33 United States Code 1251 (Clean Water Act)
(b) Title 40 Code of Federal Regulations 122, 130
(c) Department of Defense Unified Facilities Criteria 3-210-10 Design for Low Impact Development, October 2004
(d) Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management", January 2007
(e) OPNAVINST 5090.1C, Clean Water Ashore Requirement, October 2007
(f) MCO P5090.2A, Water Quality Management, July 1998

BRAC 05 implementation, Department of Defense (DoD) Grow the Force Initiatives, and ongoing installation sustainment and modernization, have resulted in significant construction activity on Department of the Navy (DON) installations. New construction results in loss of natural vegetation cover and drainage capacity and increased storm water runoff. Conventional storm water collection and conveyance systems and storm water treatment options do not and can not replicate natural systems, thus increasing the volume and flow of storm water as well as sediment and nutrient loadings to streams, wetlands, and other receiving water bodies. Because of continuing water quality problems, States and the US Environmental Protection Agency are considering mandatory treatment and control of storm water. Conversely, low impact development (LID) techniques offer a suite of Best Management Practices that maintain or restore predevelopment hydrology. It mitigates the adverse effects of construction projects on water quality by cost effectively reducing the volume and pollutant loading of storm water before it reaches the receiving water bodies. LID utilizes strategies that infiltrate, filter, store, evaporate, and/or retain runoff close to its source. LID further reduces installation reliance on aging storm water management infrastructure. References (a) thru (f) provide requirements and guidance for LID.

This DON policy sets a goal of no net increase in storm water volume and sediment or nutrient loading from major renovation and construction projects[1]. In order to support this goal, as well as reduce reliance on conventional storm water collection systems and treatment options, this policy directs that LID be considered in the design for all projects that have a storm water management element. LID will be implemented where possible to assist DON installations in complying with references (a) and (b), as well as all applicable State and Federal requirements for sustainable development. In those infrequent situations where LID is not appropriate given the characteristics of the site, the Navy and Marine Corps are authorized to establish a waiver process that, if used, would include regional engineer level review and approval.

The Navy and Marine Corps are directed to immediately plan, program, and budget to meet the requirements of this policy starting in FY 2011. All efforts shall be made to incorporate LID practices in the fiscal years 08, 09, and 2010. The services are further directed to submit to my office an annual report that summarizes all projects that have a storm water component and identify how LID was implemented or waived. If waived, the report must identify the approving official. Naval Facilities Engineering Command, as the Department's expert in acquisition, construction, and environmental management, shall assist Navy and Marine Corps installations in meeting these policies. My point of contact for this matter is CAPT Robin Brake, robin.brake@navy.mil, (703) 693-2931.

BJ Penn

[1] Major renovation projects are defined as having a storm water component and exceeding $5 million when initially approved by DASN (I&F). Major construction projects are defined as those exceeding $750K.

Appendix 6

BASH Guidance

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The Bird Aircraft Strike Hazard (BASH) potential at Navy and Marine air stations is a manageable hazard. Bird management measures are required to reduce hazardous bird/animal activity relative to airport flight operations. OPNAV requires commands to develop a BASH plan that would be implemented as a bird/animal conflict occurs. This information package is provided to assist your command in setting up a local Bash Reduction Plan. The guidance to develop and find the people that will assist in establishing a comprehensive bash plan are enclosed. The safety center message provides a list of references, and outlines the responsibility of the different organizations within the U S Navy. There are four different command instructions and bash Reduction plans provided to use as examples, outlining some of the minimum requirements of a bash plan.

Naval Safety Center
375A Street
Norfolk, VA 23511-4399
(804) 444-3520

BASH GUIDANCE PACKAGE

1. Introduction:

a. The conditions that attract birds and the potential for Birdstrikes vary at each base. Birds may flock to airfields or cause hazards enroute; hazards may be seasonal or year round. Bird activity may change as crops change, as sanitary landfills are opened or expanded, or as wildlife refuges are completed. Base-level personnel must be aware of bird attractants and proper Bird control techniques. Station bash personnel should contact Local agencies or the NAVFAC ENGINEERING FIELD DIVISION (EFD) to help them solve bird problems. The EFD team or local agencies may be able to suggest proven methods for bird dispersal, bird avoidance procedures, and land management techniques that discourage birds from gathering.

b. The time and effort needed to maintain a safe aerodrome depends upon the severity of the bird strike hazard and how well base personnel are prepared to reduce these hazards. The key to a successful BASH reduction program is an active concern by well-trained individuals assigned specific tasks. The possibility of bird strikes can never be eliminated, but the potential for bird Strikes and damage to US Navy/Marine Corps property can be limited with an aggressive well planned program developed on the basis of Bird habits, the environment, and the command's mission. Following are guidelines for BASH reduction programs.

2. Developing a BASH Reduction Program:

a. Bird Hazard Reduction Plans. Each installation with a flying mission must develop a plan that lists responsibilities and procedures for bird control. A well written, workable BASH plan is the key to reducing bird strike hazards and ensures continuity of knowledge with personnel turnover. The intent of this model is to provide a comprehensive plan for standardization of BASH programs and to cover all contingents that may arise at any air station. All aspects of the model plan may not apply at your base. You should incorporate those areas that do apply and

tailor your plan to meet the specific hazards in your region. Integrate habit modification procedures within your station BASH plan and make sure they are compatible with station natural resource plans. This plan should:

(1) Inform new personnel of local hazards.

(2) Cite local conditions that attract birds to the airfield and measures to reduce the attractiveness (for example, Long grass, insect reduction, water drainage) .

(3) Seek assistance from the Aviation Safety Officer (ASO) and the Bird Hazard Working Group (BHWG) . Composition of the BHWG is defined below.

b. BHWG Organization. This group meets with personnel from Base offices affected by bird problems to discuss possible solutions.

To meet its goals, the BHWG:

(1) Assists the safety office in drafting and implementing the Bird Hazard Reduction Plan.

(2) Is chaired by the base Commanding Officer.

(3) Meets regularly with representatives from Aviation Safety Office, Airfield Management, Base Operations, Air Traffic Control, Civil Engineering, Aircraft Maintenance Department, and any other organization concerned with bird hazards.

NOTE: Ideally, the BHWG should meet on a recurring basis as part of the agenda of ongoing committees such as the Air Traffic Control Factors Meetings or Base Safety Meetings. However, the BHWG should meet at least semiannually, or more often if necessary, to remain current on bird hazards and to address them before they become a serious problem. The Aviation Safety Office should maintain the minutes of the BHWG when it meets as a separate entity.

c. Base Self-Inspection Checklist. (enclosed) The BHWG may use this checklist to determine areas of deficiency in attempts to reduce bird hazards. If there is a discrepancy in the program, the BHWG should set a suspense date and take action to correct the discrepancy. The EFD may also use the checklist and the list of noted discrepancies during staff assistance visits to evaluate a program. The EFD may be contacted for assistance in developing plans for individual installations.

3. Documenting Bird Hazards

a. Part of evaluating airfield bird hazards is learning about local bird activities, species that cause hazards, locations of local birds refuges, and daily bird surveys. When information is compiled over several seasons or years, development of a more effective bird hazard reduction program is possible. The bird surveys must include:

(1) Date and time.

(2) Weather conditions.

(3) Bird species.

(4) Bird locations on the airfield.

(5) Bird flying activity (soaring to and from roosts, feeding, etc).

(6) Bird activities (loafing, feeding, drinking, etc).

(7) Possible attractants.

NOTE: If birds come to the field when it is mowed, record increases in insects on the airfield that attract birds, and determine whether crops harvested in the area attract birds to feed. Periodically, evaluate the information you gather to give a clear picture of the hazard.

b. Documenting the local bird problem and technical assistance received and recording the success of solutions tried are essential parts of any bird hazard reduction program. Complete documentation is necessary to acquaint new personnel with the problem and may be required in any civil litigation regarding bird hazards.

c. Base operations personnel should photograph and summarize all hazardous situations that birds create on base. (For example, pictures of gulls loafing on the airfield accompanied by observations that show the birds are using a nearby sanitary Landfill can provide a strong case against future expansion of the Landfill). Operations personnel should keep photographic equipment readily available. Photos can also assist in photographically documenting Local bird hazards. Good documentation gives credence to the problem and shows that solutions are being considered.

4. Airfield Bird Control.

Several active and passive techniques can be successful in reducing bird population levels. These techniques vary in cost and effectiveness depending on the situation. Active control involves causing birds to disperse from an airfield to give short-term relief from an immediate safety hazard. Passive techniques are more long term in nature. They involve managing the airfield to eliminate those factors that attract birds to the field.

4.1 Active Controls for Short Term Reduction of Bird Hazards.

Birds on runways, taxiways, or airfields create an immediate Safety hazard and must be dispersed before flying operations can safely continue. Birds move quickly and unpredictably. Even when left in a "safe" portion of the airfield, they can easily move and create an immediate hazard. They may also act as decoys that attract additional birds. No single method of bird dispersal works in all cases; therefore, a combination of techniques must be used to produce results. Pyrotechnics, bioacoustics, depredation, and other methods have been effective in dispersing birds from fields.

NOTE: The key to active bird dispersal is perseverance. When birds are strongly attracted to an airfield, several teams may be required to provide continual harassment. Usually, a single trip around the airfield will not remove all the birds.

4.2 Active Controls Defined.

a. Pyrotechnics. Pyrotechnics are noise-producing devices which are effective in bird dispersal. Scare cartridges are commercially available pyrotechnics fired from a 12-gauge shotgun.

The Air Force uses a M-8 Very pistol with a locally manufactured Steel sleeve insert (technical order TO IIW2-9-2-31).

With these devices, an explosive charge is fired 50 to 100 meters. At this distance, it detonates producing a loud noise. Pyrotechnics can be used to flush and direct flocks of birds in a desired direction. For example, if a flock of gulls is feeding near an Active runway, a scare cartridge exploded between the birds and the runway will usually cause the birds to fly away from the source of the noise and not pass over the runway. Close coordination with the control tower is essential so that birds are not directed into the path of arriving or departing aircraft. Always advise station security police before pyrotechnics are used. The base agency storing and using pyrotechnics must develop a Operating instruction governing such use and storage. The station weapons and Safety office must review and approve this instruction before pyrotechnics may be stored or used.

b. Bioacoustics. This dispersal technique uses broadcasts of recorded bird distress calls. The calls alarm birds and may cause them to fly toward the sound. For this reason, the sound source must be properly placed so that the birds fly away from the runway. Tapes of distress calls for many bird species can be identified by the EFD team or other organizations upon request. Distress tapes are used with a vehicle equipped with a sound system that can produce 30 to 50 watts of distortion-free sound in 90 to 100 decibel (dB) with a frequency response between 12,000 and 14,000 Hertz (Hz). A speaker to broadcast the sound in the direction of the birds is mounted on the vehicle. When in use the operator first identifies the birds to be dispersed and selects the desired tape. The vehicle is driven as close as possible to the Birds. Depending on physical factors such as terrain, trees, and structures on the airfield, the distance from the problem birds will vary. Employ bioacoustics 100 to 200 meters as the maximum distance from birds to achieve the desired results. The distress call is then played for 15 to 20 seconds. If the birds have not move within 20 seconds, play the call again. If they have not moved by the third attempt, other methods are required.

Remember four important points when using bioacoustics:

(1) Try to identify the bird species you wish to disperse and use that species distress tape. However, a variety of tapes may be tried to determine what is effective for that particular type of pest bird. Some bird species do not respond to distress calls.

(2) Make sure the vehicle is stopped when the distress calls are played. Birds need to identify the source of the disturbance before they can react.

(3) Do not allow the distress calls to play indefinitely because birds can become accustomed (habituate) to them.

(4) The effectiveness of distress calls is dramatically increased when combined with other frightening techniques especially pyrotechnics.

(a) Distress calls have limited use in many situations. Again, not all birds are affected by bioacoustics. Birds often react to the calls by flying towards the source, circling it, and gradually moving away. This takes time and may create a momentary hazard. Combining bioacoustics can best disperse these birds with pyrotechnics. The distress tape is played to get the birds in the air, and then pyrotechnics are used to disperse them. Hazards to flight operations

can be alleviated by using these techniques before flying begins or during breaks in flight activities.

(b) Gulls, Starlings, Blackbirds, and Crows can be effectively dispersed with distress tapes. Occasionally, recorded distress calls of different bird species will frighten a variety of birds; however, nonspecific distress calls are the most effective. The EFD with cooperation of the US Fish and Wildlife Service, is investigating new sounds and techniques to help disperse other problem species.

c. Depredation. Bioacoustics and pyrotechnics provide good bird control in most situations. Yet birds sometimes become accustomed to these techniques, and a few individual birds may have to be killed to reinforce the idea that a significant danger exists. A federal depredation permit, available from the US Fish and Wildlife Service, is required before killing any protected birds. Only European starlings (Sturnus vulgaris), house sparrows (Passer domesticus), and rock doves/domestic pigeons (Columbia livia) are not federally protected in the United States and require no federal depredation permit. The permit specifies the species and numbers of birds that can be killed with shotguns or with an approved poison; however, shotguns are preferred because they are specific and easier to control.

d. Other bird control methods listed below are effective for short periods.

(1) Propane Gas Cannons. Properly placed propane gas cannons can provide effective dispersal for a few days. These devices should be operated, especially at dawn and dusk, as birds come in to feed or roost. Change the location of the cannons at least twice a day for effectiveness. The cannon is very effective on waterfowl, pheasants, and other game birds and can also be used for gulls and black birds.

(2) Scarecrows may also be effective. Loose clothing or pieces of material should be used to dress the scarecrow. The movement of the loosely attached articles will increase the effectiveness of the scarecrows. Relocate or temporarily remove the scarecrows every 2 to 3 days to prevent birds from habituating to their presence. If removing the scarecrows, replace them only after an absence of at least 2 days. A black plastic garbage bag crackling in the wind can be just as useful for dispersing birds.

(3) Models imitating dead or distressed gulls have been effective in scaring gulls off specific portions of airfield. But, move these models frequently and reinforce with other techniques to remain effective.

(4) Remote-controlled model airplanes have recently shown effective results. Some of the aircraft, resemble falcons in order to imitate a predator. Be sure the model aircraft does not pose an additional hazard to flying operations.

(5) Falcons trained for airfield bird dispersal are very effective when used in combination with other frightening techniques. But, there are limitations to falconry. Falcons can be flown only during daylight hours in good weather, they are difficult to obtain, train, and maintain, and they cannot be flown when molting
or after feeding.

e. Ineffective Methods of Control:

(1) Stuffed owls and rubber snakes have been advertised to rid hangars and buildings of birds. They are usually a waste of money and effort.

(2) Rotating lights have brought conflicting results, but, are generally considered ineffective. Birds quickly habituate to these devices, and the problem remains unsolved.

(3) Eye spots on aircraft components is being studied in the United States and other countries. Early results suggest the addition of eye spots does not significantly reduce the BASH potential.

4.3 Personnel and Equipment. Each installation with a BASH program should designate and train personnel for bird dispersal regardless of the severity of airfield bird strike problems. In many instances, the presence of hazardous birds is a transient condition and may only require active bird dispersal for short periods throughout the year. Bird dispersal equipment should be located in the same area as the personnel tasked for bird dispersal so that it is readily available when bird hazards arise. Installations subject to deployment should include bird dispersal equipment for such contingencies. Each installation should designate individuals responsible for bird dispersal during deployments and properly train these personnel.

4.4 Passive Controls for Managing Airfields to Reduce BASH. The most permanent methods of discouraging birds from using airfields involve removing attractive habitat features. Methods to reduce bird attractants include:

(a) Grass Management. Become familiar with airfield turf species and manage the airfield vegetation to make it as homogeneous as possible. Address the following factors:

(1) Grass Height. Mow to maintain a uniform grass height between 7 and 14 inches (18-36 cm). Mowing frequency depends on height requirements. Coordinate mowing with periods of low flight activity. Cut grass before it goes to seed to discourage seed eating birds from using the airfield. In some regions like the southwest United States, this may mean cutting at the 3 to 5 inch
level.

Long grass discourages flocking species from entering the airfield because reduced visibility disrupts interflock communication and flock integrity and also prevents predator detection. Normally, grass should not exceed 14 inches (36 cm) as high grass will attract some bird species and rodents, which in turn attract raptors. Airfields with a variety of grass species may have a fast-growing strain, which reaches 14 inches (36cm) sooner than the rest of the airfield. Mow when the average grass height reaches 14 inches (36 cm). Allow variance in grass height if the airfield is outleased for hay production.

(2) Mowing criteria. Begin mowing adjacent to runways and finish in the infield or outermost grass areas. This will tend to cause insects and other animals to move away from aircraft takeoff and landing areas. Also, do not mow grass shorter next to the runway than in other areas.

