Integrated Natural Resources Management Plan
Naval Support Activity Bethesda
Bethesda, Maryland

Final
September 2015

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

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Contract #: # N40080-12-D-0350, Delivery Order 0010

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INTERGATED NATURAL RESOURCES MANAGEMENT PLAN
NAVAL SUPPORT ACTIVITY BETHESDA

APPROVAL

This Integrated Natural Resources Management Plan fulfills the requirements for an INRMP in accordance with 16 U.S. Code §670a et seq. - Sikes Act, as amended; Department of Defense Instruction 4715.03 – Natural Resources Conservation Program; Department of Defense Manual 4715.03 – Integrated Natural Resources Management Plan (INRMP) Implementation Manual; Chief of Naval Operations Operating Instruction 5090.1D – Environmental Readiness Program, and Chief of Naval Operations Operating Manual 5090.1 – Environmental Readiness Program Manual. This document was prepared and reviewed in coordination with the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service, and the head of the Maryland Department of Natural Resources in accordance with the 2013 Memorandum of Understanding for a Cooperative Integrated Natural Resources Management Program on Military Installations.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

Approving Official – Naval Support Activity Bethesda

M. L. Jones
Captain, U.S. Navy
Commanding Officer
Naval Support Activity Bethesda

Date

Susan Paul
Installation Environmental Program Director
Naval Facilities Engineering Command Washington
Naval Support Activity Bethesda
Public Works Department

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Natural Resources Program Manager
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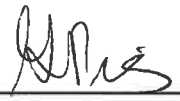

7/21/15
Date

Genevieve LaRouche
Field Supervisor
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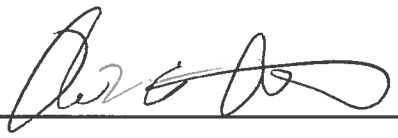

5/30/15

Paul Peditto
Maryland Department of Natural Resources,
Wildlife and Heritage Service

Date

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EXECUTIVE SUMMARY

The Department of Defense (DoD) manages approximately 25 million acres of land in the United States. Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP). This INRMP was prepared for Naval Support Activity (NSA) Bethesda in accordance with 16 U.S. Code (USC) §670a et seq. – Sikes Act, DoD Instruction 4715.03 – Natural Resources Conservation Program; Department of Defense Manual 4715.03 – Integrated Natural Resources Management Plan (INRMP) Implementation Manual; Chief of Naval Operations Operating Instruction 5090.1D – Environmental Readiness Program, 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 consistency with the installation's military mission and to support "no net loss" in military mission capability for the installation lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on NSA Bethesda.

In accordance with the Sikes Act, as amended, 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 head of the Maryland Department of Natural Resources (MDNR). Because of this coordination effort, the INRMP reflects the mutual agreement of these parties concerning conservation, protection, and management of flora and fauna. Future involvement of the state and federal wildlife agencies will ensure continued mutual agreement and cooperation in managing the natural resources at NSA Bethesda. 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 Navy Conservation Website.

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

- Urban Forest and Landscape Management
- Wetlands and Floodplain Management
- Soil and Water Management
- Fish and Wildlife Management
- Migratory Bird Management
- Rare, Threatened, and Endangered Species Management

- Vegetation and Invasive Species Management
- Outdoor Recreation and Environmental Awareness

The management actions and projects identified for NSA Bethesda are intended to help the Installation Commanding Officer manage natural resources effectively, ensure installation lands remain available and in good condition, support the military mission, and 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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1.0 OVERVIEW

1.1 Authority and Background

1.1.1 Purpose

In accordance with the 16 United States Code (USC) §670a et seq. – Sikes Act, as amended; Department of Defense Instruction (DoDI) 4715.03 – Natural Resources Conservation Program; Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1D – Environmental Readiness Program; and Chief of Naval Operations Operating Manual OPNAV M -5090.1 – Environmental Readiness Program Manual, the Department of the Navy (DoN) is required to implement and maintain a balanced and integrated program for the management of natural resources. To facilitate the natural resources program, Naval Support Activity Bethesda (NSA Bethesda) must prepare and implement an Integrated Natural Resources Management Plan (INRMP). The purpose of this INRMP is to ensure consistency with the installation's military mission and to support "no net loss" in military mission capability for the installation lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on NSA Bethesda. In accordance with Department of Defense (DoD) policy on natural resources conservation programs, this INRMP must work to guarantee DoD's continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of natural resources and the ecosystem services they provide (DoDI 4715.03). The INRMP must also ensure the natural resources conservation program and military operations are integrated and consistent with Navy policy on stewardship and all legal requirements concerning natural resources.

1.1.2 Authority

The DoDI 4715.03, DoDM 4715.03, OPNAVINST 5090.1D, OPNAV M-5090.1, 32 Code of Federal Regulations (CFR) Part 190 – DoD Natural Resources Management Program), and 16 USC §670a et seq. (Sikes Act), as amended, provides much of the legal authority for management of wildlife and natural resources on military lands and are the main authorities for the development and implementation of the INRMP at NSA Bethesda.

1.2 Scope

Section 101(a)(1)(B) of the Sikes Act requires that each Military Department prepare and implement an INRMP, unless the Secretary of Defense determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate. The scope of this INRMP is to address natural resources management on those lands and near-shore areas that are:

- Owned by the United States 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 on the installation and occupied by non-DoD entities.

The Sikes Act further requires, to the extent appropriate and applicable, the INRMP provide for:

- Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation,
- Fish and wildlife habitat enhancement or modifications,
- Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants,
- Integration of, and consistency among the various activities conducted under the plan,
- Establishment of specific natural resources management objectives and time frames for proposed actions,
- Sustained use by the public of natural resources to the extent such use is consistent with the needs of fish and wildlife management and subject to installation safety and security requirements,
- Enforcement of natural resources laws and regulations,
- No net loss in the capability of military lands to support the military mission of the installation, and
- Such other activities as the Secretary of the military department determines appropriate.

This INRMP is primarily concerned with integrating natural resources management within the undeveloped, natural areas at NSA Bethesda with the natural resource issues in developed areas such as the medical support, base support, research and training, airfield operations, supply and storage, and recreational areas.

1.3 Responsibilities

1.3.1 Internal INRMP Stakeholders

The responsibility for the development, review, revision, and implementation of INRMPs is shared by several command elements and other internal Navy stakeholders. The roles and responsibilities for Navy natural resources management are fully described in OPNAVINST 5090.1D and in the Navy guidance for INRMP development and implementation (U.S. Navy 2006). A brief summary of responsibilities for natural resources management at NSA Bethesda follows.

The Chief of Naval Operations (CNO) serves as the principal leader to provide policy, guidance, and resources for the development, revision, and implementation of INRMPs and related National Environment Policy Act (NEPA) documentation. CNO also represents the Navy on issues and resolves high-level conflicts regarding development and implementation of INRMPs.

The Commander, Navy Installation Command (CNIC) has overall shore installation management responsibility and authority as the Budget Submitting Office for installation support and the Navy point of contact for installation policy and program execution oversight (CNIC n.d.). CNIC must ensure the programming of resources necessary to maintain and implement INRMPs; participate in the development and revision of INRMPs; endorse INRMPs and promote and coordinate their implementation, and evaluate and validate Program Objectives Memorandum (POM) submittals and other requests for funds for natural resources projects.

Naval Facilities Engineering Command (NAVFAC) Washington is the regional facilities engineering systems command and supports the mission of CNIC with technical authority, project management, and contracts management as requested. With specific regard to this INRMP, NAVFAC Washington facilitates agency review and concurrence of the INRMP and related NEPA documentation. NAVFAC Washington reviews and signs the INRMP to ensure technical sufficiency and also provides technical oversight for the management activities in the INRMP.

The NSA Bethesda Commanding Officer must ensure preparation, completion, and implementation of the INRMP and should systematically apply conservation practices set forth in the plan. It is his/her responsibility to act as steward of installation natural resources and integrate natural resources requirements into the day-to-day decision-making process; involve appropriate operational and training commands in the INRMP review process to ensure no net loss of military mission; and endorse this INRMP via Commanding Officer signature.

The natural resources program is in the Environmental Division under the jurisdiction of the NAVFAC Washington Public Works Department (PWD). The NAVFAC PWD Bethesda Natural Resources Program Manager is responsible for identifying issues and concerns by assessing current programs and evaluating the status and trends of natural resources. He/she is primarily responsible for implementing this INRMP and coordinating with other personnel and tenants on the installation.

Other important installation stakeholders include Facility Planning, the Family Readiness Division and Navy Morale, Welfare and Recreation (MWR) Division, and Inpatient Warrior, the Defense Health Agency (DHA), and Family Liaison Office (IWFLO) who have been invited to participate in development, review and revision of the INRMP to ensure goals, objectives and actions are in line with mission requirements, and to identify potential project conflicts or opportunities for cooperative program implementation.

1.3.2 External INRMP Stakeholders

External stakeholders are non-DoD entities that have a vested interest in how the natural resources at NSA Bethesda are managed. As such, external stakeholders have been included in the natural resources planning process and have had the opportunity to provide technical and/or regulatory input during the development of this INRMP and in its annual reviews.

Under the Sikes Act, new INRMPs and significant changes to existing INRMPs are required to be developed in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the appropriate state fish and wildlife agencies, and be made available to the public for review. The USFWS is the principal federal agency for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats and has responsibility for the enforcement of federal wildlife protection laws such as the Endangered Species Act (ESA) and Migratory Bird Treaty Act (MBTA).