(3) Herbicides and Growth Retardants. Keep broad-leaved weeds to a minimum on the airfield. Apply herbicides as necessary to control weeds and comply with environmental usage requirements. Broad-leaved weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Growth retardants should be tested on small test plots before use on areas in general.

(4) Planting Bare Areas. Prevent bare areas as birds frequently use them as resting sites on the airfield. Plant grass adapted to the area and irrigate only until new grass is established.

(5) Fertilizing. Fertilize as needed to stimulate grasses and promote a uniform cover. Rate and frequency of application may vary from that of other semi-improved grass areas.

(b) Managing Reforested Areas. Site commercial forest areas so as not to contribute to the installation BASH problem. The types of trees planted for forest production are often different than those in the surrounding community and may serve as bird roosting sites. For example, the dense canopy of a planted pine forest in a hardwood region may provide ideal roosting sites. When this happens, roosting can usually be discouraged by thinning the roosting areas (removing certain trees to produce an open stand canopy). If necessary, remove all trees from the site and grass and maintain the area with other airfield turf areas.

(c) Landscaping. Shrubs, ornamental trees, shelterbelts, hedgerows, and noise suppression barriers are important plantings on a station. However, the airfield and clear zones are not proper places for landscape plantings. These types of vegetation can influence bird populations and their movements around the base. Trees that are planted close together when they are young often intermingle as they mature, forming a continuous canopy. This close, dense foliage attracts birds and is ideal for providing shelter, food, and nesting.

Proper planning can reduce these potential bird attractants. When planting shrubs, select those species that do not produce fruit, especially during the winter. Ripe berries attract birds for short periods each year. Blackbird and starling roosts are particularly hazardous because of the large number of birds (often in the millions) that may be present in a single roost. Birds can usually be stimulated to move by pruning and thinning trees and shrubs to open the canopy. In some situations, it may be necessary to remove all the plants. Trees and shrubs should not be allowed to grow in the infield areas.

(d) Removing of Edge Effects. The greatest numbers of bird species are found where vegetation types change from forests to brush or brush to grass. To reduce bird problems, keep edge effects to minimum, or as far from the active runway as possible. If an airfield has clumps of brush and shrubs around the grass, more bird habitats are available. Remove brush and weeds to maintain the airfield in the most uniform condition possible. This eliminates the cover many birds and rodents require. Single trees or snags on an airfield may provide perches for hawks, owls, or other bird species.

(e) Controlling Drainage. Fresh water is one of the most important airfield bird attractants, especially in arid regions and near the sea coast. Standing water creates a breeding place for insects, amphibians, and other food sources for birds. After heavy rains, mark airfield areas with chronic standing water. When dry, fill, level and reseed these areas with grass to match the rest of the airfield. Make airfield drainage ditches as deep as possible to limit the surface area of the water and still allow proper drainage according to civil engineering requirements. Wading birds, such as herons and shorebirds, are less likely to use deep drainage ditches. Grade the banks of the drainage ditches to allow mowing up to the edge of the ditch. Keep drain pipes, culverts, and screens clear of debris so drainage is not impeded.

(f) Locating Sewage Lagoons. Water fowl and shorebirds are often attracted to sewage holding ponds. Birds use the water for resting and sometimes as a food source. Sewage lagoons

are most attractive in arid climates. Ponds designed with steep sides and little surface area reduce the attraction to birds. Locate ponds as far from the runway as possible and place them so birds moving from off base areas to the ponds do not cross runways.

(g) Managing Sanitary Landfills:

(1) On base Landfills are the most significant attractant to hazardous bird species. Operate disposal sites according to FAA Order 5200.5a and state and federal laws. Relocate landfills that do not meet FAA guidelines criteria. If landfill relocation is not feasible, make the site as unattractive to birds as possible. Consider the following methods:

(a) Maintain a small working force to minimize exposed waste.
(b) Incinerate waste.
(c) Operate the landfill as a pit or trench to limit access to birds.
(d) Dump waste at night or during non-flying periods.
(e) Cover waste material immediately.
(f) Discourage gulls and other birds with overhead wire barriers.
(g) Relocate putrescible wastes to a more remote landfill.
(h) Use bioacoustics and pyrotechnics to frighten birds away.

(2) Off base Landfills. The US Navy cannot control land use off base; however, before landfills can be opened, the operator must obtain a state permit. A hearing is held about the potential environmental impact. US Navy concerns about potential bird hazards should be expertly presented at these hearings. Environmental Planning, Flight Safety, Public Affairs, and judge Advocate should work jointly to present US Navy interests.

(h) Managing Agricultural Outleases.

Many stations have agricultural programs on their airfields to reduce maintenance costs. These range from crop and hay outleases to grazing and reforestation. The types of crops grown and the agricultural methods used have important effects on local bird populations.

(1) Grain crops within 1,000 feet of the runways are not recommended because harvest methods expose a ready food supply. Hay, cotton, and flax are the least attractive crops. Airfield crops should not be radically different from crops found in the surrounding community. Anything that makes the airfield unique can attract birds. Cultivation may attract birds by exposing large numbers of insects and earthworms.

(2) Harvesting and planting schedules can also affect the numbers of birds the airfield attracts. For example, if an airfield hay crop is harvested before or after other hay crops in the region, large numbers of invertebrates may be on the airfield that are not exposed in other fields. This might provide a more intense bird attractant than would usually exist.

(3) Agricultural activities should also consider the local flying schedule. Planting, cultivating, harvesting or burning may temporarily increase airfield bird attractants, but, should be done on weekends or other periods of reduced flying. Both airfield management and civil engineering personnel should closely monitor actual practices.

(4) Grazing animals can be a serious hazard. Ensure strict animal control and proper fencing.

5. Flight Operations Considerations:

a. When environmental modifications and active control measures do not satisfactorily reduce bird hazards on the airfield, flight operations may have to be modified to reduce the risk of bird strikes. These operational changes are dictated by the severity of the problem, the performance capability of the aircraft, and training or readiness requirements. Bird hazards, like any other safety hazards and risk management, must be assessed with respect to operational requirements. During contingency operations or advanced stages of readiness, bird hazards have minimal safety priority. During training to maintain operational readiness, however, certain changes can be made to improve safety, reduce costly repairs, and protect aircrews.

b. Knowledge of unit operational and training requirements, combined with an understanding of local flight restrictions, is necessary to properly evaluate possible modifications to local procedures.

c. BHWG forms the nucleus for developing a bird avoidance program. The following recommendations can help to reduce bird hazards by modeling operational procedures. Many of the recommendations apply to bird hazard reduction plans at any base. The key to reducing bird strikes by changing fight operations is to avoid known locations, concentrations, or movements of birds.

(1) Mission Aborts Caused by Bird Strikes. A takeoff or planned touch-and-go must be aborted if a bird strike occurs and enough runway remains to stop. Bird strike damage cannot be accurately assessed in flight and may result in a complex airborne emergency. Only maintenance personnel on the ground can make damage assessments. Several bird strikes that appeared to cause minor damage have proven to be much more substantial and had the aircrews continued the mission a serious emergency would have resulted. Structural damage, such as a dent in the wing, has led to fuel and hydraulic system failures through damaged lines.

(2) Takeoff procedures. Aircraft making formation departures increase the risk of damaging bird strikes when birds are feeding on/or near the runway. Formation and single-ship interval takeoffs, during which the wing aircraft take 6 to 10 seconds spacing, often result in birds being scared up by the lead aircraft. This causes the wingman's aircraft to hit the birds. If large flocks of birds are scared up by the lead aircraft the wingman may want to delay departure until the birds are clear of the runway. Pilots of lead aircraft must be alert and warn the wingman of bird hazards during takeoff. This is especially important for formation takeoffs when the wingman's attention is focused on the lead aircraft.

(3) Migratory Bird Problems. When flocks of migratory birds are a problem, formation takeoffs and single-ship interval takeoffs with minimum spacing involving rejoins, increase the risk of serious bird strikes.

All rejoins require greater attention by pilots to the lead aircraft position. The increased speed required to catch the lead aircraft after takeoff increases the risk of damaging bird strikes. When birds are known to be flying in the area, departures under visual meteorological conditions (VMC) may need to be modified to reduce the risks. Departures should be made in trail, with the rejoin beginning after the aircraft passes 2,000 to 3,000 feet above ground level (AGL). If aircraft are to enter a low-level route immediately or stay at an intermediate altitude for a

prolonged period, tactical formation provides enough aircraft clearance to allow wingmen to stay clear of birds. When weather is a factor, single ship takeoffs with an increased time interval between aircraft, approaches, and landings are preferred, since many bird strikes occur when aircraft are just under or immediately above a low overcast sky condition.

(4) En Route Bird Strikes. Aircrews experiencing enroute bird strikes should abort the mission when possible. While an engine ingestion or a wind screen strike may readily be apparent from the flight deck, the damage from many fuselage, wing, tail, or radome strikes cannot be adequately assessed. Continuing a mission may cause greater structural damage and a serious inflight emergency situation later.

(5) Low-Level Bird Strikes, Low-Level Routes. When flying low-level routes, higher aircraft speeds and greater exposure within the bird's flight environment have led to many damaging bird strikes. Many of these strikes occur on low-level routes, airdrops and bombing runs. During these flights, aircrews are involved in cockpit duties, which allow them little time to monitor bird activity. "Heads-up" flying should be stressed during these critical transitions. Attachment 1, (enclosed) "Low-Level Flight Considerations" provides general guidance for bird avoidance at low-level.

(6) Low-Level Bird Risk Model. The US Air Force BASH team created a computer model to predict the relative bird strike risk for flying along military low-level routes. The model is developed based on waterfowl and raptor (birds of prey) population data. It provides information in a graphic format. The graphs display the risk for flying these routes during day, dawn, or dusk, and evening periods on the same graph. By comparing graphs of different routes during specific time periods, the safest time to fly these routes can be determined. See attachment 1, for additional guidelines.

(a) Published Routes. Submit requests for graphs to BASH Coordinator, Naval Safety Center, using the low-level route number.

(b) Military Operating Areas (MOA), Ranges, and Proposed Routes. Submit longitude and latitude or perimeter and AGL level of MOA, range of turn points of proposed routes through the BASH Coordinator for evaluation of these areas.

(7) Checklist Procedures and Prebriefings items should be done in a manner that allows maximum field of vision outside of the aircraft. Briefings on bird strikes are much like briefings on takeoff emergencies when urgency declares a preplanned course of action. As a minimum, aircrews should brief (or be briefed on) the following:

(a) Potential bird problems along their proposed route of flight.

(b) Use of double helmet visors or sunglasses during daylight hours, the clear visor at night during low-level operations.

(c) Locking of shoulder harnesses of injured crewmembers to prevent them from falling forward onto flight controls.

(d) Avoidance maneuvers at low altitude.

(e) Actions if flocks of birds are encountered (for example, initiate a climb since the majority of birds dive to avoid a potential collision).

(f) Engine failure procedures if birds are ingested.

(g) Lost communications including change of aircraft control and aircraft recovery procedures.

(h) Procedures for a controllability check to determine ability to control the aircraft if the airframe is damaged.

(i) Crew egress procedures if control cannot be maintained.

The aircrew's ability to react to a bird strike situation is further enhanced by periodically reviewing bird strike procedures during continuation training and safety briefings.

(8) Informing Transient Aircrews of Local Bird Hazards. Transient aircrews are often unfamiliar with airfield hazards, including birds. At some bases, the most damaging bird strike incidents happen to transient aircraft. Information in the Flight Information Publications (IFR-EN Route Supplement, VFR-EN Route Supplement, and Area Planning/lB) , and broadcasts of information on either Automatic Terminal Information Service (ATIS) or on initial radio contact can alert the aircrew of potential bird hazards. Advisory reports can inform aircrews of the timing and location of transient birds.

(9) Aircrew Responsibility. Aircrews must help detect birds on the airfield and in the local flying vicinity. When aircrews sight birds, they should notify other aircrews and the controlling agency. Aircrews may also help Air Traffic Control (ATC) personnel remain aware of bird hazards by requesting bird hazard information before takeoff and landing. These requests remind air traffic controllers to inspect for birds before authorizing movement.

(10) Bird Hazard Identification. Bird populations, both in the local area and in regions where low-level sorties are flown must be monitored. Aircrews must be aware of potential bird hazards they may face. Information on bird concentrations and movements can be obtained from local universities, state and federal wildlife agencies, and private organizations such as the National Audubon Society.

(11) BIRDWATCH. The term BIRDWATCH is used to help inform aircrews of operational changes required because of bird activities in local areas. BIRDWATCH alerts aircrews to possible flight hazards from increased bird activity. BIRDWATCH conditions should reflect varying degrees of bird hazards. For example, BIRDWATCH SEVERE would exist when birds loaf on airfield runways and taxiways, and BIRDWATCH MODERATE could signify flocks feeding near runways, and BIRDWATCH LOW would indicate no particularly hazardous condition in the aerodrome. Each installation defines operational changes for each BIRDWATCH conditions. The air traffic control personnel or airfield manager could declare a BIRDWATCH. Encourage aircrews flying in the local area to use BIRDWATCH terminology to inform other aircrews about bird hazards in the traffic pattern. A BIRDWATCH alert is very useful when informing transient crews and can be broadcast over ATIS. See paragraph 8. BIRD HAZARD WARNING WATCH.

5.1 Technical Assistance. Personnel at individual bases may not always be aware of the best methods for bird control and hazard reduction. Help is available from several sources.

a. NAVFACENGCOM (EFD) assists in bird hazard reduction world wide at Navy/Marine Corps facilities. EFD personnel are trained in bird control and have experience in wildlife ecology, land management, and flight operations. They also have current information on authorized bird control equipment and techniques.

b. Federal and State Agencies. Often, bases employ professional foresters or agronomists who have valuable insights into base problems. Local expertise and assistance is available through the USDA Animal Damage Control, US Fish and Wildlife Service, or State Natural

Resources Department. The following sections contain a listing of agencies that can assist your BASH efforts by region, agency, and state: see attachment 2

6. Execution

a. Concept of Operations:

(1) Reducing the bird strike hazard at Naval Stations requires a cooperative effort between several command organizations. The coordinator for coordinating this plan should be the Aviation and Safety officers.

(2) BHWG:

b. Function. Collects, compiles, and reviews data on bird strikes, identifies, and recommends actions to reduce hazards. Recommends changes in operational procedures. Prepares informational programs for aircrews. Assists the base Commanding Officer by acting as a point of contact for off-base BASH issues.

c. Authority. The BHWG submits all recommendations to the operational commander for approval. Implementation is through normal chain of command.

d. Composition. The chairperson should be either the Wing Commander or base Commanding Officer. The group should consist of a representative from Aviation Safety, Station Safety Office, Aircraft Maintenance, Civil Engineering (Pest Management, Natural Resources, Grounds Maintenance. etc.), Air Operations, tenant units, and representatives from other tasked organizations as required.

e. Meeting Schedule. Semiannually or as requested by the chairman of the BHWG.

7. Maps and charts

This section outlines the use and requirements for the maps and charts required to implement the BASH program. Much of this information is available in the Base Comprehensive Plan. Include as a minimum:

NAS (station) habitat map.
NAS (station) surrounding area map.
Low-level/training area/range maps.

a. NAS (station) Habitat Map:

1. Conduct habitat survey to identify major habitat types available to birds. Make a map based on this survey.

2. When a specific hazard is identified and the location of the activity isolated, use the habitat map to determine if a specific attractant exists which can be altered within the scope of this plan.

3. Use the habitat map as a guide for the long-range civil engineering program to reduce actual and potential hazardous environmental factors on NAS (station).

b. NAS (station) Surrounding Area Map:

1. Make a map similar to the base map for the surrounding area.

2. Use this map to identify specific hazards such as wildlife refuges, wetlands, lakes, landfills, etc., to avoid overflying. Modify through negotiation with the local community, hazards when possible.

c. Low-Level Route/Training Area/Range Maps:

1. Maintain maps depicting all low-level routes/training areas/ ranges at the Aviation Safety Office.

2. Plot all bird strikes on these maps. Obtain complete bird strike information from the BASH coordinator at the Naval Safety Center.

3. Use this data to determine if the use of certain routes/areas should be discontinued or altered.

Airfield and Local Area Maps. Include a detailed description of the station and its surroundings. This information should be available in the base's natural resources plan.

As a minimum they should include:

-Base location (county, state)
-Base size (acres)
-Base elevation
-General topography
-Significant terrain features
-Rivers, lakes, ponds
-Developed areas
-Vegetative types
-Airfield (native or planted grass species, etc.)
-Adjacent to airfield
-Developed/planted areas
-Species mix on undeveloped land
-Landfill locations
-Sewage ponds
-Golf course
-other significant bird attractions

Enroute/Training Areas/Gunnery Ranges/Low-Level Routes:

-Describe as above (base description)
-Include wildlife refuges, bodies of water, landfills, coastal areas, and any other significant bird attractants.