The Maryland Department of Natural Resources (MDNR) is the lead fish and wildlife agency in Maryland. The MDNR Wildlife and Heritage Service is responsible for conserving Maryland's wildlife, plants, and the natural communities. As such, they manage the health and recreational use of the state's wildlife, including the conservation of rare plants and animals under the coordination of the Natural Heritage Program, and the management of game species in the state.

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 and MDNR agree to 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 reviews be conducted in coordination with the Sikes Act partners on an annual basis. Although mutual agreement is the goal with respect to the entire INRMP, it is only required with respect to fish and wildlife management elements of the plan. No element of the Sikes Act is intended to either enlarge or diminish the existing responsibility and authority of the USFWS or state fish and wildlife agencies concerning natural resources management on military lands.

Maryland Department of the Environment (MDE) is another state regulatory agency that has a vested interest in some aspects of natural resources management at NSA Bethesda and has been provided an Environmental Assessment (EA) of the INRMP for review under the NEPA process. In Maryland, MDE has regulatory authority over the discharges of pollutants to the waters of the United States under Section 402 of the federal Clean Water Act (CWA), the National Pollutants Discharge Elimination System (NPDES) Program, and Section 401 of the CWA, which requires an applicant for any federal permit covering an activity that may result in a discharge into the state's waters to first obtain a state certification, to ensure that the project will comply with state water quality standard. MDE also oversees compliance with the federal Clean Air Act (CAA) in Maryland.

1.4 Goals and Objectives

The INRMP is a long-term planning document that guides implementation of the natural resources program at NSA Bethesda to ensure support for the installation mission, while protecting and enhancing natural resources, meeting legal requirements, and providing for a variety of outdoor recreational opportunities for DoD personnel, including injured service members (wounded warriors), and their dependents and guests. The goals of this INRMP are to:

- Identify and facilitate coordination between the responsible parties and stakeholders concerned with natural resources management at NSA Bethesda,
- Describe the current and future installation mission and its requirements and constraints on natural resources,
- State the policies, management philosophy, and objectives of natural resources management at NSA Bethesda,
- Provide information regarding the existing biological and physical conditions and the desired future conditions of the installation natural resources,
- Identify key natural resource management issues and concerns at the installation 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.

Goals and objectives that are specific to the natural resources management and outdoor recreation programs at NSA Bethesda are presented with the descriptions of each program element in Chapter 4. Detailed management prescriptions that are recommended along with project-specific goals and objectives are identified in Appendix 15; and a table of projects that identifies priorities, legal drivers, cost estimates, an implementation schedule, and potential funding sources is in Appendix 16.

1.5 Management Strategy

Navy policy on natural resources management, as summarized from OPNAVINST 5090.1D, is to manage natural resources in support of and consistent with the installation 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.

DoDI 4715.03 further requires that INRMPs incorporate the principles of ecosystem management for natural resources under the stewardship and control of DoD. The goals of this

strategy are to maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations. The basic principles and guidelines of ecosystem management are to:

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

An ecosystem management approach encourages management decisions to be made on the community or ecosystem level rather than at a single species level. Maintaining or improving the quality, integrity, and connectivity of the ecosystem benefits both natural communities and individual species. On facilities such as NSA Bethesda, which is over 75 percent developed, efforts to protect and restore the remaining natural ecosystems to improve ecosystem function while continuing to support the military mission is the most appropriate management strategy.

1.6 Stewardship and Compliance

Environmental compliance requirements are management actions that are driven by federal, Executive Orders (EOs); and Memoranda of Agreements or Understanding (MOAs or MOUs). The primary federal environmental laws that are legal drivers for natural resources management at NSA Bethesda include, but are not limited to:

- Sikes Act
- ESA
- MBTA
- NEPA
- CWA
- CAA
- Federal Noxious Weed Act.

Environmental mandates also include several executive orders such as:

- EO 13508 - Chesapeake Bay Protection and Restoration
- EO 13514 - Federal Leadership in Environmental - Federal Leadership in Environmental, Energy, and Economic Performance
- EO 13112 - Invasive Species
- EO 11990 - Protection of Wetlands
- EO 11988 - Floodplain Management.

A more comprehensive list of environmental laws, regulations, policies, guidelines, instructions and EOs that are relevant to natural resources management is in Appendix 2.

It is Navy policy that the INRMP identify natural resources management priorities that ensure compliance with these legal requirements as well as ongoing stewardship responsibilities. It must identify critical management requirements necessary for maintaining ecosystem health and integrity to ensure the sustainability of the land for current and future military missions and to ensure effective stewardship of public land. Therefore, this INRMP identifies both stewardship and compliance projects that help meet natural resources management goals at NSA Bethesda. However, priority will be given to projects that are required to meet compliance criteria. Stewardship efforts that rely on volunteer labor and enjoy the support of the military community, or have available alternate funding sources are also likely to be implemented.

1.7 Other Plan Integration and Preparing Prescriptions for Projects

NSA Bethesda has several plans that specifically address land use on the installation and must be considered in the development of project prescriptions for fulfilling natural resources management objectives. The land use goals and objectives of these plans, as they relate to natural resources issues, have been incorporated and referenced throughout this INRMP.

1.7.1 NSA Bethesda Installation Master Plan

NSA Bethesda had two previous master plans; one developed in 1990 and one from 2008 under the National Naval Medical Center (NNMC). The goal of the 1990 Master Plan was to stabilize patient care operations and provide increased access to patient services. As a result of the requirements of the 2005 Base Realignment and Closure (BRAC) Law there was a tremendous expansion of services at WRNMMC. The 2008 Master Plan update provided a framework for anticipated development throughout the installation considering existing constraints and opportunities (U.S. Navy 2008b).

The most recent NSA Bethesda Installation Master Plan (U.S. Navy 2013d) was developed subsequent to the completion of a substantial portion of BRAC construction and the transfer from NNMC to NSA Bethesda. The purpose of the 2013 Master Plan is to provide an installation-wide plan from the perspective of NSA Bethesda in order to improve installation facilities, standards, and quality of life. This Master Plan brings the previous 2008 NNMC Master Plan up to date and uses post-BRAC construction conditions as the starting point with a 10-year time-frame (U.S. Navy 2013d). A stated goal of the Master Plan is to "guide improvements in organization, circulation and wayfinding that will make the campus more accessible". The plan also strives to preserve and enhance the natural beauty of the campus and improve the availability of spaces and activities that promote the good health of all people at NSA Bethesda. The master plan further recognizes that green space is an essential part of a

campus as a healing environment and maintaining the natural resources of the Stoney Creek corridor, the eastern woodlands, and recreational fields are integral parts of plan implementation.

1.7.2 NSA Bethesda Installation Appearance Plan

The NSA Bethesda Installation Appearance Plan (IAP; U.S. Navy 2010a) provides guidance for the design, development, and review of all physical development at NSA Bethesda. The IAP provides strategies for renovation projects and concepts for new developments. The plan promotes an environment that fosters civic beauty, enhances pride and professionalism, protects natural and cultural resources, preserves the existing architectural fabric, and improves the overall quality of life for personnel and the public (U.S. Navy 2010a). As with the 2013 Installation Master Plan, the IAP recommends locating new land uses in existing areas, rather than develop on pristine or undeveloped sites in order to increase walkability among buildings, reduce vehicular traffic, reduce impervious surfaces, increase water quality, reduce the heat island effect, and reduce costs of earthwork and utility construction (U.S. Navy 2010a). A major initiative for connecting the northeast portion of the base to the southwest portion by developing a new trail along Stoney Creek is presented in the IAP. The trails would be fully accessible, providing an asphalt trail or boardwalk wherever appropriate. The IAP also provides design guidelines, including Leadership in Energy and Environmental Design (LEED) strategies, for meeting federal sustainability targets in new development and major renovations.

1.7.3 NSA Bethesda Accessibility Plan

The Accessibility Plan (U.S. Navy 2011) was prepared with the general goal of providing a universally accessible campus for its tenants. This study identified challenges to accessibility and provided recommendations for establishing accessible routes and zones within the NSA Bethesda campus. The Accessibility Plan also provides specific guidance for design elements along accessible routes, which include details of paving, detectable warnings, curb ramps, stairs, ramps, railings, furniture, signage and lighting. Concepts from the Accessibility Plan were incorporated into the 2013d Installation Master Plan.

1.7.4 NSA Bethesda Stormwater Management Action Plan

The purpose of the Stormwater Management Action Plan (SWMAP, U.S. Navy 2010c), which encompasses both the Pollution Prevention Plan (PPP) Discharge Permit and Municipal Separate Storm Sewer Systems (MS4) General Permit requirements, is to document policy, responsibilities, procedures and technical guidance to reduce pollutants in stormwater runoff at NSA Bethesda. The SWMAP provides mechanisms to minimize the potential to contaminate receiving waters from discharges from the drinking water system and stormwater discharges from the NSA Bethesda MS4 system. The PPP identifies the quantity, volume, locations and schedule of planned discharge of water from the potable water distribution system that may reasonably be expected to affect water quality at NSA Bethesda. In addition, the PPP identifies

discharge and treatment options available for the discharge of water from the potable water distribution system during the course of hydrant flow testing, system flushing and water main breaks. The MS4 General Permit includes best management practices (BMPs) used to meet the six minimum control measures, the implementation schedule, and reporting and record keeping requirements. The six minimum control measures are:

- Personnel education and outreach,
- Public involvement and participation,
- Illicit discharge detection and elimination,
- Construction site stormwater runoff control,
- Post-construction stormwater management, and
- Pollution prevention/good housekeeping.

1.7.5 NSA Bethesda Environmental Restoration

NSA Bethesda recognizes that adverse impacts to natural resources addressed in this INRMP may result from the release of hazardous substances, pollutants, and contaminants into the environment or from the actual restoration of contaminated sites. The DoN Environmental Restoration (ER) program is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) releases, Resource Conservation and Recovery Act (RCRA) releases, and releases under related provisions and reporting such releases to the EPA and the MDE.

When appropriate, the natural resources manager will help the ER program Remedial Project Manager (RPM) identify potential impacts to natural resources caused by the release of these contaminants. Also, when appropriate, the natural resources manager will make recommendations to the ER program RPM regarding cleanup strategies and site restoration. During initial monitoring protocols, the natural resources manager may suggest sampling and testing be accomplished so as to not impact sensitive or critical areas. Also during site restoration, the natural resources manager has the opportunity to recommend site restoration practices that are outlined within this INRMP.

Under a RCRA Corrective Action Permit, several areas of NSA Bethesda have been designated as a Solid Waste Management Unit (SWMU) or an Area of Concern (AOC). A SWMU is a discernible unit where solid or hazardous wastes have been placed at any time, or any area where solid wastes have been routinely and systematically released. An AOC includes non-SWMU area(s) of potential or suspected contamination, as well as actual contamination. The EPA identified 35 SWMUs and 12 AOCs at NSA Bethesda (EPA 2014). Chemicals of concern include tetrachloroethane, trichloroethane and benzene, toluene, ethylbenzene, and xylene, which have been detected in background studies. Of these, five; AOC 2, AOC 3, AOC 6, SWMU 20, and SWMU 32,were recommended for further sampling during the most recent RCRA Facility

Investigation (RFI) (U.S. Navy 2013f). EPA issued a Statement of Basis for no further investigation or cleanup for SWMUs 4, 5, 6, 8, 9, 12, 13, 14, 15, 16, 18, 21, 25, 28, 34 and AOCs 1,7, 8, and 12 (EPA 2014).

2.0 CURRENT INSTALLATION CONDITIONS AND USE

2.1 General Description

NSA Bethesda is located just north of Bethesda, Maryland, in southern Montgomery County approximately two miles northwest of the District of Columbia (Figure 2-1). NSA Bethesda is a 243-acre medical facility bounded by Maryland Route 355 (Rockville Pike) to the west, with the National Institutes of Health (NIH) main campus and the Medical Center Metro Station located across Maryland Route 355 (Rockville Pike) to the west; Stone Ridge School of the Sacred Heart and residential housing to the north; residential housing, North Chevy Chase Local Park, and Rock Creek Park to the east, and Columbia Country Club, and residential housing to the south. Interstate 495 (Capital Beltway) is adjacent to the northeastern corner of the installation and Jones Bridge Road and Rockville Pike form the southern and western boundaries of the installation, respectively (Figure 2-1).

2.2 Regional Land Use

NSA Bethesda is located near downtown Bethesda, Maryland, an unincorporated city with a population of 60,858 in 2011 (MDP 2011). Bethesda supports a number of defense industry corporate and military government headquarters, healthcare, law firms and banking institutions, and is a major urban core and employment center for the region in southwestern Montgomery County. Land use surrounding NSA Bethesda is primarily institutional (NIH to the west) and medium density residential (Figure 2-3).

Based upon Maryland Department of Planning (MDP) 2010 land use data, 51 percent (160,470 acres) of Montgomery County lands are classed as developed, 22 percent (68,494 acres) are agricultural and 27 percent (85,998 acres) are forested (MDP 2013). The majority of developed lands in the county in 2010 was for medium density housing and other residential uses. Development acreage in the county increased 4.4 percent from 2002 to 2010, while undeveloped land shrank by 4.2 percent. Of the undeveloped lands, forests comprised the greatest land use cover, followed by agriculture, wetlands, and extractive, bare land or barren use categories.

2.3 Historic Land Use

The land at NSA Bethesda has a long history of use dating back to prehistory, with evidence of transient occupation in the early Archaic period approximately 10,000 years ago (U.S. Navy 2009b). The following discussion of historic land use is based upon the Integrated Cultural Resources Management Plan completed in 2013 (U.S. Navy 2013a) and the Installation Master Plan completed in 2013 (U.S. Navy 2013d).