8. Bird hazard warning watch

This section establishes procedures to use for the immediate exchange of information between ground agencies and aircrews concerning the existence and location of birds that could pose a hazard to flight safety.

a. Bird Watch Conditions. Use the following terminology for rapid communications to disseminate bird activity information and implement unit operational procedures. Give bird locations with the condition code.

1. Bird watch condition (RED) SEVERE. Heavy concentration of birds on or immediately above the active runway or other specific locations that represent an immediate hazard to the safe flying operations. Aircrews must thoroughly evaluate mission need before operating in areas under condition SEVERE.

2. Bird watch condition (YELLOW) MODERATE. Concentrations of birds observable in locations that represent a probable hazard to safe flying operations. This condition requires increased vigilance by all agencies and extreme caution by aircrews.

3. Bird watch condition (GREEN) LOW. Normal bird activity on and above the airfield with a low probability of hazard.

4. Bird Watch Alert. Weather, time of day, and seasonal conditions, which make an influx of birds onto the airfield likely.

b. The Operations or Aviation Safety officer should be the authority to declare a bird watch condition during normal flight operations. The (base) Airfield Manager, or his/her designated representative should also have the authority during all other periods. This person can declare conditions based on ground observations, pilot reports, radar observations, etc.

c. Communications. Disseminate bird watch conditions by the following means:

1. During periods of flight operations, include bird watch conditions other than LOW at NAS (station), low-level routes/training areas, etc. in the hourly ATIS information. When Aviation Safety Office declares Bird Watch Condition MODERATE or SEVERE, notify tower personnel and Base Operations. Base Operations must notify wing safety, weather office, and the squadrons. Base operations personnel should post the bird watch condition in the flight planning room for transient aircrew personnel, weather personnel change the display for the weather vision.

2. During periods of nonflying operations, note that the Airfield Manager or his/her designee will declare the bird watch condition. Upon declaration of a bird watch condition other than LOW, base operations personnel will notify tower personnel. They should also ensure bird watch information is posted in the flight planning room.

3. Note that the primary means of transmitting bird watch conditions will be via ATIS and the weather monitor. However, under Bird Watch Condition SEVERE, the air traffic control agency should ensure that the pilot understands the condition and is provided the option to delay, divert, or continue the proposed operation into the hazardous area.

d. Aircrew Responsibilities and Procedures:

1. If an aircrew observes or encounters any bird activity while in flight, which could constitute a hazard, the aircrew should contact the control tower or range operator and request that the observed bird activity be passed on to the Aviation Safety Office. The following information is necessary:

(a) Call sign.
(b) Location.
(c) Altitude.
(d) Time of sighting.
(e) Type of bird (if known).
(f) Approximate number of birds.
(g) Behavior of birds (soaring, flying to or from a location, etc.).

2. Additional direction to all pilots is provided below, based upon the coded bird watch conditions and the location.

(a) Condition SEVERE:

(1) Traffic Pattern. Only full-stop landings are permitted. Formation takeoffs are prohibited. The Aviation Safety Officer may consider changing runways, delaying takeoffs and landings, diverting aircraft, changing pattern altitude, etc.

(2) Ranges/Training Areas. Identify a specific area and altitude. All flights must avoid using the range or area.

(3) Low-Level Routes. Note and avoid specific routes or segments and altitudes.

(b) Condition MODERATE:

(1) Traffic Pattern. Limit touch-and-go's to the minimum number required for training. Limit low approaches, and perform only those required for training. Pilots should be particularly cognizant of bird activity when on final approach and will initiate a wave-off, immediately, if a bird strike is imminent.

(2) Ranges/Training Areas. Make changes in flight profile or altitudes to avoid bird hazards.

(3) Low-Level Routes. Make amendments to flight altitude to minimize bird hazards. Limit formation flying to a minimum for mission and training requirements.

(c) Condition LOW: All Locations. Continue with normal operating procedures.

(d) Bird Watch Alert. In addition to the above bird watch conditions, a Bird Watch Alert may be declared. All aircrews should be aware of the increased likelihood of bird hazards to flight safety.

BASE SELF-INSPECTION CHECKLIST
ALL PURPOSE CHECKLIST
BASE SELF-INSPECTION CHECKLIST

1. Is the bash plan current and readily accessible for your reference?

2. Is the station instruction current and readily accessible for your reference?

3. If the base has a flying-mission, has a BASH reduction programand written plan been established?

4. Is the BASH plan reviewed annually?

5. Are changes and annual reviews posted to the plan?

6. Does the program establish a Bird Hazard Working Group (BHWG) or similar organization?

7. Are base agencies such as Safety, Civil Engineering, and Air Operations assigned responsibilities for the BASH program?

8. Is the base Commanding Officer or Wing Commanding Officer the BHWG chairman?

9. Does the BHWG meet at least semiannually as a separate meeting or along with another meeting containing the same members?

10. Are BASH topics included in flight safety briefings?

11. Are posters, pictures, maps, etc., related to BASH posted in the aircrew briefing areas, safety bulletin boards, and base operations flight planning areas?

12. Are local bird problems documented?

13. Are both damaging and nondamaging bird strikes recorded?

14. Are all nondamaging bird strikes reported to COMNAVSAFECEN, ATTN Code 54 375 A St., Norfolk, VA 23511-4399 ?

15. Are all damaging bird strikes reported with COMNAVSAFECEN as an addressee?

16. Are bird remains (feathers, beaks, feet) collected as a result of a bird strike?

17. Are bird remains sent to a local authority (US Fish and Wildlife Service, university, or ornithologist) for identification?

18. Is the bird strike information tracked to facilitate the identification of trends (for example, type of bird, route, time of day, type of aircraft)?

19. As part of the bird awareness program, do you have a bird identification book?

20. Are daily surveys taken of the airfield and surrounding area to observe potential and actual bird hazards?

21. Are records of daily observations kept in order to establish trends?

22. During the surveys, are areas like standing water, food sources, or areas for protection noted?

23. Is the vegetation on the airfield particularly attractive to birds?

24. Does the mowing or guideline contract specify that the grass be maintained at a height of 7-14 inches?

25. Does the base practice controlled burning?

26. Are trees or shrubs located within Primary Surface and Clear Zone of the runways removed in accordance with NAVFAC P-80.3?

27. Are these trees or shrubs attractive to birds?

28. Are birds attracted to the taxiways or active runways?

29. Has it been determined what type birds are attracted to the taxiways and runways?

30. Are the areas with water (ponds, lakes, swamps, etc.) attractive to birds?

31. Are the birds, feeding in these wet areas?

32. Has it been determined what type of birds are attracted to these wet areas?

33. Do wet areas contain vegetation along their perimeters?

34. Do the wet areas contain fish or amphibians (frogs or salamanders)?

35. Are there other areas near the runways that attract birds (horse stables, recreation areas, golf courses, etc.)?

36. Has it been determined what is attracting the birds?

37. Has it been determined what type of bird is being attracted to these other areas?

38. Does farming in the surrounding area of the base attract birds?

39. Is the base notified by the farmer of the plowing times in order to alter operations?

40. Does the base outlease cropland on adjacent areas?

41. Does the lease provide for restrictions concerning BASH?

42. Are there garbage dumps, landfills, or sewage lagoons in the area near the base?

43. Is the garbage dump, landfill, or sewage lagoon covered daily with dirt, wire, or netting?

44. Does the garbage dump, landfill, or sewage lagoon attract birds?

45. Are there other areas attractive to birds near the base (for example, lakes, ponds, swamps, cemeteries, wildlife areas)?

46. Have aircraft hangars and buildings been inspected for pest birds?

47. Do bird droppings cause problems for equipment or aircraft?

48. Is equipment covered and aircraft cockpits closed each night to provide protection against bird dropping?

49. Are hangar doors left open all the time?

50. Is the cost of cleaning up the bird droppings and any damage incurred less than any type of solution to the problem?

51. Is there an active hunting club on base?

52. Are the game birds and deer controlled so they do not interfere with flying operations?

53. Does the control tower warn operations and pilots of birds in the airdrome?

54. Is there a designated bird control team that actually manages and controls birds and maintains bird dispersal equipment and permits?

55. Is the control team actively patrolling the airdrome?

56. Does the BHWG suggest ways of altering the situation or changing the habitat to discourage birds from the areas before using elimination or reduction techniques?

LOW-LEVEL FLIGHT CONSIDERATIONS

1. Avoid flying routes with the following conditions:
   a. Areas with known raptor (birds of prey) concentrations during summer, especially during 1000-1700 hours, due to increased thermals (generally a maximum altitude of 3000-4000 ft AGL is reached by all raptor species, though soaring can occur at considerably higher altitudes).
   b. Areas with ideal terrain for creating thermals during summer months, such as ridge lines, rolling hills, and areas near water. This applies to southern Florida and Texas during winter.

2. Avoid flying 1 hour before and after dawn and dusk when there is a known increase in bird activity, and when in the following areas:
   a. All coastal areas, Great Lakes region, and Great Salt Lake to avoid gulls and shorebirds.
   b. Areas of known blackbird and starling roosts. Information is available from the USFWS and local experts.
   c. Known local concentrations of waterfowl (ducks, geese, swans).

3. Avoid flying at altitudes with most favorable wind speed and direction for migrating birds (particularly near shear altitude) up to 48 hours prior to, and 24 hours after, frontal passage-especially October and November. Weather is a prime stimulus for migratory bird movements.

4. Avoid flying near wildlife refuges, landfills, stockyards, and food processing plants as these all attract birds.

5. Obtain the following from the BASH Coordinator at the NAVSAFECEN to best assess low-level route hazards:
   a. TYCOM. TYCOMs provide migratory waterfowl route information or dissemination to base bird hazard working groups.
   b. Bases:
      (1) Bird avoidance mode (BAM) graphs for raptor (hawks, owls, and vultures) risk prediction.
      (2) BAM graphs for migratory waterfowl risk prediction.
      (3) Specific guidance when unusual bird movements are noted.
      (4) Guidance in specific geographical areas.

6. Consider the following operational changes to reduce threats from bird strikes, mission requirements permitting:
   a. Reduce low-level flight time.
   b. Reduce formation flying.
   c. Reduce air speed at low levels.
   d. Increase flying altitudes.

ATTACHMENT 1

U N C L A S S I F I E D

ADMINISTRATIVE MESSAGE

ROUTINE

R 291005Z MAR 96 ZYB PSN 962634130

FM COMNAVSAFECEN NORFOLK VA//10/11/114/FTLE//

TO ALL NAVMARCOR AIR STATION ACTIVITIES

INFO CNO WASHINGTON DC//N45//
CMC WASHINGTON DC//51/SD/DCS.A//
CINCLANTFLT NORFOLK VA//N44//
CINCPACFLT SAN DIEGO CA//JJJ//
COMNAVAIRLANT NORFOLK VA//JJJ//
COMNAVAIRPAC SAN DIEGO CA //N45//
COMNAVAIRSYSCOM WASHINGTON DC //09F//
COMNAVFACENGCOM ALEXANDRIA VA //N45D/143//
ENGFLDACT CHES WASHINGTON DC //243//
ENGFLDACT NW CO SILVERDALE WA//231//
ENGFIDACT MED CO NAPLES IT//NS//
ENGFLDACT WEST SAN BRUNO CA //243//
LANTNAVFACENGCOM NORFOLK VA //09P//
SOUTHNAVFACENGCOM CHARLESTON SC //063//
SOUTIMSTNAVFACENGCOM SAN DIEGO CA //231//
PACIFICNAVFACENGCOM PEARL RARBOR HI//23//
COMCABEAST CHERRY PT NC
COMCABWEST EL TORO CA
HQ AFAC KIRTLAND AFB NM//SEF//
UNCLAS //NO3750//
MSGID/GENADMIN/COMNAVSAFECEN/114-452/MAR//
SUBJ/BIRD/ANIMAL-AIRCRAFT-STRIKE HAZARD (BASH) PROGRAM//
REF/A/DOC/OPNAVINST 3750.6Q//
REF/B/DOC/NAVFAC P-73 VOL II//
REF/C/DOC/OPNAVINST 5090.IB//
NARR/REF A, THE NAVAL AVIATION SAFETY PROGRAM INSTRUCTION, ESTABLISHES THE AVIATION REPORTING PROCEDURES FOR BASH. REF B, NAVAL FACILITIES ENGINEERING COMMAND REAL ESTATE OPERATIONS AND
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U N C L A S S I F I E D

NATURAL RESOURCES PROCEDURAL MANUAL, PROVIDES SPECIFIC GUIDANCE TO NATURAL RESOURCES MANAGEMENT (NRM) PROGRAM MANAGERS TO ESTABLISH A BASH REDUCTION AND ANIMAL DAMAGE CONTROL PLAN.
REF C, ENVIRONMENTAL AND NATURAL RESOURCES PROGRAM MANUAL, REQUIRES COMMANDING OFFICERS AND NRM PROGRAM MANAGERS TO IMPLEMENT A PROGRAM TO REDUCE THE POTENTIAL FOR COLLISION BETWEEN AIRCRAFT AND BIRDS OR OTHER ANIMALS.//
POC/LCDR STELLA/AIR OPERATIONS SAFETY ANALYST/CODE 114/TEL: DSN 564-3520 EX: 7281/TEL: COMM: (804) 444-3520 EX: 7281//
RMKS/1. THIS MESSAGE ANSWERS NUMEROUS REQUESTS FOR GUIDANCE IN ESTABLISHING A BASH PLAN AT COMMANDS IN THE INTEREST OF IDENTIFYING THE HAZARDS AS PART OF RISK MANAGEMENT. NAVAL AVIATORS REPORTED 1,420 BIRDSTRIKES DURING FY 94/95 WHICH RESULTED IN 107 AIRCRAFT MISHAPS THAT COST $85,866,467.
2. IN REVIEWING THE MANY RECENT BASH INVOLVED AIRCRAFT MISHAPS, WE'VE FOUND THE LACK OF BASH PLAN A CONSISTENT DEFICIENCY. REF A ESTABLISHES BASH REPORTING PROCEDURES AND STATES "THE OBJECTIVE OF A COMMAND AVIATION SAFETY PROGRAM IS TO ELIMINATE HAZARDS WITHIN THE COMMAND AND WITHIN NAVAL AVIATION AND TO ENHANCE SAFETY AWARENESS IN ALL PERSONNEL." REFS B AND C ADDRESS ALL CNO'S NATURAL RESOURCES PROGRAM REQUIREMENTS, GUIDELINES, AND STANDARDS. THESE REQUIREMENTS INCLUDE DEVELOPING A BASH PLAN FOR REDUCING COLLISIONS BETWEEN AIRCRAFT, ANIMALS AND BIRDS. THIS HAZARD CAN BE REDUCED THROUGH THOUGHTFUL LAND MANAGEMENT. AREAS
ADJACENT TO RUNWAYS CAN BE MADE LESS ATTRACTIVE TO WILDLIFE. REF C, PARAS. 22-6.3 AND .4 F, REQUIRES MAJOR CLAIMANTS, INTERMEDIATE COMMANDS AND COMMANDING OFFICERS TO ENSURE THAT SUBORDINATE COMMANDS SUPPORT NATURAL RESOURCES PROGRAMS ON INSTALLATIONS UNDER THEIR CONTROL.

3. IAW REF B, THE ENGINEERING FIELD DIVISION (EFD), NATURAL RESOURCE BRANCH WILL ASSIST, UPON REQUEST, WITH THE PREPARATION OF NRM PLAN IF IT IS BEYOND THE YOUR CAPABILITY, AND WILL REVIEW AND UPDATE SECTIONS OF YOUR NRM PLAN. FUNDING REQUIREMENTS FOR PROJECTS MUST BE SUBMITTED THROUGH THE EFD.