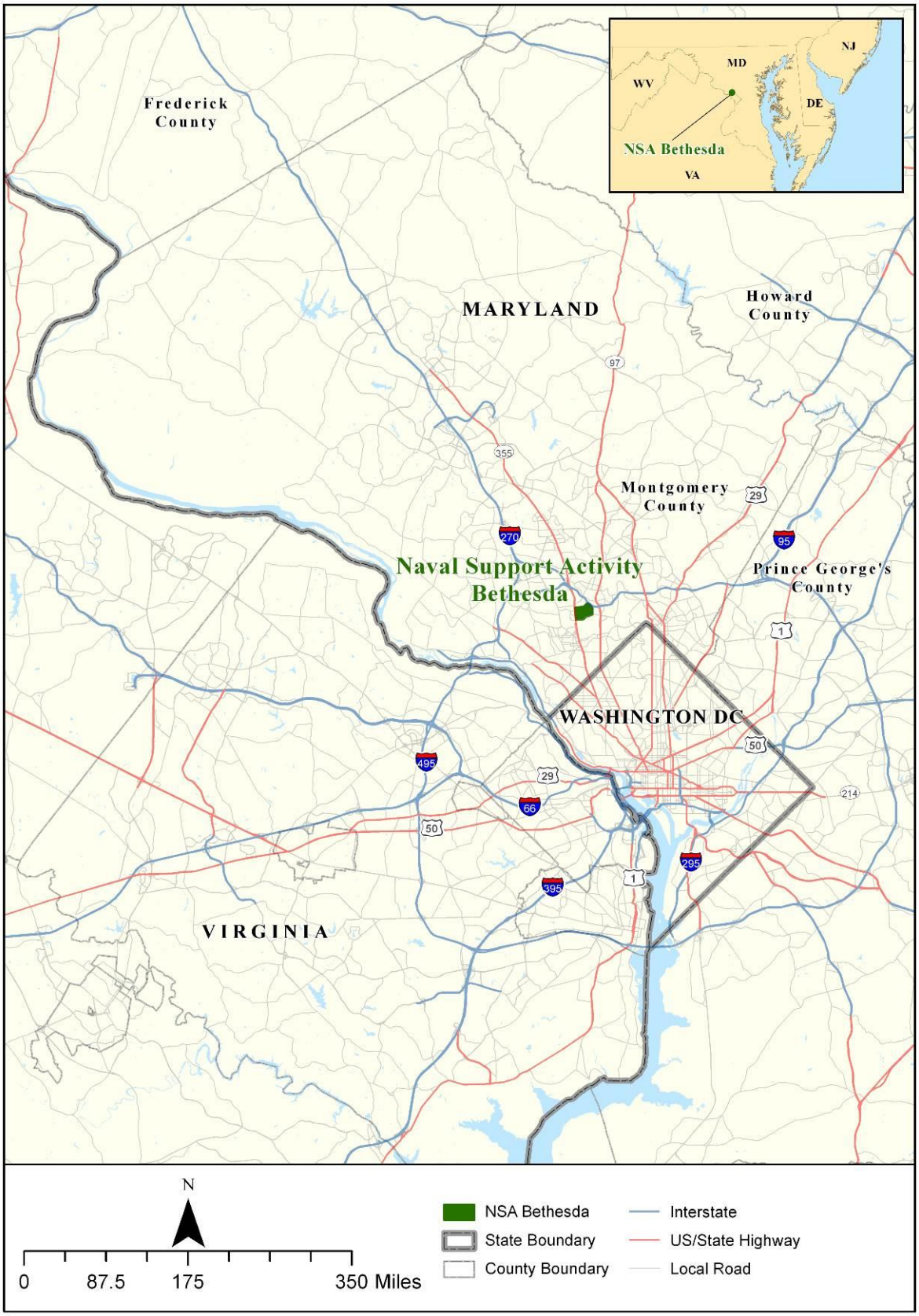

Figure 2-1. NSA Bethesda Regional Location

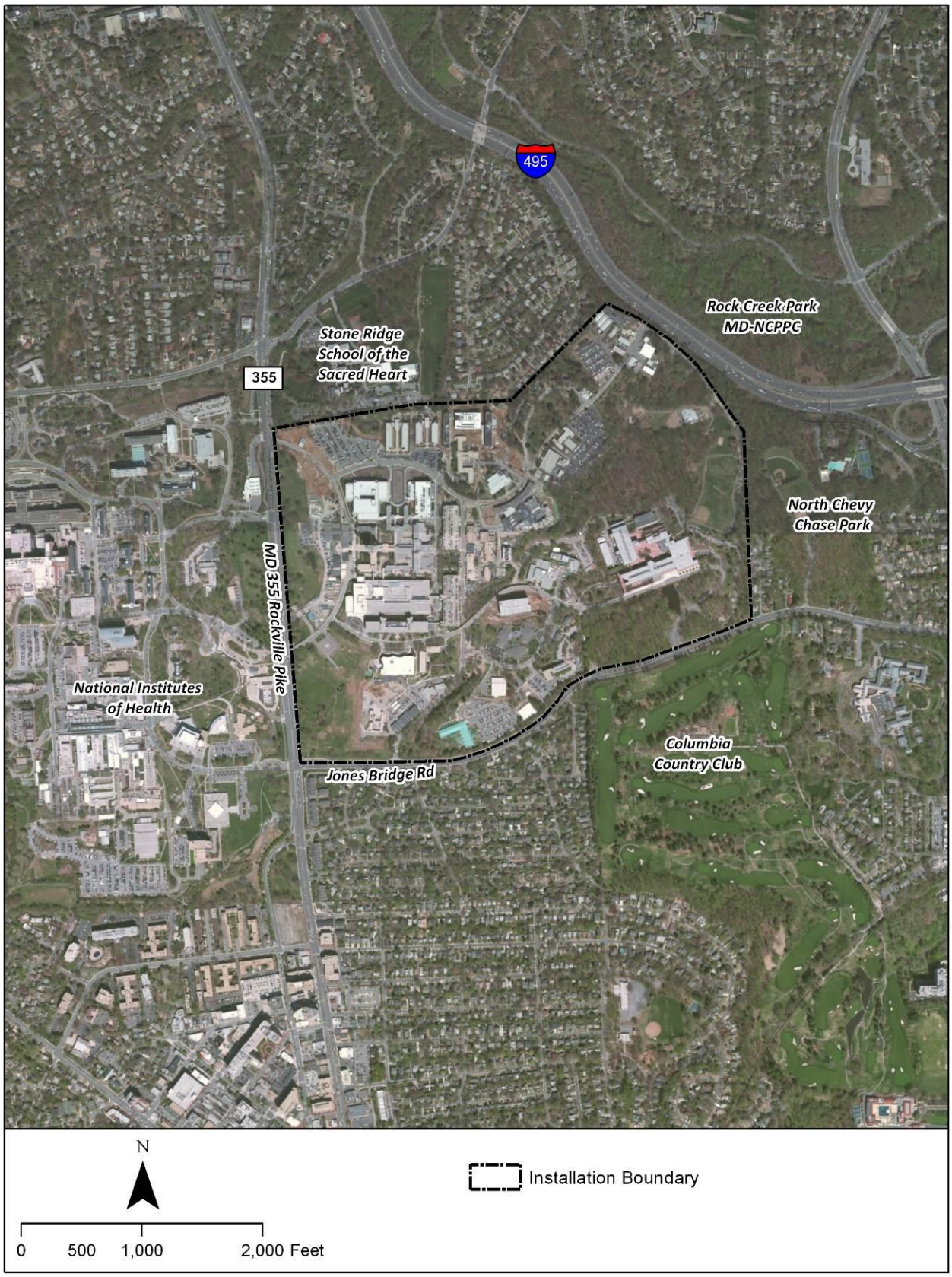

Figure 2-2. NSA Bethesda Immediate Vicinity

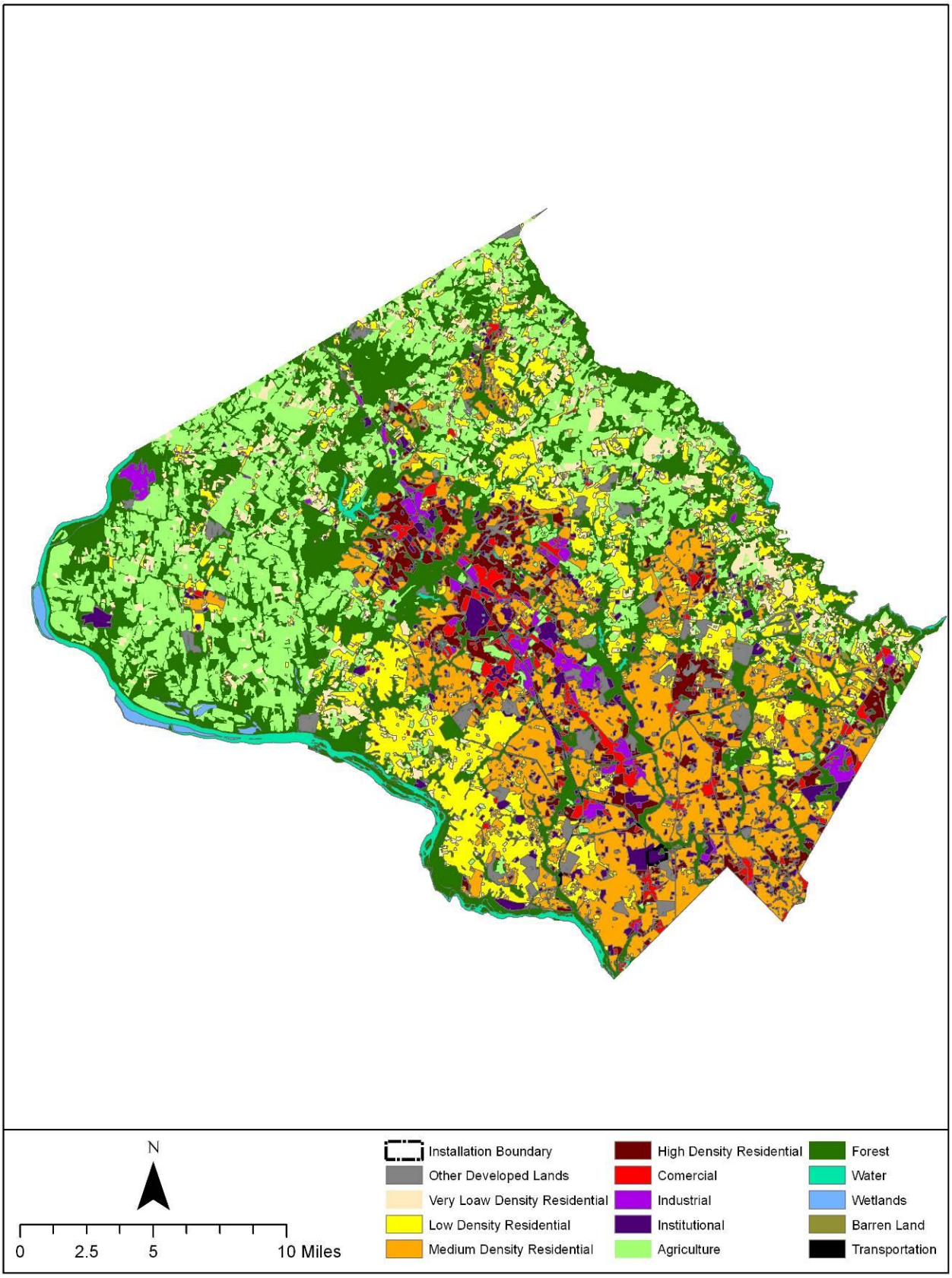

Figure 2-3. Regional Land Use, Montgomery County

The European American history of the site began when Thomas Fletchall purchased the property containing the future NSA Bethesda in 1715. The area was farmed primarily for tobacco cultivation in the early 18th century. The location of the property along the road between Georgetown and Rockville tied it into the developing economic network of the region in the 1780s. In the mid-nineteenth century, a plantation house known as "Green Sod" was built where the current Naval Hospital now stands. A portion of the property continued to be used for farming through the early 20th century despite the growth of the villages and towns connected by the Rockville Pike.

In the 1930s, the Roosevelt Administration, and President Franklin D. Roosevelt himself, investigated the state of medical care for naval personnel in the United States. Legislation was passed by Congress in 1930 to improve naval medical care, although it did not immediately lead to the construction of new facilities. In 1937, Congress specifically authorized and funded the construction of a new naval medical complex at a new site to be selected. The initial purchase consisted of more than 260 acres of rolling fields and dense woods between Rockville Pike on the west and Rock Creek Parkway on the east. President Roosevelt assumed an active role in both the conceptual modernist design and the site selection for the complex. The core complex of buildings at NSA Bethesda was built between 1939 and 1941 and was dedicated by President Roosevelt on 31 August 1942.

Aerial View of NSA Bethesda circa 1944

The original Naval Medical Center included the Naval Hospital, Naval Medical School, Naval Dental School, and Naval Medical Research Institute. Over time the Bethesda complex acquired new tenant commands, adapting to the particular requirements of military medicine. The Naval School of Hospital Administration, Naval Medical Data Service Center, and the Naval Toxicology Unit of the Armed Forces Radiobiology Research Institute (AFRRI) were among them. In 1973, the hospital and the tenant commands were combined in one organizational structure referred to as NNMC or Bethesda Naval Hospital. Also during this period, the armed services medical school, Uniformed Services University of the Health Sciences, (USUHS), was built at the southeastern corner of the NSA Bethesda property.

2.4 Military Mission

NSA Bethesda was established as the Naval Medical Command, National Capital Region (NMCNCR) in 1942 and has maintained its military medical mission up to today. In May 2010, the Navy changed the management of the installation from the Bureau of Medicine and Surgery to CNIC. The entire installation then became NSA Bethesda and NNMC became its tenant (U.S. Navy 2012a and b).

NSA Bethesda is home to the Walter Reed National Military Medical Center (WRNMMC), which was stood up in September 2011 when NNMC and portions of the Walter Reed Army Medical Center were realigned under one command. NSA Bethesda is responsible for base operational support for the WRNMMC and numerous medical, research, health support, and welfare/relief commands in the Military Health System (MHS), including Uniformed Services University of the Health Sciences. These and other tenant commands have the goal of providing a full spectrum of medical and recovery services to members of the Armed Forces and their families (U.S. Navy 2012a and b).

2.5 Operations and Infrastructure

2.5.1 Population

The 2011 worker population for the overall NSA Bethesda installation was recently estimated by the Transportation Management Program Update at 11,686 people, including 7,539 serving the medical mission, 3,521 in the education mission and 1,551 with a support mission (U.S. Navy 2012c). Worker population at NSA Bethesda, however, changes by the day. Based upon the results of a population survey conducted at the installation, approximately 45 percent of the worker population is military, 40 percent are civilians and 15 percent are contractor personnel (U.S. Navy 2012c). The installation also receives approximately 1.2 million patient visits annually, in addition to other visitors, averaging 131.65 daily patients in 2011 (U.S. Navy 2013g). Population at NSA Bethesda is expected to grow to 12,611 by 2022, with the greatest projected increase to support the education mission of the installation (U.S. Navy 2013b).

2.5.2 Installation Operations and Activities

Installation operations and activities at NSA Bethesda support patient care; medical education, research and administration; security; airfield operations for the helipad; sailor and family support; and base support such as utilities, supply and storage (U.S. Navy 2012a). Figure 2-4 identifies the major operational areas, supporting infrastructure, and land use areas at NSA Bethesda.

The built environment of NSA Bethesda consists of approximately 106 buildings, roadways, parking structures and surface parking, walks, and utilities and supporting structures for the

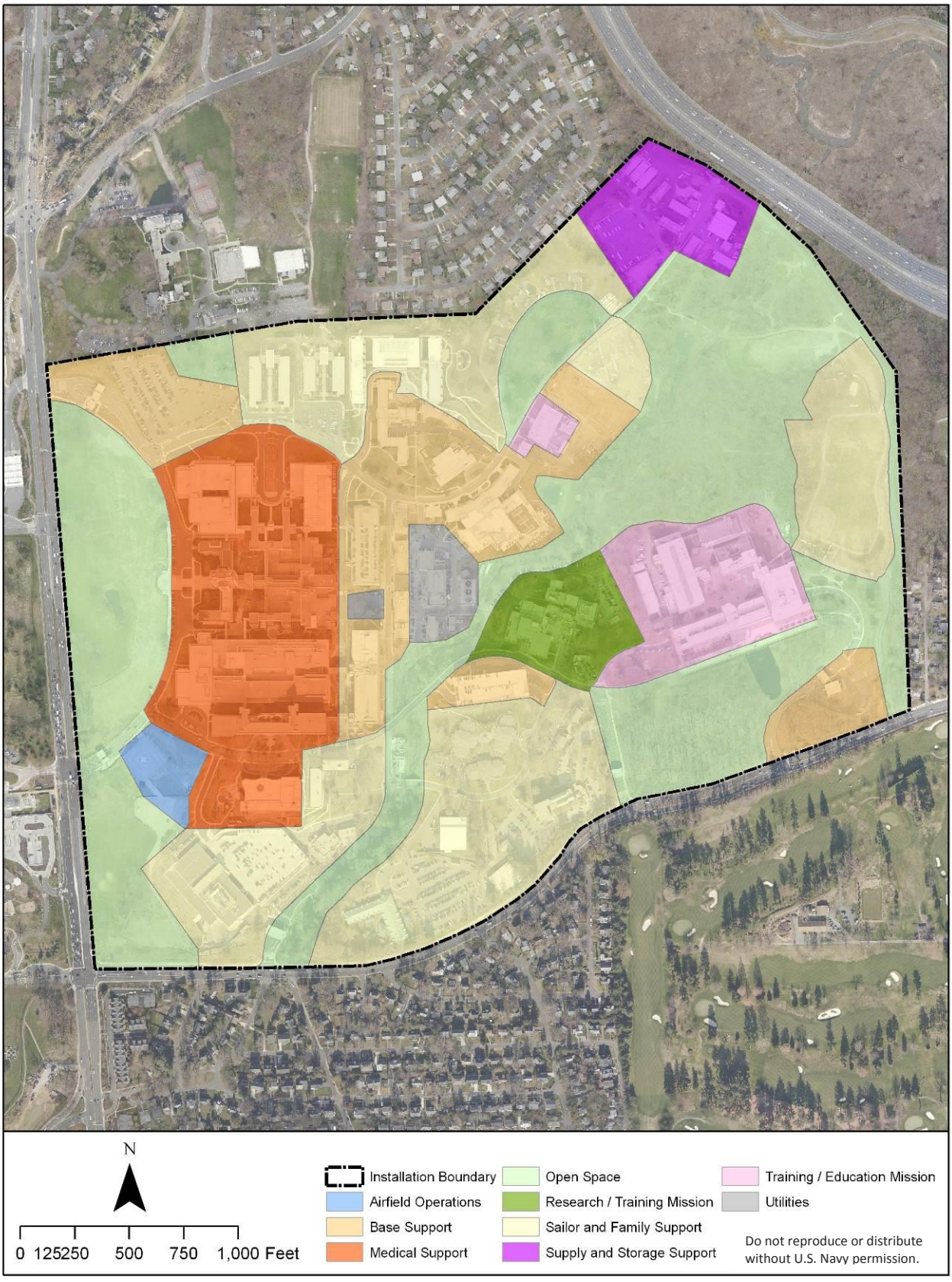

Figure 2-4. Installation Operations and Activities

medical mission and tenants located on the campus (U.S. Navy 2012a). The Medical Support operations are concentrated in the center of the western portion of the campus and consist of the primary medical functions, including inpatient and outpatient care, clinics and administrative functions. These facilities provide services to a wide-variety of patients external to NSA Bethesda. The helipad and its airfield operations are located in the southwest corner of the Medical Support core area. Base support operations are primarily east and north of the Medical Support core area, and include administrative offices for several base support commands and organizations, surface parking lots, parking structures and security facilities. Utilities and research/training operations are located along Stoney Creek near the center of the installation. Training/education operations are located at the medical schools located in the southeast part of the base, whereas sailor and family support operations and facilities such as housing and recreational areas are on the outside edges of the base to the north, east, and south. Base supply and storage occurs primarily in the northeast extent of the installation.

2.6 Constraints

2.6.1 Internal Encroachment

Internal encroachments are those actions within the NSA Bethesda campus that may impact the operations or the mission of the installation. Because having adequate, state-of-the–art facilities is critical to the NSA Bethesda mission, encroachment issues include those that impact future growth and development. The installation Encroachment Action Plan (EAP) completed in 2013 (U.S. Navy 2013c) and the 2013 Master Plan for NSA Bethesda (U.S. Navy 2013d) identify several internal encroachment challenges at NSA Bethesda, including noise, competition for air and land space, competition for scarce resources, air quality, water quality, cultural resources, Anti-Terrorism/Force Protection (AT/FP) setbacks, and ER sites. Such constraints must be considered in all natural resources planning.

2.6.1.1 Noise

Noise generators on campus include the permanent and alternate helicopter landing pads (helipads), the power plant and its cooling towers, construction related noise, and traffic. The permanent helipad is located in the southwestern portion of the campus adjacent to Gate 2 and is located away from major populated areas. The alternate helipad is located on the athletic fields in the eastern portion of the installation. Both sites generally receive a low volume of air traffic and are not perceived as having a significant impact on the base mission (U.S. Navy 2013c). Some noise is produced by the boiler plant located at the center of NSA Bethesda, but is attenuated at the main medical complex by parking structures on the west and other buildings to the north, south, and west, by stands of trees and topography, and other secondary buildings (U.S. Navy 2012a). Maintaining and expanding tree and shrub cover around noise generators or campus

through proactive forest management and landscaping programs can help attenuate these sources of noise.

2.6.1.2 Competition for Air and Land Space

Air space restrictions associated with the existing helipad constrain development that would interfere with the primary surface of the helipad, clear zones, approach/departure and transitional surfaces, and the accident potential zones. Plans for helipad expansion and realignment to accommodate multiple helicopters and meet Naval Air Systems Command (NAVAIR) regulations would further impact sidewalks, roads, and trees that support hospital operations (U.S. Navy 2013c).

Recent new construction has also increased competition for usable land space at NSA Bethesda and limits mission expansion capabilities. Limited parking, in particular, has had a major impact on employee morale and retention (U.S. Navy 2013c). Usable land at NSA Bethesda is severely limited as much of the remaining undeveloped land is encumbered by steep terrain, waters of the U.S., including wetlands, and the need to maintain forested buffers and high quality natural areas for the recuperation and enjoyment of injured service members.

2.6.1.3 Air Quality

NSA Bethesda is in an air quality control region that is in moderate nonattainment for 8-hour ozone, in nonattainment for particulate matter with diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), and is in maintenance for carbon monoxide as established by the National Ambient Air Quality Standards (NAAQS) (EPA 2013b). It is also in an ozone transport region. Federal actions located in nonattainment and maintenance areas are required to demonstrate compliance with general conformity guidelines established in 40 CFR Part 93, Determining Conformity of Federal Actions to State or Federal Implementation Plans. NSA Bethesda operates under a Title V permit that requires annual renewal. New construction, additional power and heat production, and additional vehicles associated with future base personnel could cause the installation to exceed allowable pollutant limits and require a modification in the installation's Title V permit.