4. RESPONSIBILITIES FOR ESTABLISHING A COMPREHENSIVE BASH PLAN AS PART OF THE FISH AND WILDLIFE MANAGEMENT PROGRAM INCLUDE:
A. COMMANDERS AND COMMANDING OFFICERS OF NAVAL AIR FACILITIES AND INSTALLATIONS TO:
(1) DEVELOP, ESTABLISH, AND MAINTAIN A PROGRAM TO REDUCE POTENTIAL FOR COLLISIONS BETWEEN AIRCRAFT AND BIRDS OR OTHER
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ANIMALS.
(2) HAVE THEIR BASH PLAN CERTIFIED AS TECHNICALLY ADEQUATE BY THE APPROPRIATE EFD.
(3) ESTABLISH PROCEDURES FOR EXCHANGING INFORMATION BETWEEN

GROUND AGENCIES AND AIRCREWS CONCERNING THE EXISTENCE AND LOCATION OF BIRDS WHICH COULD POSE A HAZARD.
B. NAVAL FACILITIES ENGINEERING COMMAND EFD'S TO:
(1) PROVIDE TECHNICAL SERVICES TO INSTALLATIONS WHICH WILL AID IN THE DEVELOPMENT OF FISH AND WILDLIFE CONSERVATION PROGRAMS.
(2) PROVIDE TECHNICAL ASSISTANCE TO AIR FACILITIES REGARDING STRIKE HAZARD REDUCTION TO INCLUDE:
(A) DEVELOPMENT OF TECHNIQUES FOR BIRD AND OTHER ANIMAL CONTROL.
(B) EVALUATE PROPOSED AND EXISTING LOW LEVEL ROUTES, LANDFILL SITES, WEAPONS RANGES, SEWAGE PLANTS, AND WILDLIFE REFUGES FOR STRIKE POTENTIAL.
(C) CONDUCT AN ON-SITE REVIEW OF NAVAL AIR STATION'S BASH PROGRAMS NOT LESS THAN EVERY TWO YEARS.
(D) REVIEW AGRICULTURAL AND GRAZING LEASING PROGRAMS AND WILDLIFE AND LAND MANAGEMENT PLANS.
(E) PREPARE AND COORDINATE SHORE INSTALLATION DEPREDATION PERMIT APPLICATIONS.
(F) REQUEST THE STATE FISH AND GAME AGENCY, U. S. FISH AND WILDLIFE SERVICE, AND U.S. DEPARTMENT OF AGRICULTURE ASSISTANCE AND COOPERATION TO REDUCE STRIKE POTENTIAL.
(3) PROVIDE ASSISTANCE TO INSTALLATIONS IN THE PREPARATION OF COOPERATIVE AGREEMENTS, MANAGEMENT PLANS, ANNUAL INCREMENTS, RESEARCH STUDIES AND INVENTORIES, AND OTHER INSTALLATION FISH AND WILDLIFE MANAGEMENT REPORTS.
(4) CONDUCT A TECHNICAL, REVIEW OF INSTALLATION FISH AND WILDLIFE MANAGEMENT PROGRAMS, AT LEAST EVERY TWO YEARS, TO ENSURE THEY ARE BEING FOLLOWED TO THE BEST ADVANTAGE OF THE INSTALLATION.
C. MAJOR CLAIMANTS AND INTERMEDIATE COMMANDS SHALL REQUIRE, BUDGET FOR, AND ASSIST SUBORDINATE COMMANDS WITH THE PLANNING AND IMPLEMENTION OF THEIR FISH AND WILDLIFE MANAGEMENT PROGRAM.
D. NAVAL FACILITIES ENGINEERING COMMAND HEADQUARTERS SHALL:
(1) PROVIDE LEADERSHIP, TECHNICAL ASSISTANCE, AND ADMINISTRATIVE COORDINATION TO ENSURE EFFECTIVE IMPLEMENTATION OF THE FISH AND WILDLIFE MANAGEMENT PROGRAM.
(2) ESTABLISH, COORDINATE, AND PROMULGATE FISH AND WILDLIFE MANAGEMENT GUIDANCE, POLICY AND SERVICES REQUIRED.
(3) ESTABLISH EFD ANNUAL WORKLOAD GUIDANCE AND APPROVE EFD ANNUAL OPERATING PLANS REGARDING FISH AND WILDLIFE MANAGEMENT
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PROGRAM REQUIREMENTS.
(4) APPROVE OR DISAPPROVE ANNUAL REQUEST FOR INSTALLATION AUTHORITY TO USE FISH AND WILDLIFE USER FEE COLLECTION RECEIPTS.
(5) COORDINATE WITH OTHER FEDERAL AGENCIES INVOLVED IN BIRD/AIRCRAFT STRIKE HAZARD (BASH) REDUCTION.

5. IN SUPPORT OF REDUCING BASH PROBLEMS, EACH AVIATION INSTALLATION MUST HAVE AN ACTIVE BASH PROGRAM. THE ABOVE OUTLINE AND THE LOCAL EFD SHOULD PROVIDE THE REQUIRED INFORMATION NECESSARY. NAVSAFECEN WILL, UPON REQUEST, MAIL A SAMPLE BASH PLAN AND OTHER SUPPORTING INFORMATION FOR REDUCING THE BASH PROBLEM.//

BT

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NAVAL AIR STATION

BIRD AIRCRAFT STRIKE HAZARD REDUCTION PLAN

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA

CODE 2031

TABLE OF CONTENTS

PLAN SUMMARY

I. Purpose: The purpose of this plan is to significantly reduce the Bird aircraft strike hazard (BASH). Aircraft bird strikes can not and will not be accepted as unavoidable.

II. Implementation: This plan will be implemented upon receipt and remain active year round. This plan contains two basic parts, the BASH Plan itself, and an Appendix which is the detailed operational procedures needed to reduce the bird strike potential by monitoring bird activity and actively controlling bird population and movement through habitat manipulation and land use plans.

III. References: (a) OPNAVINST 3750.7Q
(b) OPNAVINST 5090,lB
(c) NAVFAC P-73 VOL II

BIRD-AIRCRAFT STRIKE HAZARD REDUCTION PLAN

BASIC PLAN:

1.1. SITUATION: Naval Station is geographic location. The airfield is surrounded by (terrain).

1.1.1. A bird-aircraft strike hazard (BASH) exists at NAVSTA ROTA and its vicinity due to resident and migratory bird species.

1.1.2. The agricultural activities on and around Naval Station probably play the key role in the BASH problem at Naval Station. Large populations of small birds in the spring and early fall account for percentage of the collisions which have occurred over the last four years.

1.1.3. A large rabbit population also exists on the base, and especially within the airdrome. The rabbits attract a great number of raptors which are constantly hovering over the runway.

1.1.4. There is a very large flock of geese on the NAVSTA. These egrets roost near the runway on the Naval Station golf course. The egrets transect the runway twice a day, early dawn and at dusk.

1.1.5. Because of its location, the area has a high gull population, especially during the winter months (rainy season) when the gulls can be found loafing on the runway and taxiway.

2.1. PURPOSE: No single solution exists to this BASH problem, and a variety of techniques and organizations are to be involved in the control program. This plan is designed to:

a. Establish a Bird Hazard Working Group (BHWG) with representatives from Legal, Public Works, Flight Safety, Airfield Management, Air Mobility Support Squadron and assign responsibilities.

b. Oversee procedures to identify high hazard situations and establish bird watch conditions.

c. Oversee aircraft and airfield operating procedures to avoid high-hazard situations.

d. Oversee guidelines to decrease airfield attractiveness to birds.

e. Oversee the guidelines for dispersing birds when they occur on the airfield.

3.1. TASKING: The Commanding Officer, Naval Station, shall appoint the Air Operations Officer (AOO) the responsibility for implementing the NAVSTA BASH Program. The AOO shall assign the following responsibilities to specific staff individuals or organizations:

3.1.1. Bird Air Strike Hazard (BASH) Officer shall:

a. Be designated by the AOO.

b. With the Aviation Safety Officer (ASO), maintain and review a file of all Bird Strike Hazard Reports occurring at NAVSTA.

c. With the ASO, provide liaison with all aviation activities at NAVSTA to develop and maintain awareness of this Plan.

d. Assist the AOO in determining aircraft and airfield procedures to abate bird hazards.

e. With the ASO, develop a continuing information and Education program at NAVSTA to disseminate Bird Hazard information.

3.1.2. Air Traffic Control Facility Officer shall:

a. Declare and issue bird hazard warning, via ATIS and Ground/Tower radio frequencies, whenever bird activities are observed, See Appendix one (1) for operational guidelines.

b. Instruct tower controllers to verify runway is clear of bird activity prior to issuing takeoff or landing clearances.

c. Notify Flight Planning to ensure current Bird Watch Conditions are posted at Base Operations so that all aircrews shall be aware of the potential Bird Watch Conditions at NAVSTA. The following terminology will be used for rapid communication to disseminate bird activity information in an air facility airdrome or low level route.

1. Bird Hazard Condition severe (RED): Heavy concentrations of birds on or immediately above the vicinity of the runway or at other specific locations that represents an immediate hazard to safe flying operations. Aircrews must thoroughly evaluate mission need before operating in areas under condition SEVERE.

2. Bird Hazard Condition Moderate (YELLOW):
Concentrations of birds observed in locations which represent a probable hazard to safe flying operations. Declaration of condition YELLOW requires increased vigilance by all agencies and extreme caution by aircrews.

3. Bird Hazard Condition Low (GREEN): Normal bird activity on or above the airfield with a low probability of a hazard.

d. Notify ATOC and initiate bird dispersal/abatement procedures when potentially hazardous bird activities are observed.

e. Report all bird strikes and significant wildlife activity to the BASH Officer.

3.1.3. Airfield Facilities Division Officer shall:

a. Establish and have available a Bird "Scare Team" to include a minimum of two individuals properly trained in the use of available pyrotechnics, and vehicle "Hazing" techniques in order to conduct bird dispersal activities, See Appendix two (2) for guidelines.

b. During conditions of MODERATE and SEVERE bird hazard conditions, utilize Gas Cannons for bird dispersal.

c. Store and maintain necessary pyrotechnics, gas cannons and other supplies required for bird abatement and dispersal.

d. With Air Operations Officer's approval, order pyrotechnics, launchers and other bird scare devices as required.

3.1.4. Aviation Safety officer shall:

a. With BASH Officer, provide liaison with all aviation activities at NAVSTA to develop and maintain awareness of this Plan.

b. With BASH Officer, develop a continuing information and education program at NAVSTA to disseminate bird strike hazard information.

c. Develop a Bird Air Strike Hazard (BASH) Working Group, to meet quarterly (MAR, JUN, SEP, DEC) to discuss Bird abatement procedures and monitor effectiveness of such procedures. BASH Working Group will include at a minimum the Air Operations Officer, Aviation Safety Officer, BASH Officer, Air Traffic Control Facility Officer, Environmental Officer, Air Facilities Division Officer, and Air Terminal Operations Center LCPO.

3.1.5. Public Works Officer shall:

a. Manage the habitat at NAVSTA to reduce the attractiveness of the installation to birds and rabbits.

b. Assign the Environmental Officer (EO) to coordinate and obtain recommendations and permission in writing from Spanish Navy 32 in order to resolve land management issues.

c. Assign the EO to assess bird strike data and significant Wildlife activity reports to develop strike trends, Historical database, and develop habitat modification Recommendations, in association with LANTDIV Code 2031.

3.1.6. Aviation Squadrons shall:

a. Periodically brief aircrews on bird strike hazard and prevention, emphasizing the importance of reporting to the tower all significant bird activity that poses a bird strike hazard.

b. Submit a Bird Strike Hazard Report, and ensure NAVSTA is an information addressee, following all bird strikes.

3.1.7. Administration: All tasked individuals and organizations shall develop standard operating instructions (OI's) and / or checklists to ensure completion of assigned tasks.

4.1. Training and Reference Books:

The following information outlines training opportunities, field equipment, and reference books required implementing and maintaining an effective BASH program at NAVSTA.

a. Training. Contact the Chairpersons for Bird Strike Committee (BSC). Each committee holds an annual BASH conference to which the NAVSTA's, AOO and ASO should attend. These conferences provide a creditable source of technical information and professional contacts.

b. Reference Books. A BASH reference library needs to be established at NAVSTA. These books provide bird identification guides, habitat requirements, and migration patterns and routes.

1. "Prevention and Control of Wildlife Damage", Vol. 1 and Vol.2, Wildlife Damage Handbook, 202 Natural Resources Hall, University of Nebraska, PO Box 830819, Lincoln, NE 68583-0819; tel. (402) 472-2188

2. "Handbook of the Birds of Europe, the Middle East and North Africa", Vol.1-Vol.4. Oxford University Press.

3. "Bird Migration". T. Alerstam, 1990. Cambridge University Press.

4.1 Review Responsibility: The Air Operations Officer is responsible for the periodic review and updating of this BASH Plan, with the assistance of the Aviation Safety Officer.

GUIDELINES AND RECOMMENDATIONS:

Appendix 1:

Flight Operational changes:

The Air Traffic Control Facility Officer should consider the following flight operational changes to avoid areas and times of known hazardous bird concentrations, mission permitting:

a. Raise pattern altitude.

b. Change pattern direction to avoid bird concentrations.

c. Avoid takeoffs/landings at dawn/dusk + 1 hour.

d. Limit or prohibit formation takeoffs and landings

e. Depart pattern in trail; rejoin 3000 AGL.

f. Reschedule local training or transition elsewhere.

g. Raise altitude enroute to low-level or training areas.

h. Limit time on low-level routes to minimum for training requirements.

i. Select low-level routes or training areas based on Bird hazard data such as the Air Force BASH Team Bird Avoidance Model.

j. Split formation during recovery.

k. Discontinue formation instrument approaches.

l. Make full-stop landings.

Appendix 2

Guidelines for dispersing birds on the airfield:

The following information is provided to assist the "Scare Team" in dispersing birds on the airfield.

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

b. Pyrotechnics are 12-gauge scare cartridges that produce a secondary explosion to scare the birds from the area. The scare cartridges are launched from either a shotgun or a pyrotechnic pistol (M-8 Very Pistol) with a steel sleeve insert to modify the gun to the 12- gauge size. Pyrotechnics are effective for dispersing most bird species.

c. Gas cannons may also be used. These devices should be operated, especially at dawn and dusk as
Birds come in to feed or roost. Cannons must be relocated frequently to avoid habituation problems.
These devices are very effective on gulls, blackbirds and waterfowl.

d. Depredation. Birds must be killed occasionally as a reinforcement of other methods. Domestic pigeons, European starlings, and house sparrows can be killed without a permit.

e. Other Devices. Ingenuity is encouraged in the bird scare program. Other devices may be used.
Radio-controlled model aircraft, hawk kites, model birds in distressed positions, falconry, etc., may all be considered based on availability and problem bird species.

f. Falconry has been quite successful with blackbirds, Pigeons and gulls, but it is unlikely to be successful with much larger raptors. There is some risk that the Falcons may join in rabbit hunting, rather than frightening raptors. The presence of falcons may add to the existing BASH risk, rather than reduce it.

g. Ineffective methods. Ultra sound, rubber snakes, stuffed owls, rotating/flashing lights, loud music, and other such devices have not proven effective and should not be used.

Appendix 3

PWD Guidelines To Decrease Airfield Attractiveness To Birds:

Habitat manipulation is the easiest and the long-term solution to reduce the attractiveness of the installation to raptors, gulls, Egrets, and rabbits. The overall objective is to provide a nearly uniform natural environment with no unique features, and little edge effect that either rabbits or raptors could use. Specific recommendations are:

A. The Facilities Support Contract (FSC) Division of Public Works needs to modify the existing grounds maintenance contract to incorporate the following practices within the airdrome:

a. Grass mowing and scrub brush removal needs to occur 800 feet from the center line of the runway, or at least to the edge of the agricultural outleases on the East Side of the runway and as far as possible on the taxiway side.

b. Grass height management: Mowing operations shall maintain a uniform grass height between 7 and 14 inches. Mowing frequency will be as needed to maintain height requirements. Coordinate mowing with periods of low flight activity. Grass must be cut before it goes to seed to discourage seed-eating birds from utilizing the airfield. Long grass discourages flocking species from entering the airfield because reduced visibility disrupts interflock communication and flock integrity and also prevents predator detection. Grass normally should not exceed 14 inches, as high grass will attract some bird species and rodents which in turn attract Raptors. Airfields with a variety of grass species may have fast-growing strain, which reaches 14 inches sooner than the rest of the airfield. Mowing will be conducted when the average grass height reaches 14 inches. Higher grass height may be allowed if the airfield is outleased for hay production.

c. Broad-leafed weed control. Broad-leafed weeds produce seeds or berries, which attract a variety of birds. Broad-leafed weeds will be kept to a minimum on the airfield as they also inhibit grass growth. Apply Herbicides as necessary. Obtain assistance in herbicide selection for weed control, appropriate grass seed selection, fertilization, and erosion control vegetation.

d. Planting bare areas. Bare areas are frequently used by Birds as resting sites and should be eliminated on the Airfield. Grass will be planted as necessary.

e. Fertilizing. Selectively stimulate grasses to promote uniform cover.

B. There is poor drainage throughout the airdrome: The Airdrome needs to be included in the upcoming drainage evaluation contract.

a. Grading of airfield. High and low spots on the field will be leveled or filled to prevent standing water, which will reduce attractiveness to birds.

b. Drainage ditches. Ditches will be inspected regularly and kept clear and obstacle-free. Ditch sides will be maintained as steeply as possible, minimum slope ratio of 5:1--to discourage

wading birds and emergent vegetation. Vegetation will be removed as often as necessary to maintain flows and discourages use by birds.

c. Eliminate standing water. The drainage between the U.S. and Spanish hangers needs to be re-established to eliminate the small ponds and puddles. Low spot and ditch maintenance is essential to reduce attractiveness to birds.