2.6.1.4 Water Quality

Lower Rock Creek is listed as impaired under the State's 303(d) program from unknown causes, bacteria and other microbes, impaired biota, flow alterations, mercury, metals, and sediment (EPA 2013d). Although Stoney Creek was not assessed in the 2012 Maryland's Final Integrated Report of Surface Water Quality (MDE 2012), Stoney Creek is a tributary to Lower Rock Creek and must meet total maximum daily load (TMDL) requirements for nitrogen and phosphorous for the Chesapeake Bay and its tributaries. In accordance with EO 13508 - Chesapeake Bay Protection and Restoration, NSA Bethesda is required to reduce these pollutants. Additional or enhanced stormwater treatments, BMPs, stream restoration and, low impact development (LID)

such as rain gardens, bioswales, green roofs, and permeable paving, may be required to mitigate additional runoff and pollution and reach Chesapeake Bay TMDL reduction requirements.

A recent condition assessment of Stoney Creek also indicated several stream bank erosion issues on campus due to increased stormwater flow over the last few years (U.S. Navy 2010b). Continued erosion may not only impact base infrastructure, but contributes sediment to State waters and the Chesapeake Bay.

2.6.1.5 Cultural Resources

NSA Bethesda has a historic district that encompasses over 60 percent of the installation and includes 19 buildings, structures, and landscape features. The Main Hospital Tower (Bldg. 1) is a major feature of the historic district and is on the National Register of Historic Places (U.S. Navy 2013a). The AFRRI complex is not part of the historic district, but has also been determined to be eligible for the National Register of Historic Places (U.S. Navy 2012a). Archaeological studies have also revealed five prehistoric archaeological sites (18MO644, 18MO645, 18MO646, 18MO647, and 18MO648) along with a large area of mixed and apparently re-deposited historic materials in the southeast area of the installation.

In compliance with the American Antiquities Act, Archeological Resource Protection Act, Historic Sites, Buildings, Objects, and Antiquities Act, National Historic Preservation Act (NHPA), several executive orders, and DoD regulations, NSA Bethesda is responsible for the care of significant historic and cultural resources located within its boundaries. The NHPA specifically requires all federal agencies to identify, inventory, evaluate and protect properties listed, or eligible for listing, in the National Register of Historic Places. Section 110 of the NHPA requires federal agencies to assume responsibility for the preservation of historic properties owned or controlled by the agency and Section 106 requires agencies to consult with the Advisory Council on Historic Preservation on undertakings affecting historic properties included, or eligible for inclusion, in the National Register.

Some activities related to BRAC implementation have resulted in the loss of certain NRHP eligible buildings, such as Building 12 (U.S. Navy 2012a). Additional buildings gaining historic designation, particularly after 2013, may increase impacts from cultural resources at NSA Bethesda. Careful planning, early coordination, and communication within the Section 106 consultation process will streamline the review and consultation process and reduce potential encroachment issues.

2.6.1.6 Anti -Terrorism/ Force Protection Setbacks

Federal guidelines set minimum AT/FP standards for security on all DoD inhabited facilities in order to minimize the likelihood of mass casualties from terrorist attacks against DoD personnel in the buildings in which they work and live. These standards are documented in Unified Facilities Criteria (UFC) 0 4-010-01 (2012), DoD Minimum Antiterrorism Standards for

Buildings and UFC 4-010-02 DoD, Minimum Antiterrorism Standoff Distances for Buildings must be considered in any planning effort. Security requirements may have major impacts on the overall design as structures are built or renovated.

2.6.1.7 Environmental Restoration Sites

As identified in Section 1.8.6, several ER sites present additional potential constraints to new development and future growth at NSA Bethesda and can be considered internal encroachment.

2.6.2 External Encroachment

External encroachment is any non-Navy action planned or executed that inhibits, curtails, or has potential to impede the performance of Navy activities. Potential external encroachment issues identified in the 2013 EAP primarily include site boundary and easements, noise, and environmental laws and mandates.

NSA Bethesda operations and mission activities could also be impacted by policies, regulations, and initiatives established by both the federal and state governments. Due to Maryland's complex regulatory environment, proactive communication and coordination is needed to ensure that NSA Bethesda interests are represented in all external decision-making processes and to stay informed of emerging regulations, policies, and development projects that could impact operations. Initiating early coordination and maintaining good relationships with these regulators are key to reducing regulatory review time and potential conflicts that may impede mission activities and operations.

2.6.2.1 Site Boundary and Easements

The surrounding land uses around NSA Bethesda are stable and generally built-out, minimizing the potential for external encroachment; however any land use change or development activity that occurs along the installation fence line has potential to impact operations or the mission of NSA Bethesda. Current proposed plans within proximity of the base include a planned Metro pedestrian tunnel and bus rapid transit line that may cause loss of property along the Rockville Pike fence line and construction at the Stone Ridge School that could impact operations along the northern base boundary. Any plans for the future expansion of I-495 may also impact operations in the northeast corner of the installation.

2.6.2.2 Noise

Major external sources of noise include the I-495, Rockville Pike, and Jones Bridge Road. A significant amount of noise from I-495 is attenuated by the trees along the eastern and northeastern portions of the campus. Noise generated by the Rockville Pike is lower relative to that of I-495, and is even more reduced on campus facilities by the setback provided by extensive lawns on the western side of the campus. Jones Bridge Road traffic noise to the south is also substantially buffered by stands of trees and changes in elevation (U.S. Navy 2012a).

2.6.3 Constraints Map

Environmental constraints to future development at NSA Bethesda include steep slopes and erodible soils, existing woodlands, surface water, wetlands, floodplains, whereas cultural and mission constraints include AT/FP setbacks, ER sites, archaeological sites, and the historic district. While development is still possible in these areas, site conditions present challenges to development that will need to be addressed during design and construction. Additional coordination with the State Historic Preservation Office (SHPO), MDE, and other regulators may also be required to minimize environmental, cultural and operational impacts. Figure 2-5 illustrates the constrained land areas at NAS Bethesda.

2.7 Opportunities

2.7.1 Internal Opportunities

Areas with little or no restrictions on the military mission provide the best opportunities for mission growth and change. Most development opportunity at NSA Bethesda lies in the redevelopment or reuse of currently underutilized built areas or substandard facilities as undeveloped land is minimal. Much of the open area at NSA Bethesda is comprised of natural and recreational areas (e.g., sports fields, woodlands, and walking trails) used by the staff and tenants and which are required for the therapeutic use of patients and their visitors. Areas that are not constrained by steep slopes and erodible soils, AT/FP setbacks, existing woodlands, ER sites, surface water, wetlands, floodplains, archaeological sites, and the historic district may be considered areas of opportunity for mission expansion.

2.7.2 External Opportunities

Encroachment up to the fence line can create undue 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 the installation may be negatively perceived by the surrounding community. Given the developed nature and current mission of the installation, any undeveloped land adjacent to the installation therefore provides a valuable buffer as regards noise, safety and natural resources. The best opportunities to prevent future encroachment involve partnering with adjacent municipalities, other federal agencies, 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.

2.7.3 Opportunities Map

The limited area of unconstrained land on NAS Bethesda is approximately two acres (Figure 2-6).

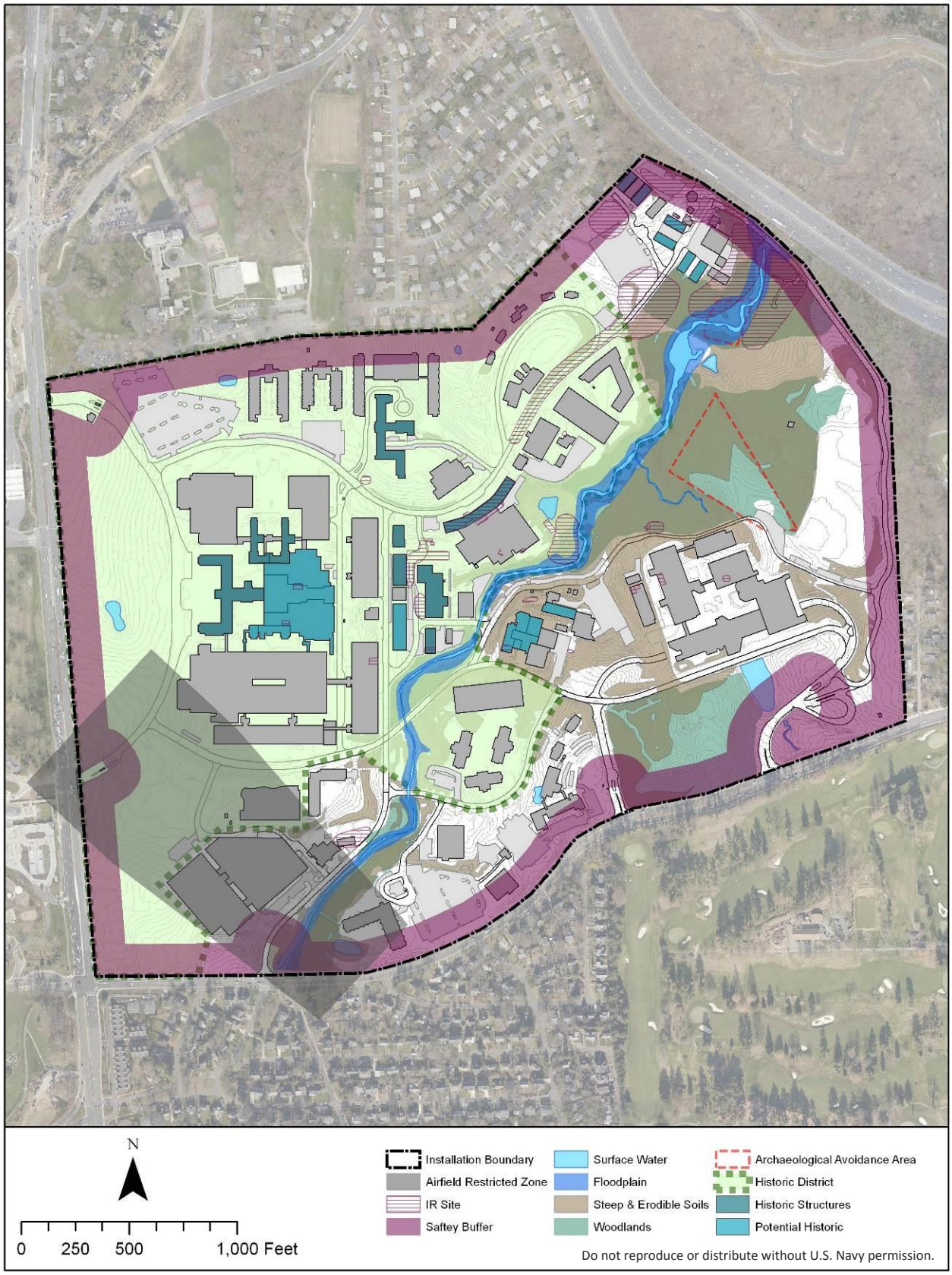

Figure 2-5. Constraints Map

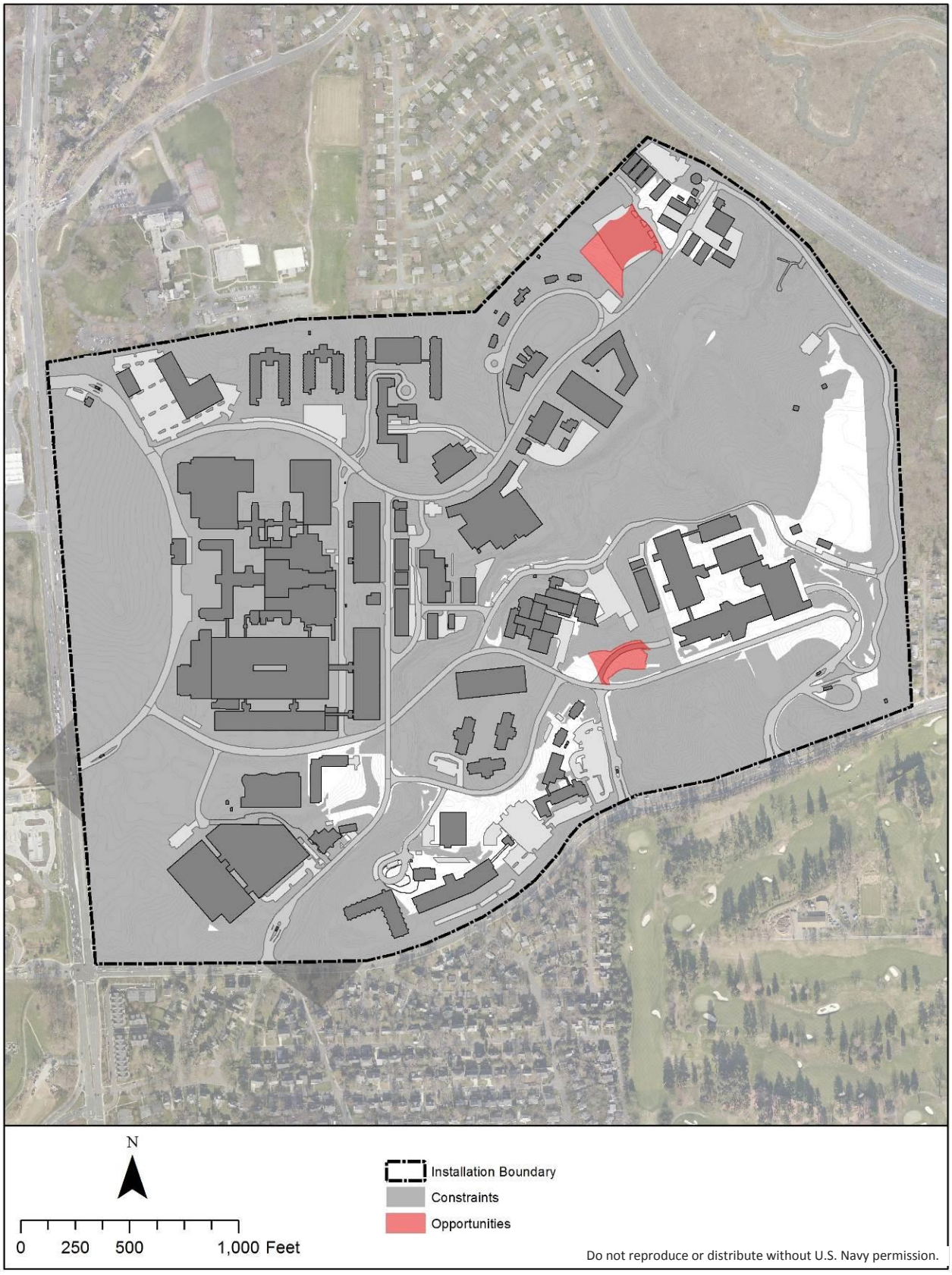

Figure 2-6. Opportunities Map

2.8 Natural Environment

2.8.1 Climate

The winter climate in Maryland is considered temperate and is intermediate between the cold of the northeastern United States and the mild weather of the South. Extremely cold air masses from the interior of the continent are moderated by passage over the Appalachian Mountains. January is the coldest month with a normal average low of mid-20 degrees Fahrenheit (°F) and July is the warmest month with a normal average high in the upper-80°F range (Maryland State Archives 2013); overall average annual temperature is 55.1°F. The highest recorded temperature in Bethesda was 105°F in 1997 and the lowest was -11°F in 1985 (Weather.com 2013). From 1948 to 2012, climate recorded at Dalecarlia Reservoir a few miles to the southwest of downtown Bethesda indicates the average annual monthly maximum temperature was 67.7°F, the minimum was 45.2°F, the average total annual precipitation was 44.1 inches and average annual total snowfall was 8 inches (Southeast Regional Climate Center [SERCC] 2013).

The climate features shown in Table 2-1 are averages of available data since 1948. However climate trends over the past 30 years indicate Maryland's climate has become wetter and hotter, resulting in more runoff and longer heat waves. August and September of 2011 were the wettest the state has seen in 117 years and July of 2010, 2011, and 2012 were the hottest on record across much of the state (MDNR 2013a). A comparison of available historic data from the Dalecarlia Reservoir seems to confirm this trend as the average maximum temperature increased by 1.2°F from 1949 - 1968 (the first 20 years for which data are available) to 1992 - 2011 (the most recent 20 years for which data are available).

Table 2-1. Dalecarlia Reservoir DC, Maryland (1948 to 2012)

	Jan	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Annual***
Avg Max. Temp (°F)	44.3	47.6	57	68.7	77.4	85.2	88.9	87.2	80.5	69.5	58.5	47.3	67.7
Avg Min. Temp (°F)	24.6	26.7	33.7	43.2	52.5	61.6	66.6	65.4	58.2	45.8	36.5	28	45.2
Avg Total Precip (inches)	3.01	2.93	3.91	3.55	4.08	3.77	4.28	4.35	3.93	3.55	3.39	3.36	44.1
Avg Total SnowFall (inches)	3.2	3.2	0.6	0	0	0	0	0	0	0	0	0.9	8

Source: SERCC 2013

By 2100, U.S. temperatures are predicted to increase between 4°F and 11°F (EPA 2013). According to the U.S. Global Change Research Program (2009), increased temperatures are

expected to result in more heavy downpours, winter precipitation falling more as rain rather than snow, and earlier spring snow melt resulting in earlier peak river flows.

2.8.2 Ecoregions

Ecoregions are defined as areas of relative homogeneity in ecological systems and their components (Woods et al. 1999) and are critical for defining and implementing ecosystem management strategies across state and federal agencies and nongovernmental organizations that are responsible for different types of resources within the same geographical areas. Using the EPA's hierarchical system based on biotic and abiotic features, NSA Bethesda is located in the Piedmont Upland subdivision of the Northern Piedmont ecoregion (Woods et al. 1999, Figure 2-7). This ecoregion is characterized by rounded hills, low ridges, relative high relief, and narrow valleys. Irregular plains and narrow valleys typically have elevations that often range from about 450 feet to 1,000 feet and a local relief that ranges from 130 feet to 330 feet. The Fall Zone occurs near the eastern edge of the Northern Piedmont ecoregion and is characterized by areas of high stream gradient, exposed bedrock, islands, falls, and a mixture of metamorphic and sedimentary rock. The area is underlain by metamorphic rocks of Lower Paleozoic and Precambrian age that are folded and faulted, distinct from the largely sedimentary rock of the surrounding ecoregions. The potential natural vegetation is mapped as Appalachian Oak Forest, which is dominated by red and white oaks or Mixed Mesophytic Forest, which may contain more tulip poplar (*Liriodendron tulipifera*) and American beech (*Fagus grandfolia*) in addition to oak species. However, urbanization and residential development is extensive within the Washington-Bethesda area, with few forested parks and other natural areas remaining.