C. Vegetative Cover:

a. Erosion control vegetation. Severe gully erosion exists on the southeast side of the runway. Best management practices should be implemented to eliminate this erosion. Vegetation should be used which is appropriate for the Region, do not control erosion using plants which produce seeds at heights below 14-18 inches.

b. Agricultural crop outleasing. Outleasing of crops should be consistent with BASH reduction philosophy. However, some crops such as alfalfa and cotton do not attract birds and may have additional advantages of reducing foreign object damage (FOD) and/or fire hazard near the runway.

c. Reducing edge effect. Edge effect refers to the highly attractive transition zone between two distinct Habitat types (e.g., brush to grassland). The Airfield will be maintained as uniformly as possible to reduce this effect (if a BASH problem is caused by Animals attracted to the transition zone).

d. Dead vegetation such as brush piles, grass clippings, Hay bales, etc., and the cover it affords will be removed as soon as possible.

e. Control waste disposal. Landfills are the most significant attractant too hazardous bird species. The landfill at NAVSTA is only open for the disposal of inert construction materials and Agricultural waste.

D. Fencing:

a. The NAVSTA shall construct rabbit proof fencing to surround the runways and tie into the existing rabbit fencing that surrounds the agricultural outleases. Thisis very successful for the farmer and is a viable alternative for the NAVSTA.

E. The Installation-Pest Control Plan will be modified to Incorporate the following when appropriate: (Any use of Pesticides shall comply with Chapter 11 of the Final Governing Standards for Spain).

1. Animal hazards to aircraft:

a. Recommend close coordination with the Spanish to allow for intensive trapping or hunting of the rabbits. The rabbits have colonized" areas between the taxiway and the runway, where they have burrowed extensively Underneath the concrete,(See Exhibit ""C""). If the NAVSTA

ties into the existing agricultural outlease fences, the rabbits within the fenced area can be removed by hiring a contractor to trap and remove them. This will also eliminate the raptor/rabbit relationship around the airdrome. If this is not feasible, professional hunters can be hired to manage the rabbit populations in and around the airdrome. Hunting should take place from fall to early spring, as this is the period that rabbits show no signs of Tularemia and their meat is edible. "Care should be taken by airfield maintenance personnel in handling rabbit carcasses to avoid exposure to Tularemia".

b. Invertebrates and rodents provide important food sources for many birds. Pest Management Section should periodically survey and reduce these pests when required. Control of insects, earthworms, rodents, etc., through use of insecticides and rodenticides will be accomplished under the supervision of the installation Pest Management office with EPA approved methods. Control should begin early in the spring. This must be coordinated with the animal control section Wildlife management section of the installation natural Resources management plan.

c. Eliminate roosting sites. There is an established egret Roosting site located on the golf course near the entrance to the Base. This roost needs to be moved off Base preferably to the north side of the Base to prevent the birds from transiting the runway at dusk and dawn as they now do. This will be a labor-intensive project with close coordination and communication between the civilian authorities.

d. Bird-proof buildings and hangars. Pigeons, sparrows and starlings frequently occur in buildings and hangars and must be excluded. Denying access by screening windows, closing doors, and blocking entry holes is most effective. When necessary, other methods such as those listed below should be considered:

1. Toxic perches. Pest management will survey bird Roosting sites and install perches where maximum numbers of birds will contact them. Ensure perches are maintained with proper pesticide to remain effective.

2. Netting. Install under superstructure to exclude pest birds from roosting areas. Ensure no gaps or holes are present for birds to get through.

3. Shot Guns. Shoot birds for a short-term solution. Experience has shown that all birds cannot be removed using this technique. Coordination with the Spanish Military will be required.

4. Avitrol. Pest Management will place in or near Hangar to kill birds or creates a distressed response, scaring others away.

5. Trapping/Removal. Use large cage with food, water, and other birds to trap pest birds. Birds can either be released away from the hangar or killed.

6. Door coverings. Use netting or plastic strips suspended over the door to exclude birds. Ensure no tears or holes are present which allow birds access to the hanger.

7. Sharp Projections. Use in limited areas such as ledges overhangs, or small places where birds cannot be allowed. Expense prohibits their use over the entire structures.

8. Night Harassment. Use high-pressure air or water to make hangars, an undesirable roosting site. Persistence is the key.

NAS Airfield
From: Commanding Officer, Naval Air Station

Subj: BIRD/AIRCRAFT STRIKE HAZARD (BASH) REDUCTION PROGRAM

Ref: (a) OPNAVINST 3750.6

Encl: (1) Animal/Bird Strike Report

1. Purpose. To reduce the bird strike hazard to aircraft aboard Naval Air Station, by creating an integrated bird control and hazard abatement program. The program is designed to minimize aircraft exposure to potentially hazardous bird strikes at and around the Naval Air Station.

2. Cancellation. This instruction is a complete revision and should be read in its entirety.

3. Discussion. The hazard posed by birds to safe flight operations at an airfield is an ever-present problem. Total elimination of the hazard is impossible due to its very nature; however, an active program can be implemented to greatly reduce aircraft exposure to bird activity on and around the airport surface. This instruction is designed to reduce the bird/aircraft strike potential by awareness of avoidance procedures, monitoring bird activity, and actively controlling bird populations and movements through habitat manipulation and land use planning.

4. Action.

a. The Air Operations Officer shall:

(1) Monitor the airfield for bird activity and direct Bird abatement actions.

(2) Provide liaison with all aviation activities at Patuxent River to develop and maintain awareness of this Instruction.

(3) Inform the Natural Resources office of any changes to low-level routes or training areas.

b. The Air Traffic Control Facility Officer shall:

(1) Issue bird hazard warnings, via ATIS, Advisory frequencies, etc., whenever bird activities are observed or reported within the Delegated Approach Control Airspace.

(2) Utilize the BASH Condition Codes to report significant bird activity noted away from the installation. Report sightings to the Aviation Safety Officer (ASO) xll45 and advise aircrews of hazardous conditions.

(3) Declare, disseminate, and terminate bird watch conditions.

(4) Chair the Bird/Aircraft Strike Hazard (BASH) Reduction Team.

(5) Initiate bird dispersal/abatement procedures when potentially hazardous bird activities are observed or reported on Trapnell Field and OLF Webster Field.

(6) Maintain records of all reported animal/bird strikes and significant wildlife activity which pose a threat to aircraft operations. Forward a copy of Animal/ Bird Strike Report form to the Natural Resource Office after each reported strike.

(7) Identify radar targets as possible bird activity and provide warnings to pilots when appropriate.

c. The Airfield Facilities shall:

(1) Appoint bird dispersal personnel, these people will be activated at any time when birds on the airfield create hazardous conditions. The bird dispersal personnel will have immediate access to bio-acoustic and pyrotechnic equipment for bird dispersal.

(2) Ensure properly trained personnel are available to conduct bird dispersal activities.

(3) Maintain records of dispersal efforts and methods used.

(4) Store and maintain necessary bio-acoustic and pyrotechnic equipment and other supplies required for bird abatement and dispersal.

(5) Advise the Air Operations Officer in determining aircraft and airfield procedures to abate bird hazards.

(6) Conduct a daily airfield survey.

d. Chief of Police shall:

(1) Store and maintain firearms and ammunition for bird depredation.

(2) Conduct training sessions for natural resources personnel and maintain a list of personnel authorized to withdraw firearms and ammunition for bird depredation activities.

e. The Public Works Officer shall:

(1) Manage the Naval Air Station land use program to minimize potential bird/aircraft strike hazards.

(2) Direct the Natural Resources Manager to:

(a) Serve as a member of the BASH Reduction Team.

(b) Review and approve/disapprove agricultural crop selections based on the likelihood of creating a potentially hazardous bird attractant.

(c) Maintain required permits for the dispersal and depredation programs. Maintain appropriate correspondence between Naval Air Station and state and federal wildlife agencies.

(d) Continually monitor bird activity levels and conduct regular bird activity surveys. Maintain and update a Database of bird strikes locations and species. Provide bird activity analysis to the Aviation Safety Officer and Air Operations Officer.

(e) Identify high-risk areas, such as landfills and wildlife refuges, to establish procedures to avoid them and disseminate information.

(f) Review all locally generated Bird Strike Hazard Reports. Attempt to identify all bird remains. Forward all unidentified bird remains to the Smithsonian institution for identification.

(g) Modify airfield habitat consistent with runway lateral and approach zone management criteria.

(h) Conduct depredation and disposal activities when lethal methods are required, providing the appropriate personnel and training.

(i) Control birds such as pigeons and starlings in Hangars and other structures.

(j) Review all low-level routes and training areas or changes to existing routes/areas for BASH potential.

(k) Provide any additional information on migratory, local and seasonal bird activities through contact with the USFWS, Audubon Society, local ornithologists, and other agencies/groups.

(l) Assist the Air Operations Officer with the information and education program.

f. <u>All NAWCAD Aviation Activities shall:</u>

(1) Periodically brief aircrews on bird strike hazards and prevention, emphasizing the importance of reporting all significant bird activity that poses a bird strikes hazard.

(2) Deliver **any** bird remains (including even minute quantities of feathers or flesh) to the Natural Resources office following **every** bird strike. Accurate identification is essential for useful bird activity analysis.

(3) Ensure aircrews participate in the BASH reduction program by promptly reporting all hazardous conditions and Bird strikes.

(4) Submit a Bird/Aircraft Strike Hazard Report for all strikes.

g. The Bird/Aircraft Strike Hazard Reduction Team shall hold a quarterly working meeting to assess the status of the Bird/Aircraft Strike Hazard Reduction Program. Team Membership shall consist of:

(1) Air Traffic Control Facility Officer (Chairperson)

(2) Air Traffic Control Tower Branch Manager

(3) Airfield Facilities Division Officer

(4) NAWCAD Aviation Safety Officer

(5) Natural Resources Manager

(6) NaturaL Resources Specialist(s)

5. BASH Condition Codes. The following terminology can be used for rapid communication to disseminate bird activity information and implement unit operational procedures. Bird locations should be given with the condition code.

a. Code Red. Heavy concentration of birds on or directly above the active runway, in the immediate vicinity of a low-level route or training area, or other locations that represent an immediate hazard to safe flying operations. Aircrews should thoroughly evaluate mission need before operating in areas under Code Red.

b. Code Yellow. Concentrations of birds observable in locations that represent a probable hazard to safe flying operations. This condition requires increased vigilance by all agencies and extreme caution by aircrews.

c. Code Green. Normal bird activity with a low probability of hazard.

6. Review Authority. The Air Operations Officer shall review this instruction annually, making changes as necessary.

ANIMAL/BIRD STRIKE REPORT

In the event of a reported animal/bird strike, including suspected strike, obtain the following information. Do not attempt to obtain information if doing so may adversely affect safety of flight. Information may be taken by radio or phone once the aircraft is safely on deck or airborne. It is important that all animal/bird strikes be expeditiously reported.

---

a. Date___ Time of Strike (specify local or Zulu time):

b. Aircraft Type:____ Callsign:___ Squadron:

c. Geographic location of strike, be as exact as possible:

d. Phase of flight:___ takeoff___ landing __level __climbing __descending _taxiing stationary

e. Lights being used:. _none __landing __strobe __both __N/A

f. Type of strike:___bird __deer __other :

If known, what type of bird (gull, blackbird, vulture, etc):

g. Number individuals seen at strike: __few __many __exact #

h. Who removed the remains: __None found __Natural Res. __AFD __Crash/Fire_Other:

i. If known, what was the extent of damage to the aircraft?

i. Weather: _____ Surface Wind (direction & speed):

k. Altitude at strike:
l. Airspeed at strike:
M. Visibility:

Printed Name extension

1. Fill out the above, notify the FWS and forward this form to the AODO.

2. AODO shall notify the Staff Safety Officer and Natural Resources Branch during working hours. If the strike occurs after working hours and results in an aircraft accident or heavy aircraft

damage, call the Staff Safety Officer at home (name, phone #, and beeper # are in the Flight Planning Call List Book - aircraft mishap call sheet).

3. Daytime AODO shall forward copies of report to Staff Safety Office.

4. All bird remains are to be delivered to the Natural Resources Office (Bldg. 1410). Deer remains must be tagged and removed by a Natural Resources Representative.

BIRD/AIRCRAFT STRIKE HAZARD (BASH) PLAN

1. PURPOSE:

To reduce the bird strike hazard to aircraft aboard Naval Air Station, by creating an integrated bird control and hazard abatement program. A bird-aircraft strike hazard exists at Naval Air Station and its vicinity due to both resident and migratory bird species. This plan established procedures to minimize the aircraft exposure to potentially hazardous bird strikes at and around the Naval Air Station. No single solution exists to this BASH problem, and a variety of techniques and organizations must be involved in the control program. This plan is designed to:

a. Assign responsibilities.

b. Establish procedures to identify high hazard situations and establish bird watch conditions.

c. Establish aircraft and airfield operating procedures to avoid high-hazard situations.

d. Establish guidelines to decrease airfield attractiveness to birds (or other wildlife that may be an aviation hazard).

e. Provide guidelines for dispersing birds when they occur on the airfield.

f. Control nuisance bird problems in the hangars.

2. AIRFIELD LOCAL AREA:

a. Naval Air Station:

(1) The base is located in (area)

(2) The installation is approximately acres.

(3) Elevations range and sea level.

(4) General topography

(a) The significant terrain features include beaches, forests, and wetlands. The base has one pastureland area and several active and inactive croplands.

(b) The installation Location.

(c) The developed areas comprise approximately acres or approximately percentage of NAS.

(5) Vegetative types:

(a) The plant species around the airfield are divided between grasses and crops. The main grass species are low maintenance.

(b)

(b) The vegetation adjacent to the airfield is predominantly woodlands. There are coniferous, deciduous, mixed coniferous/deciduous, mixed brush/shrubland, and old field stands surrounding the airfield.

(c) Developed areas on base are referred to as improved grounds. These areas include recreational areas and living quarters.

(d) Undeveloped areas are referred to as semi-improved or unimproved areas. About 302 acres of the semi-improved grounds are in agricultural outlease. The unimproved areas are woodlands, marshes, swamplands, and/or water.

(6) The landfill locataction to base.

(7) The WasteWater Treatment Plant is location to base.

(8) The golf course location to airfield. Additional facilities often associated with golf courses, such as tennis courts and Parking lots.

(9) The base has how many runways with approaches near water.

b. Naval Air station Habitat Map:

(1) Naval Air station provides habitat for a large variety of bird species.

(2) The different habitat maps will be used to determine if specific attractants exist where hazards have been identified. This will help to locate which attractants can be altered within the scope of this plan.

(3) The habitat maps found on the GIS (geographic information system) will be used as a guide for the long range program to reduce actual and potentialiy hazardous environmental factors on Naval Air Station.

3. TRAINING AREAS AND LOW-LEVEL ROUTES.

a. Training areas. The special use airspace used by Naval Air Station most predominantly, but are not restricted. Each airspace contains areas with potential bird/aircraft strike hazards. Various activities use these airspace with all types of aircraft. The main users from our installation include USN and USMC Daily flights occur in these areas usually between hours.

Airspace- This airspace location. Arcraft are permitted to fly from at times.

4. RESPONSIBILITIES:

a. The Air Operations Officer shall:

(1) Monitor the airfield for bird activity and direct bird abatement actions.

(2) Provide liaison with all aviation activities at Naval Air Station to develop and maintain awareness of this instruction.

(3) Inform the Natural Resources office of any changes to low-level routes or areas.

b. The Air Traffic Control Facility Officer shall:

(1) Issue bird hazard warnings, via ATIS, Advisory frequencies, etc, whenever bird activities are observed or reported within the Delegated Approach Control Airspace.

(2) Utilize the BASH Condition Codes to report significant bird activity noted away from the installation. Report sightings to the Aviation Safety Officer (ASO) x1145 and advise aircrews of hazardous conditions.

(3) Declare, disseminate and terminate bird watch conditions.

(4) Chair the Bird/Aircraft Strike Hazard (BASH) Reduction Team.

(5) Initiate bird dispersal/abatement procedures when potentially hazardous bird activities are observed or reported on airfield.

(6) Maintain records of all reported animal/bird strikes and significant wildlife activity that pose a threat to aircraft operations. Forward a copy of Animal/Bird Strike Report form to the Natural Resource Office after each reported strike.

(7) Identify radar targets as possible bird activity and provide warnings to pilot when appropriate.

c. The Airfield Facilities Officer shall:

(1) Appoint bird dispersal personnel, these people will be activated at any time when birds on the airfield create hazardous conditions. The bird dispersal personnel will have immediate access to bio-acoustic and pyrotechnic equipment for bird dispersal.

(2) Ensure properly trained personnel are available to conduct bird dispersal activities.

(3) Maintain records of dispersal efforts and methods used.

(4) Store and maintain necessary bio-acoustic and pyrotechnic equipment and other supplies required for bird abatement and dispersal.

(5) Advise the Air Operations Officer in determining aircraft and airfield procedures to abate bird hazards.

(6) Conduct a daily airfield survey.

d. Chief of Police shall:

(1) Store and maintain firearms and ammunition for bird depredation.

(2) Conduct training sessions for natural resources personnel and maintain a list of personnel authorized to withdraw firearms and ammunition for bird depredation activities.

e. The Public Works Officer shall:

(1) Manage the Naval Air Station land use program to minimize potential Bird/aircraft strike hazards.

(2) Direct the Natural Resources Manager to:

(a) Serve as a member of the BASH Reduction Team.

(b) Review and approve/ disapprove agricultural crop selections based on the likelihood of creating a potentially hazardous bird attractant.

(c) Maintain required permits for the dispersal and depredation programs. Maintain appropriate correspondence between Naval Air Station and state and federal wildlife agencies.

(d) Continually monitor bird activity levels and conduct regular Bird activity surveys. Maintain and update a database of bird strike locations and species. Update the GIS bird strike data layer to include recent strike data. Provide bird activity analysis to the Aviation Safety Officer and Air Operations Officer.

(e) Identify high-risk areas, such as landfills and wildlife refuges, to establish procedures to avoid them and disseminate information.

(f) Review all locally generated Bird Strike Hazard Reports. Attempt to identify all bird remains. Forward all unidentified bird remains to the Smithsonian Institution for identification.

(g) Modify airfield habitat consistent with runway lateral and approach zone management criteria.

(h) Conduct depredation and disposal activities when lethal methods are required, providing the appropriate personnel and training.

(i) Control birds such as pigeons and starlings in hangars and other structures.

(j) Review all low-level routes and training areas or changes to existing routes/areas for BASH potential.

(k) Provide any additional information on migratory, local and seasonal bird activities through contact with the USFWS, Audubon Society, local ornithologists, and other agencies/groups.

(l) Assist the Air Operations Officer with the information and education program.

f. All NAWCAD Aviation Activities shall:

(1) Periodically brief aircrews on bird strike hazards and prevention, emphasizing the importance of reporting all significant bird activity that poses a bird strike hazard.

(2) Deliver any bird remains (including even minute quantities of feathers or flesh) to the Natural Resources Office following every bird strike. Accurate identification is essential for useful bird activity analysis.

(3) Ensure aircrews participate in the BASH reduction program by promptly reporting all hazardous conditions and bird strikes.

(4) Submit a Bird/Aircraft Strike Hazard Report for all strikes.

g. The Bird/Aircraft Strike Hazard Reduction Team shall hold a quarterly working meeting to assess the status of the BASH Reduction Program. Team membership shall consist of:

(1) Air Traffic Control Facility Officer (Chairperson)

(2) Air Traffic Control Tower Branch Manager

(3) Airfield Facilities Division Officer

(4) NAWCAD Aviation Safety Officer

(5) Natural Resource Manager

(6) Natural Resource Specialist(s)

5. BIRD REMAINS IDENTIFICATION.

a. Non-fleshy bird remains taken from aircraft or airfields following all bird strikes will be forwarded to the Natural Resources Office (Bldg 1410). Small remains such as downy feathers can be used for positive identification and are not to be discarded.

b. If Natural Resources personnel are unable to make a positive identification, the remains will be sent to the Smithsonian Institution in Washington, D.C. A bird/aircraft strike form will be included which provides:

(1) Installation and state where the remains are shipped from,

(2) Date of strike,

(3) Type of aircraft and squadron,

(4) Geographic location and altitude at time of strike,

(5) and Damage amount.

6. BASH CONDITION CODES:

The following terminology can be used for rapid communication to disseminate bird activity information and implement unit operational procedures. Bird locations should be given with the condition code.

a. Code Red. Heavy concentration of birds on or directly above the active runway, in the immediate vicinity of a low-level route or training area, or other locations that represent an immediate hazard to safe flying operations. Aircrews should thoroughly evaluate mission need before operating in areas under Code Red.

b. Code Yellow. Concentrations of birds observable in locations that represent a probable hazard to safe fly operations. This condition requires increased vigilance by all agencies and extreme caution by aircrews.

c. Code Green. Normal bird activity with a low probability of hazard.

7. AIRCRAFT OPERATIONAL PROCEDURES TO REDUCE BASH POTENTIAL

Examples of typical operational changes that should be considered to avoid areas and times of known hazardous bird concentrations, mission permitting are as follows:

1. Raise pattern altitude.

2. Change pattern direction to avoid bird concentrations.

3. Avoid takeoffs/landings at dawn/dusk $\pm$ one (1) hour.

4. Limit or prohibit formation takeoffs and landings.

5. Depart pattern in trail feet AGL.

6. Reschedule local training or transition elsewhere.

7. Raise altitude enroute to low-level or training areas.

8. Minimize time on low-level routes for training requirements.

9. Select low-level routes or training areas based on bird hazard data.

10. Evaluate behavior of birds (soaring, flying to and from a location, etc).

11. Under BASH Code Red permit only full-stop landings and prohibit formation takeoffs.

12. Under BASH Code Yellow limit touch and go's to the minimum required. Low approaches should be limited and only those required should be performed. Pilots should be particularly cognizant of bird activity when on final approach and initiate a go-around immediately if a bird strike is imminent.

8. GUIDELINES TO DECREASE AIRFIELD ATTRACTIVENESS TO BIRDS

Airfield surveys should be done to determine the need for revision in the maintenance of these parcels. The land management section of the Integrated Natural Resources Management Plan outlines these practices in more detail.

1. Grass Height Management - Mowing operations shall maintain a uniform grass height between six (6) and twelve (12) inches (where appropriate). These unimproved lawn areas shall be cut according to the schedule in Attachment J of the Grounds Maintenance Contract. Grass must be cut before it goes to seed to discourage seed-eating birds from utilizing the airfield. Long grass discourages flocking species from entering the airfield because reduced visibility disrupts interflock communication and flock integrity and also prevents predator detection. Grass normally should not exceed 12 inches, as high grass will attract some bird species and rodents which in turn attract raptors.

2. Fertilizing - Selectively stimulate grasses to promote a uniform cover. Fertilizer shall be applied by broadcasting with a mechanical spreader over the area. The University of Maryland Department of Agriculture shall of the analysis and the amount specify the mixture. Watering should be controlled to enhance root production and decrease seed head production.

3. Drainage Ditches - Ditches will be inspected regularly and kept clear of obstructions. Remove obstructions (foreign or vegetation) to water flow in ditches, gutters, catch basins, storm drain curb inlets, and gratings. Open drainage channels are to be free of vegetation. Vegetated channels are to be maintained at a height of 10 - 12 inches. Ditch sides will be maintained as steeply as possible to discourage wading birds and emergent vegetation.

4. Agricultural Outlease - Agricultural-outleasing parcels shall remain consistent with BASH reduction philosophy. Parcels adjacent to runways will be planted with crops that discourage bird activity, such as bird-proof sorghum. Other crops will include corn, soybeans, winter wheat,

barley, and sorghum. All parcels will use Best Management Practices (BMP's) and will use no-till or minimum till practices. Agricultural activities will be done on the weekends or early morning during low flight activity.

5. Removal of Remains from Airfield - Dead birds and animals will be removed from the field to avoid attracting vultures or other birds. These remains will be delivered to the Natural Resources Office (Bldg. 1410).

6. Removal of Dead Vegetation - Dead vegetation such as brush piles, grass clippings, etc., will be removed as soon as possible to avoid providing cover for small animals.

7. Proper Erosion Control Vegetation - Use vegetation that is appropriate to the base and supports BASH reduction philosophy. Do not use plants which produce seeds at heights below 12 inches.

8. Removal of Vegetation - Surveys shall be conducted to determine sites for potential hazards. Trees and shrubs, clumps of brush, and tall weeds shall be removed either by cutting or herbicide. A grinder will be used to eliminate stumps, unless the stumps are next to a structure. In this case herbicides will be applied. Some shrub/brush areas may need to be hand cut to be most efficient.

9. Clear zones - Clear zones are to meet operational standards at all times. Encroachment of trees from "edge creep" shall be eliminated according to Removal of Vegetation (#8). Trees in the clear zone provide harborage for birds.

10. Eliminating Standing Water _ Non-tidal wetlands and a 25 foot vegetated Both state and federal laws and regulations protect buffer around them. Altering wetlands requires permits and mitigation. Standing water must be eliminated to reduce the attractiveness to a variety of animals. The trees harbor large numbers of deer and provide hunting perches for large birds of prey. The wetland areas provide a source of fresh water for all species of wildlife and a feeding area for waterbirds such as ducks, egrets, and herons. The recommended action is to remove all trees and stumps in and around the wetland, then replant with grass. Next install culvert pipes in place of the open drainage and fill over, or partially fill the open drainage to make it deeper and narrower (making it less attractive to waterbirds).

9. BASH PROGRAM PEST MANAGEMENT

Eliminating birds from the airfield and in hangars is done as problems arise. Each hangar or situation is handled differently but with the following guidelines.

1. The first step for deciding the appropriate action is to survey the situation. If hangar personnel call with pest problems, the Natural resources staff will assess the situation, identifying possible entry points and roosting sites of the birds. Based on the information gathered, recommendations will be given for handling it in the most efficient way.

2. The first recommendation should be to bird-proof the building/hangar. Any broken windows, holes in the walls, or insulated doors can create entries for most nuisance birds. Replacing windows, especially in clear stories, is a positive start. Holes found around utility lines provide nesting areas for house sparrows and starlings. Fill these holes with steel wire and putty, a very economical and efficient practice. Insulation on the back of truck doors should be kept in good condition. Small rips allow access to nesting areas. Installing plain curtains on the truck doors will limit bird access. Removal of house sparrows and their nests from signs on the exterior of the building and bird proofing to prevent fixture nesting will reduce the number of sparrows available to move into the hangar.

3. The next step would be to eliminate roosting/-nesting sites. Galvanized wire screen or hardware cloth and plastic netting are adaptable to a wide variety of structural situations.

4. In Hangar # only are toxic perches to be used. Hangar # was built using box joints that create perfect nesting areas for birds, but are difficult for conventional bird exclusion techniques to work. Fenthion is the chemical to be used with these perches.

5. If a pest problem arises after all bird-proofing techniques have been exhausted, the next step is to shoot the birds. Shooting is one of the most selective lethal control methods since non-target species can be avoided and there is no potential for secondary poisoning when shot birds are retrieved. This technique can be safety accomplished in structures using pellet guns. Shooting is most successful after the birds have roosted for the evening. A hand held spotlight is helpful to illuminate birds roosting in secluded areas. Pigeons, starlings, and house sparrows may be shot indoors or outdoors at any time of the year and may be shot over bait or decoys.

Other techniques may become useful with new and unique situations. Some suggestions are as follows:

1. Use high-pressure air or water hoses, if the roosting areas are low enough.
2. Trap and remove birds from the hangar, if areas are accessible.
3. Use toxic bait for indoor pest problem only.
4. Help in the designing stages of construction and consider structures with the support features located on the outside of the building to greatly, reduce bird numbers.
5. Do not use rubber snakes, stuffed owls, lights, loud music, or ultrasound devices. They have been proven inefficient with short-term results.

10. GUIDELINES FOR DISPERSING BIRDS ON THE AIRFIELD

The following information is provided to assist Airfield Facility Division.

1. **Bio-acoustics** are taped distress or alarm calls of actual birds. The equipment required to adequately project these calls include a cassette tape deck and a speaker that can be mounted on the outside of the vehicle. Special care must be taken to play in short intervals to prevent habituation by the birds. Play the tape for 20-30 seconds and then pause briefly. Repeat the procedure several times if necessary. The birds should respond by taking flight or becoming alert. These calls are effective for gulls, blackbirds, starlings, crows, and some shorebirds. If the birds become familiar with the tape, it should be reinforced with pyrotechnics.

2. Pyrotechnics - Pyrotechnics are loud explosive devices, resembling a firecracker, that are launched from assorted firearms. For example, some cartridges are 12-gauge and fired from a 12-gauge shotgun while others are smaller and fired from a pyrotechnic pistol. The cartridges are fired into or above flocks of birds to scare them from the area. Pyrotechnics are to be used in conjunction with bio-acoustics. Playing the tape and launching the cartridges will be done simultaneously.

3. Depredation - Birds must be killed occasionally as a reinforcement of other methods. Domestic pigeons, European starlings, and house sparrows can be killed without a permit. Naval Station has permits* for the depredation of gulls. This technique should be used if pyrotechnics have become ineffective. Shooting the mentioned birds is to be done while the bio-acoustic tape is playing.

4. Ineffective methods - Ultrasound, rubber snakes, stuffed owls, rotating/flashing lights, loud music, and other such devices have been proved ineffective. Driving vehicles through a flock of birds is also an ineffective way of dispersing birds. This technique works temporarily but the bird will circle around and land in the original area.

* Depredation permit must be renewed 30 days prior to expiration of existing permit. Reports are to be filed # for the previous year during which a permit was in force.

11. SPECIFIC SPECIES INFORMATION FOR OUR BASH PROGRAM

1. Gulls - These birds represent the most significant hazard to aircraft worldwide. Due to their omnivorous feeding habits and preference for flat open areas to rest, they are commonly found on airfields. Gulls are most active just after sunrise and before sunset as time to move to and from feeding areas. Maintenance of grass height between 6 and 12 inches is critical in reduction of gull numbers. Even with this in effect gulls may inhabit the airfield particularly during inclement weather. Persistent harassment using bio-acoustics and pyrotechnics is necessary to discourage these birds. Live ammunition can be used to reinforce these techniques, only with current permit. Gulls also become a problem in the location. These birds will follow the watermen at heights around 100 feet. Being alert to the water activities will help prepare pilots for evasive/preventive measures.

2. Waterfowl (ducks, geese, swans) - A distinction must be made between resident and migrating populations. Resident birds are most active at dawn and dusk, moving at low altitudes to and from feeding areas. Avoid flying near ponds or rivers with known waterfowl concentrations during these times. Resident species for Naval Station and surrounding areas include mallards, Black ducks wood ducks, and Canada geese.

Migrating waterfowl are particularly dangerous to flight safety due to the large number and generally higher altitude of the birds. These birds are most active from sunset through midnight, with numbers decreasing in the early morning hours. October and November are most hazardous. Avoidance of flying during the evening hours is generally the safest prevention or using low-level routes.

3. Raptors (hawks, falcons, eagles, vultures) - These birds can be particularly hazardous to aircraft because of their size. Raptors become active during mid-morning and remain aloft until late afternoon. These birds (particularly vultures) use thermals to their advantage to search for prey. Avoid areas with thermal-generating terrain such as landfills and water edges. Removal of dead animals, rodents, and dead vegetation along the airfield will discourage raptors from using the airfield.

4. Blackbirds, grackles, and starlings - These birds can be particularly hazardous because they frequently occur in huge flocks, sometimes in the millions. Blackbirds and starlings are attracted to flat open areas to feed, rest or stage. Maintenance of grass height between 6 and 12 inches is the best means of reducing airfield blackbird and starling numbers.

Other birds may cause occasional strikes but the groups mentioned above create the highest potential threats. Management should be focused on the above species and in turn will assist with other species.

Appendix 7

Data Call Station Required Information

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Property Name and Total Acreage	Naval District Washington Installations: Washington Navy Yard (77.9), Naval Support Facility Suitland (42.35); Naval Support Facility Arlington (31.48), Naval Support Facility Naval Observatory (72.1), and Naval Support Facility Potomac Annex (11.91)
Total Acreage of Developed/Nondeveloped Areas	NSF Potomac Annex—9.8/6.4 NSF Naval Observatory—14/48.5 Washington Navy Yard—42.4/39 NSF Suitland—14.3/26.7 NSF Arlington
Total Acreage of Agricultural Outleases	0
Total Forest Acres	NSF Potomac Annex—1.0 NSF Naval Observatory—14.5 Washington Navy Yard—0.5 NSF Suitland—1.4 NSF Arlington-0
Total Recreation Acres	NSF Potomac Annex—0 NSF Naval Observatory—0.64 Washington Navy Yard—0.43 NSF Suitland—0.18 Naval Support Facility Arlington-0
Number of Federal T&E Species	Not Surveyed
Number and Terms & Conditions for all Biological Opinions	0
Total Number of Candidate Conservation Agreements	0
Open Tasks in INRMP Implementation Table	19
NEPA Documentation Review CATEXs (List by Project)	0
NEPA Documentation Review EAs (List by Project)	0
NEPA Documentation Review EISs (List by Project)	0
NEPA Mitigation Effort	0
BASH Program	N/A
Hunting Program	N/A
Fishing Program	N/A
Invasive Species Survey	NSF Naval Observatory completed in 2010

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Appendix 8

Tree Planting Guidelines

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Appendix 8A

New Tree Planting

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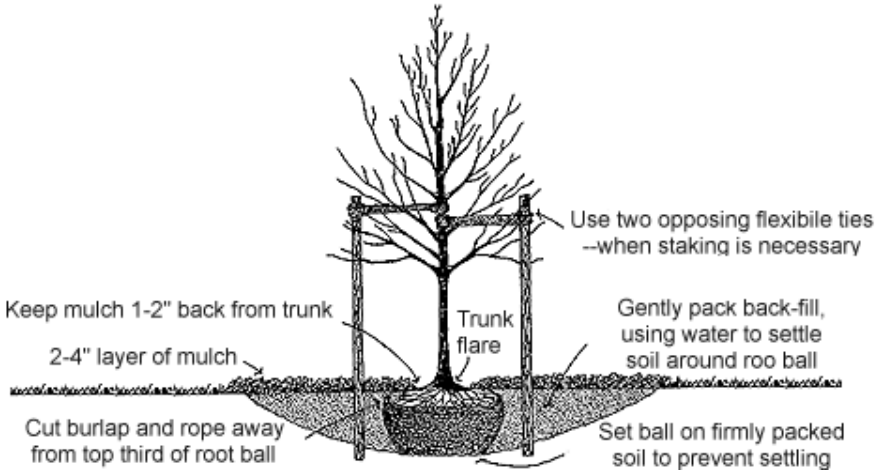
New Tree Planting

The ideal time to plant trees and shrubs is during the dormant season, in the fall after leafdrop or early spring before bud-break. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. *Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.*

If the tree you are planting is balled and burlapped, or bare rooted, it is important to understand that the tree's root system has been reduced by 90-95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit what is known as **transplant shock.** Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow up care will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish in its new location. Carefully follow eight simple steps and you can significantly reduce the stress placed on the plant at the time of planting.

1. **Dig a shallow, broad planting hole.** Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball. It is important to make the hole wide because the tree roots on the newly establishing tree must push through surrounding soil to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
2. **Identify the trunk flare.** The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.
3. **Place the tree at the proper height.** Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and no more. The majority of the roots on the newly planted tree will develop in the top 12" of soil. If the tree is planted too deep, new roots will have difficulty developing due to a lack of oxygen. It is better to plant the tree a little high, 1-2" above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see diagram). To avoid damage when setting the tree in the hole, always lift the tree by the root ball, and never by the trunk.



4. **Straighten the tree in the hole.** Before you begin backfilling have someone view the tree from several directions to confirm the tree is straight. Once you begin backfilling it is difficult to reposition.

5. **Fill the hole, gently but firmly.** Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped, cut and remove the string and wire from around the trunk and top 1/3 of the root ball (see diagram). Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.

6. **Stake the tree, if necessary.** If the tree is grown and dug properly at the nursery, staking for support is not necessary in most home landscape situations. Studies have shown that trees will establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth. Leave protective staking in place as long as necessary.

7. **Mulch the base of the tree.** Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, protect against harsh soil temperatures, both hot and cold, and reduces competition from grass and weeds. Some good choices are leaf litter, pine straw, shredded bark, peat moss, or wood chips. A two to four inch layer is ideal. More that four inches may cause a problem with gas exchange. When placing mulch, care should be taken so that the actual trunk of the tree is not covered. This may cause decay of the living bark at the base of the tree. A mulch-free area, one to two inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

8. **Follow-up care.** Keep the soil moist but not soaked; overwatering will cause leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less frequent watering. Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting, and wait to begin necessary corrective pruning until after a full season of growth in the new location.

Source: International Society of Arboriculture at http://www.isa-arbor.com/consumer/planting.htm

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Appendix 8B

Bare-Root Planting Guidelines

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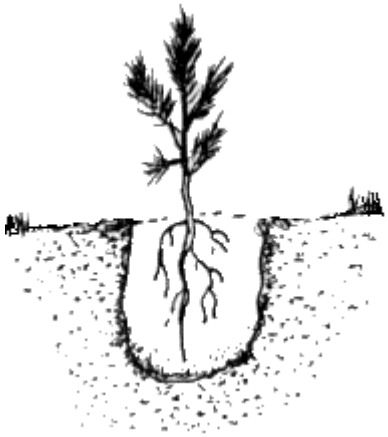
How to Plant Bare-Root Trees

1. It is best to plant bare-root trees immediately, in order to keep the fragile roots from drying out. If you can't plant because of weather or soil conditions, store the trees in a cool place and keep the roots moist.

2. Unpack tree and soak in water 3 to 6 hours. Do not plant with packing materials attached to roots, and do not allow roots to dry out.

3. Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a three-foot circular area. To aid root growth, turn soil in an area up to 3 feet in diameter.

4. Plant the tree at the same depth it stood in the nursery, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add soil amendments.



5. Shovel in the remaining soil. It should be firmly, but not tightly packed with your heel. Construct a water-holding basin around the tree. Give the tree plenty of water.

6. After the water has soaked in, place a 2-inch deep protective mulch area 3 feet in diameter around the base of the tree (but not touching the trunk).

7. Water the tree generously every week or 10 days during the first year of establishment.

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Appendix 8C

Dibble Bar Planting Guidelines

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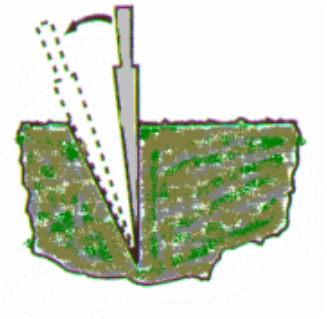
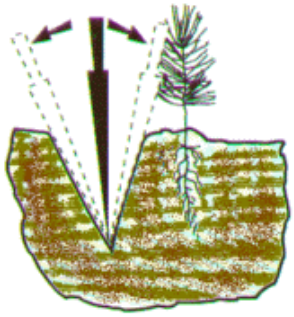
How to Plant with a Dibble Bar



1. Push the blade vertically into the soil then pull the handle toward you to open the hole.

2. Set the seedling 1 to 3 inches deeper than the nursery depth with the roots straight.



3. Push the blade into the soil just behind the planting hole then pull the handle back to close the bottom of the hole. Push the handle forward to close the top of the hole.

4. Pack the soil firmly with your heel.

Source: South Carolina Forestry Commission at www.state.sc.us/forest/refplant.htm

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Appendix 8D

Recognizing Hazardous Trees

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Recognizing Hazardous Trees

Hazardous Trees & Utility Lines. Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages, surges, fires and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

Tree Hazard Checklist

Consider these questions . . .

- Are there large dead branches in the tree?
- Are there detached branches hanging in the tree?
- Does the tree have cavities or rotten wood along the trunk or in major branches?
- Are mushrooms present at the base of the tree?
- Are there cracks or splits in the trunk or where branches are attached?
- Have any branches fallen from the tree?
- Have adjacent trees fallen over or died?
- Has the trunk developed a strong lean?
- Do many of the major branches arise from one point on the trunk?
- Have the roots been broken off, injured or damaged by lowering the soil level, installing pavement, repairing sidewalks or digging trenches?
- Has the site recently been changed by construction, raising the soil level or installing lawns?
- Have the leaves prematurely developed an unusual color or size?
- Have trees in adjacent wooded areas been removed?
- Has the tree been topped or otherwise heavily pruned?

Managing Tree Hazards

One of these treatments may help make your tree safer. Reducing the risk associated with hazardous trees can take many forms.

- **Prune the tree**. Remove the defective branches of the tree. Since in appropriate pruning may also weaken a tree,
- **Provide routine care**. Mature trees need routine care in the form of water, fertilizer (in some cases), mulch and pruning as dictated by the season and their structure.
- A number of treatments are best done by a Certified Arborist
- **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.
- **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

Source: International Society of Arboriculture at *http://www.isa-arbor.com/consumer/hazards.html*

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Appendix 8E

Pruning Guidelines

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Pruning Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, it will shorten the tree's life.

Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure.

When to Prune

Most routine pruning to remove weak, diseased or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree.

A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.

Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

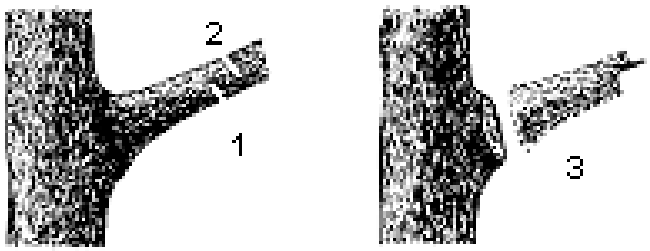
Making Proper Pruning Cuts to Mature Trees

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar (see figure).

On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar.

If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12-18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb leaving the 12-18 inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark

How Much Should be Pruned?



Use the 3-cut method to remove a large limb.

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. A widely accepted rule of thumb is never to remove more than one fourth of a tree's leaf bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large, mature trees is usually limited to the removal of dead or potentially hazardous limbs.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure, and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, then only a thin coating of a non-toxic material should be applied.

Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches. Save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances, which stimulate new root production. Unpruned trees establish faster, with a stronger root system than trees pruned at the time of planting.

Source: International Society Arboriculture at *http://www.isa-arbor.com/consumer/pruning.html*

Appendix 9

Native Vegetation for the NDW Installations

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Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Forbs/Herbs									
Boneset	*Eupatorium* spp.	1'-4'	√	√	√		√	√	reclamation, wildflower meadow
Butterflyweed	*Asclepias tuberosa*	1'-3'	√					√	reclamation, wildflower meadow
Common Milkweed	*Asclepias syriaca*	1'-2'		√	√		√	√	reclamation, wildflower meadow
Goat's Rue	*Tephrosia virginiana*	1'-2'	√	√				√	reclamation
Goldenrod	*Solidago* spp.	2'-6'	√	√	√		√	√	reclamation, wildflower meadow
Late Purple Aster	*Symphyotrichum patens*	1'-4'	√	√			√	√	reclamation, wildflower meadow
New York Aster	*Symphyotrichum novi-belgii*	1'-4'		√	√		√	√	reclamation, wildflower meadow
Round-head Bushclover	*Lespedeza capitata*	2'-4'	√					√	reclamation
Sunflower	*Helianthus* spp.	1'-2'	√	√			√	√	reclamation, wildflower meadow
Swamp Milkweed	*Asclepias incarnata*	1'-2'			√		√	√	reclamation, wildflower meadow
Threadleaf Coreopsis	*Coreopsis verticillata*	2'	√				√	√	reclamation, wildflower meadow
Wand-like Bushclover	*Lespedeza intermedia*	1'-3'	√	√			√	√	reclamation
Wild Bergamot	*Monarda fistulosa*	<1'-3'	√					√	reclamation, wildflower meadow
Grasses									
Big Bluestem	*Andropogon gerardii*	6'-7'		√	√		√	√	native warm-season grassland
Broomsedge	*Andropogon virginicus*	1'-3'	√	√			√	√	native warm-season grassland

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Bushy Broomsedge	*Andropogon glomeratus*	1.5' -5'		√	√		√	√	native warm-season grassland
Coastal Panicgrass	*Panicum amarum* var. *amarulum*	3'-5'	√	√			√	√	native warm-season grassland
Dropseeds	*Sporobolus* spp.		√	√			√	√	native warm-season grassland
Eastern Gamma Grass	*Tripsacum dactyloides*		√	√			√	√	native warm-season grassland
Indian Grass	*Sorghastrum nutans*	5'-6'	√	√			√	√	native warm-season grassland
Little Bluestem	*Schizachyrium scoparium*	2'-3'	√	√			√	√	native warm-season grassland
Purple Lovegrass	*Eragrostis spectabilis*	1'-3'	√	√			√	√	native warm-season grassland
Manna Grass	*Glyceria* spp.			√	√		√	√	native warm-season grassland
Side-oats Grama	*Bouteloua curtipendula*			√			√		native warm-season grassland
Switchgrass	*Panicum virgatum*	3'-5'	√	√	√		√	√	native warm-season grassland
Wildrye	*Elymus virginicus*			√	√		√	√	native cool-season grassland
Wildrye	*Elymus canadensis*			√	√		√	√	native cool-season grassland
Shrubs									
Blueberry, Highbush	*Vaccinium corymbosum*	2'-12'		√	√	√	√		riparian buffer
Blueberry, Lowbush	*Vaccinium pallidum*	1'-1.5'	√	√		√	√		reclamation, wildlife
Buttonbush	*Cephalanthus occidentalis*	3'-7'			√	√	√		riparian buffer
Chokeberry, Black	*Aronia melanocarpa*	3'-10'		√	√		√		riparian buffer
Chokeberry, Red	*Aronia arbutifolia*	3'-10'	√	√	√		√	√	riparian buffer, reclamation
Dogwood, Gray	*Cornus racemosa*	10'-15'	√	√	√	√	√	√	riparian buffer, reclamation
Dogwood, Silky	*Cornus amomum*	6'-10'		√	√		√		riparian buffer
Hazel Alder	*Alnus serrulata*	6'-15'		√	√	√	√		riparian buffer
Hazelnut	*Corylus americana*	6'-10'		√	√		√	√	reclamation, wildlife
Inkberry	*Ilex glabrs*	2'-10'		√	√	√	√		riparian buffer, landscape
Mountain Laurel	*Kalmia latifolia*	3'-10'	√	√		√	√		landscape
Serviceberry	*Amelanchier canadensis*	5'-15'		√					landscape, wildlife
Swamp Azalea	*Rhododendron viscosum*	3'-8'		√	√	√	√		riparian buffer

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Sweet Pepperbush	*Clethra alnifolia*	3'-8'		√	√	√	√	√	riparian buffer, landscape
Viburnum, Arrowwood	*Viburnum dentatum*	4'-8'		√	√		√	√	riparian buffer, landscape
Viburnum, Blackhaw	*Viburnum prunifolium*	8'-15'	√	√	√	√	√		landscape, reclamation
Virginia Sweetspire	*Itea virginica*	3'-5'		√	√	√	√	√	riparian buffer, landscape
Wax Myrtle	*Morella (Myrica) cerifera*	2'-6'		√	√		√	√	riparian buffer
Winterberry	*Ilex verticillata*	4'-12'		√	√		√	√	riparian buffer
Small Trees									
Dogwood	*Cornus florida*	20'-30'		√			√	√	landscape
Hawthorn	*Crataegus* spp.	10'-20'		√			√	√	landscape
Sassafras	*Sassafras albidum*	20'-40'		√			√	√	landscape, reclamation
Serviceberry	*Amelanchier arborea*	15'-25'		√			√	√	landscape, wildlife
Sweetbay Magnolia	*Magnolia virginiana*	15'-30'		√	√	√	√		riparian buffer, landscape
Medium to Large Trees									
America Holly	*Ilex opaca*	40'-50'		√	√		√	√	landscape, wildlife
Ash, Green	*Fraxinus americana*	50'-80'		√	√			√	riparian buffer, landscape
Ash, White	*Fraxinus pennsylvanica*	50'-60'		√	√			√	riparian buffer, landscape
Black Locust	*Robinia pseudoacacia*	30'-50'	√	√			√	√	reclamation
Black Willow	*Salix nigra*	30'-50'		√	√	√	√		riparian buffer
Blackgum	*Nyssa sylvatica*	50'-70'		√	√		√	√	riparian buffer, landscape, wildlife
Eastern Red Cedar	*Juniperus virginiana*	45'-65'	√	√	√		√	√	visual screen
Hackberry	*Celtis occidentalis*	40'-60'		√	√		√	√	riparian buffer, landscape
Oak, Black	*Quercus* velutina	65'-80'	√	√	√		√	√	landscape, reforestation
Oak, Cherrybark	*Quercus pagoda*	70'-80'		√	√		√	√	landscape, reforestation,
Oak, Chestnut	*Quercus prinus*	65'-80'	√				√	√	reforestation, reclamation
Oak, Pin	*Quercus palustris*	60'-70'		√	√		√	√	riparian buffer, landscape

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Oak, Southern Red	*Quercus falcata*	70'-80'	√	√			√	√	landscape, reforestation
Oak, White	*Quercus alba*	70'-80'		√			√	√	landscape, reforestation
Oak, Willow	*Quercus phellos*	40'-60'	√	√	√		√	√	landscape, riparian buffer,
Persimmon	*Diospyros virginiana*	30'-40'	√	√			√	√	reclamation, wildlife
Pine Loblolly	*Pinus taeda*	80'-100'	√	√	√		√	√	landscape, reforestation
Pine, Shortleaf	*Pinus echinata*	80'-100'	√	√			√	√	reforestation
Pine, Virginia	*Pinus virginiana*	30'-50'	√	√			√	√	reclamation
Red Maple	*Acer rubrum*	50'-80'	√	√	√		√	√	riparian buffer, landscape
Red Mulberry	*Morus rubra*	30'-40'		√			√	√	wildlife
River Birch	*Betula nigra*	40'-70'		√	√	√	√		riparian buffer, landscape
Sycamore	*Platanus occidentalis*	75'-120'		√	√		√	√	riparian buffer, landscape
Yellow Poplar	*Liriodendron tulipifera*	100'-150'		√			√	√	landscape, reforestation

Appendix 10

Deer Population Survey Methodology

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Introduction

The recommended methodology for estimating deer density at U.S. Naval Observatory is outlined below. This method involves counting the amount of fecal pellet groups deposited over a known period of time within a fixed area (Mayhew 2003; also see reference list). The length of time over which pellets were deposited (deposition period), the number of pellet groups deposited, and the number of pellet groups deposited per deer per day (deposition rate) are used to calculate a population density index (Mayhew 2003). The persistence of pellet groups gives this method an advantage over other methods of population density estimation (Eberhardt and Van Etten 1956). Precautions against introducing bias into the estimations include conducting surveys as early as possible after leaf fall (if snow accumulation is not an issue) or after the last frost, training surveyors, and using a second trained surveyor as quality assurance (Eberhardt and VanEtten 1956).

Assumptions of this methodology are summarized from Eberhardt and VanEtten 1956 and PDCNR:

1. Average deposition rate = 12 pellet groups per day per deer;
2. Counts made in winter/spring will include only pellet groups deposited since last leaf fall and that pellets deposited prior to leaf fall will be identifiable as such. Also, that pellets will persist from fall-spring;
3. All pellet groups are correctly identified and none are missed;
4. That 1/10 acre plot is an efficient sampling unit; and
5. A valid estimate of sampling error is obtained, although this is dependent on statistical theory and will not be investigated in detail for this methodology.

Materials

This methodology is straightforward and requires few, inexpensive pieces of field equipment. Required materials include: 10 stakes with a hook in the top (to which the rope will be attached), a length of rope cut to 11 feet and 9 inches, survey flags, and data forms. All but the data forms are available at local home supply stores or through Forestry Suppliers, Inc. (http://www.forestry-suppliers.com).

Sampling Methods

Ten plots, with a radius of 11’9” (1/100 acre), should be distributed throughout the forest and open areas at the site. Figure 1-Appendix 10 displays the suggested location and GPS coordinates of 10 semi-randomly placed plots to estimate deer population in the forest and forested edges of U.S. Naval Observatory. In this survey methodology, fecal pellet groups are

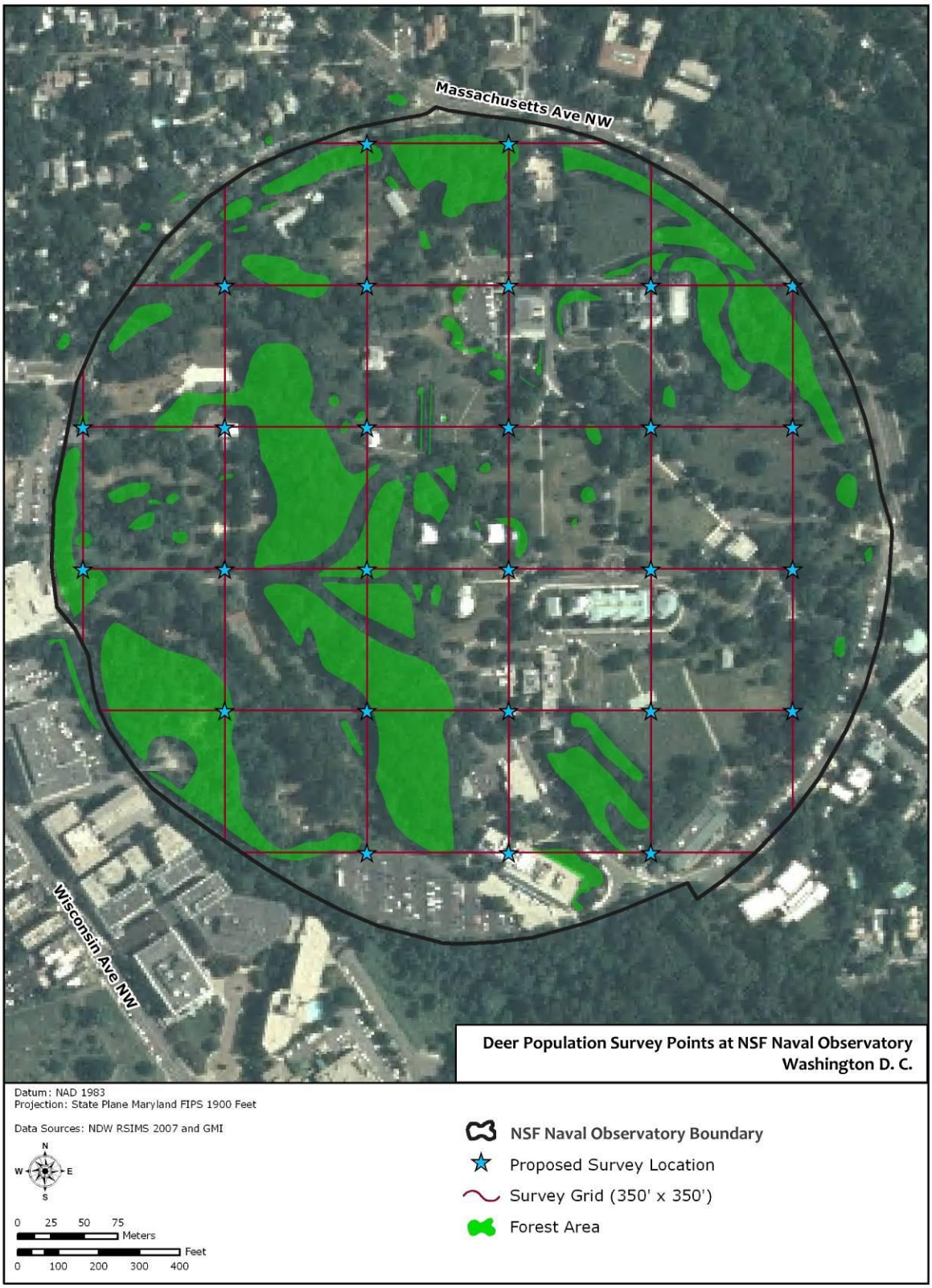

Figure A10-1. Deer Population Survey Points.

counted as a way to estimate population density; more information on this method can be found in the references listed below. Deer usually leave droppings where they are feeding (PDCNR No Date), and fecal pellet group counts are widely used to determine animal density in a given area (Campbell et al. 2004). A pellet group is defined as $\geq$ 5 pellets (CVNP 2007) and on average a deer will deposit approximately 12 pellet groups per day (PDCNR No Date). During the survey, other deer sign including trails, tracks, and vegetation browse should be noted.

The survey can be conducted anytime between December and April, provided snow cover is not a problem, but should be finished before spring growth begins (Marques et al. 2001; Campbell et al. 2004). Ideally, two surveys should be done per year to provide two estimates of deer population density and a measure of quality control. For the first survey, in winter/spring (Jan 15), the survey plots should be permanently marked with a center stake. Attach the 11'9" rope to the center stake and place a survey flag at the outer edge of the plot circle where you start counting so as not to duplicate the count. The number of both new and old pellet groups should be counted within the 11'9" radius plot, and other deer sign should be recorded on field data sheets. If more than half of a pellet group on the edge of the plot is inside the plot, it is counted. However, only *new* pellet groups will be used in the calculations (old pellet groups will be used as other indicators of deer presence). After reading the plot, all pellet groupings should be removed from the plot, and the rope and survey flag should be removed for use at the next plot. Sixty days later (Mar 15), pellet groups occurring on the plot should be recounted using the same methodology, and the pellets left in place. Be sure to note the correct dates, as the time between counts (sampling interval) is very important to calculations. Sampling should take approximately 1 hour per plot to count pellet groupings, observe and note other deer sign and describe the vegetation / habitat type in which the plot is located.

Deer defecate in clusters, usually all in one spot, although uncommonly they may be spread out over a small area (PDCNR No Date). Deer pellets are oblong and usually have a tip at one end (CVNP 2007). Rabbit pellets may be confused, but are generally lighter in color and are round with no tip or point (CVNP 2007) and are rarely in clusters (PDCNR No Date). New pellet clusters are distinguished by a darker, shiny appearance and perhaps have recognizable bits of vegetation. Since the survey is taking place after leaf off, they should also be located on top of the fallen leaves. Old clusters are lighter in color, look dry and cracked and may be located under leaves.

Calculating Deer Density

Calculation of deer density is accomplished with the following four equations (from PDCNR):

1. $\frac{\text{total \# of pellet groups}}{\text{total \# of plots}} \text{ X } \frac{\text{100 plots}}{\text{1 acre}} = \text{\# pellet groups per acre (A)}$

2. $\frac{\text{\# pellet groups per acre (A)}}{\text{12 (pellet groups per deer per day)}} = \text{\# deer per day per acre (B)}$

3. \# deer per day per acre (B) X 61 (\# acres in study area) = \# deer per day in study area (C)

4. $\frac{\text{\# deer per day in study area (C)}}{\text{sampling interval}} = \text{population density in study area}$

Notes on calculations:
Total # of pellet groups is the total of new pellet groups across all plots
Total # of plots should be 10 if the above methodology is followed
12 pellet groups per day per deer is the average outlined in PDCNR
Acres in study area is approximately 61 (NSF NAVAL OBSERVATORY total of 75.3 – 14 acres of buildings and roads = 61.3)
Sampling interval is number of days between sampling

Deer Management References

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Appendix 11

Regulatory Coordination Letters

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

March 3, 2010

Ms. Maria Vargas
NEPA & Natural Resources Program Manager
NAVFAC Washington
Public Works Department
1013 O St. SE, Bldg 166, Suite 100N
Washington Navy Yard, DC 20374

Re: Integrated Natural Resources Management Plan Update for Naval District Washington Installations, Maryland, District of Columbia, and Virginia.

Dear Ms. Vargas,

The U.S. Fish and Wildlife Service (Service) has reviewed your pre-Final Naval District Washington, Update of Integrated Natural Resources Management Plan (INRMP), dated July 2009. This INRMP covers the installations of the Washington Navy Yard, Anacostia Annex, Potomac Annex, National Maritime Intelligence Center, Arlington Service Center, and the U.S. Naval Observatory, located within Virginia, the District of Columbia, and Maryland.

General Comments

The Service notes that the majority of these installations are developed urban lands, with limited opportunities to enhance natural landscapes. The Naval Observatory does appear to have some mature forest areas which should continue to be protected and enhanced, especially due to its proximity (1/4 mile) to the Rock Creek Park habitat corridor.

The Service encourages the Navy to continue to seek innovative ways to reduce stormwater runoff and its concurrent contaminants from entering the Anacostia and Potomac Rivers. The Navy should consider complying with the new District of Columbia law banning the use of coal-tar sealants on parking lots and other surfaces. Greater use of native vegetated buffers for runoff should be explored.

Specific Comments

Page 4-1. The document states that, "Anacostia Annex and NMIC have stormwater management ponds that may provide landing and loading areas for geese, which may become a nuisance." Then the document refers to the nuisance wildlife management in Section 4.C.4, which contains no reference to geese. We would like you to clarify the current resident Canada goose issue at these ponds, and proposed clear management actions to control resident Canada goose populations, whether they occur now or in future years under this INRMP.

Page 4-7. The Service's revisions to the list of bird species protected under the Migratory Bird Treaty Act was published on March 1, 2010, (*Federal Register* 75 (1 March 2010): 9282 – 9314). Total number of migratory birds is now 1007 species.

Conclusion

The Service appreciates the opportunity to assist the Navy in the management of our Nation's wildlife and the habitats upon which they depend. If you have any questions or concerns regarding our comments, please contact Ms. Janet Norman at Janet_Norman@fws.gov or (410) 573-4533.

Sincerely,

Leopoldo Miranda
Supervisor

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Joseph P. Gill, Deputy Secretary

April 13, 2010

Maria Vargas
NAVFAC Washington
Public Works Department
1013 O Street SE, Bldg 166, Suite 100N
Washington Navy Yard, DC 20374

RE: Update of INRMP

Dear Maria:

We have reviewed the updated Integrated Natural Resources Management Plan (INRMP) for Naval District Washington, as requested. We appreciate the opportunity to participate in the review of this updated plan. We only reviewed the plan for the one property within the State of Maryland, which is the National Maritime Intelligence Center in Suitland. That facility is entirely urban with very little natural resources on the property.

Given the very limited natural resources on the facility and limited opportunity for natural resources management there, we have no recommendations or suggestions for improving the INRMP as drafted. However, we will point out that deer and beavers are classified as game species by the State of Maryland and are therefore protected species with established hunting or trapping seasons. The section on Nuisance Animal Management (page 4-3) states that they are not protected by federal or state law. That is incorrect for these two species.

Again, thank you for the opportunity to review the INRMP.

Sincerely,

Glenn D. Therres

Glenn D. Therres, Associate Director
Wildlife and Heritage Service

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Department of the Environment

Fisheries and Wildlife Division

September 16, 2009

MEMORANDUM:

TO: Deborah Thomas, Deputy Director
Office of Natural Resource

FROM: Bryan King, Associate Director
Fisheries and Wildlife Division

SUBJECT: Integrated Natural Resources Management Plan Update for Naval District Washington Installations. Contract Number N62470-02-D-9997, Task Order 0095.

The DDOE Fisheries and Wildlife Division has reviewed the above mentioned document for relevant wildlife subject matter. Our consolidated comments are attached for use in a consolidated response by the DDOE for submission to the NAVFAC Washington, Public Works Department. Reviews are still required by the Watershed Protection and/or Water Quality Divisions and the legal staff of DDOE. The document requires the signature of the Director, District Department of the Environment (see signature page).

To successfully and responsibility carry out the proposed studies, inventories and activities spelled out in the referenced resource plan, a cooperative effort is necessary between local and state and federal natural resource agencies. The DDOE Fisheries and Wildlife Division, has the capacity to provide relevant information and/or to assist in the implementation of many of the proposed activities. To enhance our knowledge of the status of local species and suitable habitat for wildlife species within the District of Columbia, we are eager to participate in and/or provide assistance to the Washington Division, Naval Facilities on their federal lands in Washington, DC.

We can make available to the Washington Division, Naval Facilities (1) information on rare, threatened and endangered (RTE) species in the District of Columbia; (2) limited assistance with field assessments and surveys for invasive plants, RTE species, habitat suitability, amphibians, birds, mammals, reptiles, and invertebrates. The Division can also provide suggestions and/or guidance for best management applications to control nuisance wildlife and invasive vegetation and provide recommendations for suitable native plantings to benefit both the human populations and wildlife populations.

Vargas, Maria A CIV NAVFAC Washington

From: Ossi, Damien (DDOE) [damien.ossi@dc.gov]
Sent: Wednesday, January 13, 2010 7:21 AM
To: Vargas, Maria A CIV NAVFAC Washington
Subject: RE: NDW INRMP

Hi Maria,

Uh oh, I thought it had made its way back to you already.

I reviewed it and made comments over the summer and sent it around to the people in my division, and then we sent it up the line to be reviewed by other divisions (Water Quality, Watershed Protection). I am going to go around to these divisions and find out who has it. My boss said that he saw our director's signature on it, so he thought it was being sent back to you a few months ago.

To summarize the comments that my division made: we think it's a good plan and offered to assist you with any wildlife surveys or invasive plant management that you are performing. Our funding comes from the US Fish & Wildlife Service and it permits us to do wildlife inventory and management on any land in the District - provided that it is decent habitat and that we have permission from the landowner. So we want to and should be able to help you.

I started looking for the document yesterday, and I'll continue the search today. Sorry it has taken so long!

Damien

Damien P. Ossi
Wildlife Biologist
Fisheries and Wildlife Division
D.C. Dept. of Environment
51 N St. NE, Fifth Floor
Washington, DC 20002
202-741-0840
damien.ossi@dc.gov

-----Original Message-----
From: Vargas, Maria A CIV NAVFAC Washington [mailto:maria.vargas@navy.mil]
Sent: Tuesday, January 12, 2010 1:27 PM
To: Ossi, Damien (DDOE)
Cc: Barrett, Susan CIV NAVFAC Washington
Subject: NDW INRMP

Hi Damien,

Happy New Year. Wanted to touch base with you about the review of Navy's NDW INRMP. Does your agency have any comments? We are in a tight deadline to get this completed. Please let me know. Thanks.

V/r,

Maria Vargas
NEPA & Natural Resources
NAVFAC Washington
Public Works Department