2.8.3 Landcover

NSA Bethesda is largely developed, and because of the realignment with Walter Reed Army Medical Center and the development of numerous new or expanded facilities, the base has seen an increase in construction of buildings and parking lots in recent years. Currently, over 40 percent of the installation is urban land and is occupied by buildings, roads, parking lots, and other impermeable surfaces, and 37 percent is comprised of lawns and landscaped areas, whereas only 23 percent is natural or semi-natural (Figure 2-8). Approximately 56 acres of undeveloped land including forests, forested buffers, and stream corridor, currently occur on the installation. Natural woodlands are primarily located in the eastern part of the base, with the largest forested areas lying to the north and south of the AFRRI and USUHS campus and smaller wooded areas along the riparian areas along the Stoney Creek stream corridor. A large expanse of grass lawn with numerous landscaped trees and shrub extends from the medical core complex toward the Rockville Pike on the western boundary of NSA Bethesda south to Jones Bridge Road. Frequently mowed recreational fields are located in the eastern portion of the installation.

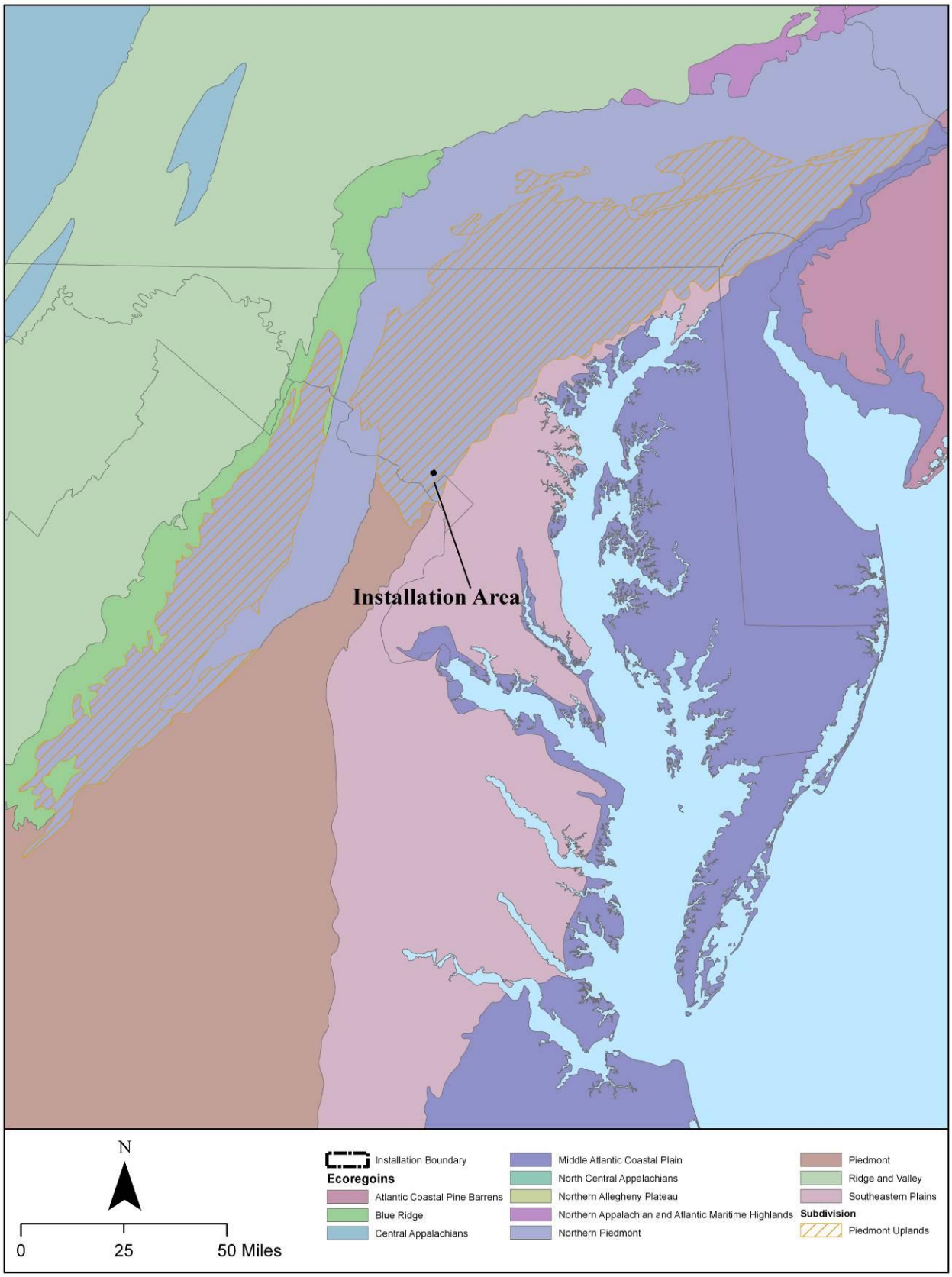

Figure 2-7. Ecoregions

Figure 2-8. Landcover Types

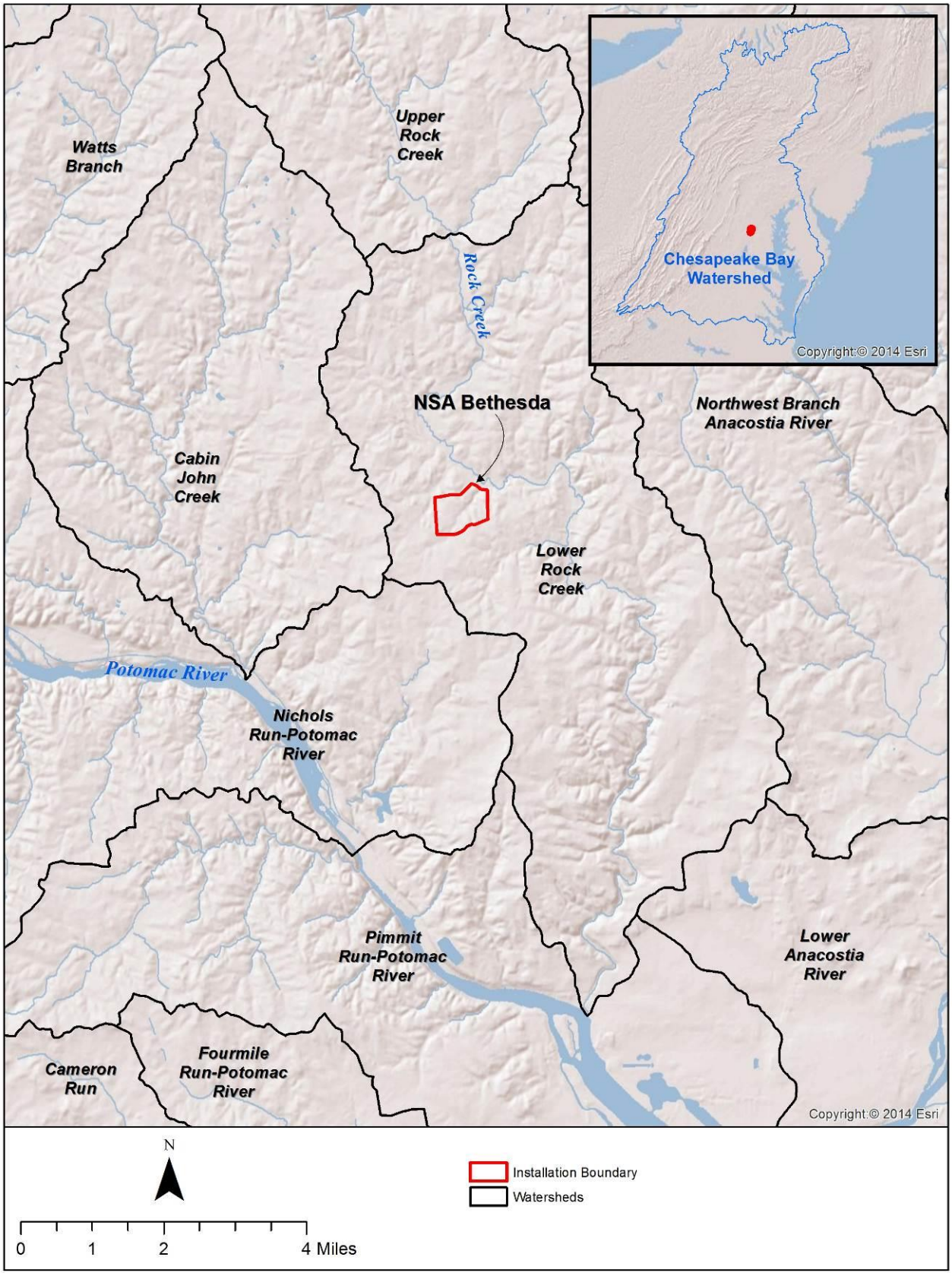

Figure 2-9. Regional Surface Waters and Watersheds

2.8.4 Aquatic Habitats

Aquatic habitats at NSA Bethesda include surface water, floodplains, wetlands, groundwater, and watersheds. NSA Bethesda is located within the Lower Rock Creek watershed (U.S. Geological Survey Hydrologic Unit Code 020700100102) with a drainage area of approximately 92.5 square kilometers or 22,857 square acres (EPA 2013c). Rock Creek, located about one mile to the east of NSA Bethesda, flows into the Potomac River at Georgetown, and eventually into Chesapeake Bay (Figure 2-9). Many of the headwater areas have been piped in this highly developed and densely populated watershed, impacting aquatic habitat and stream systems. NSA Bethesda is primarily drained by Stoney Creek, flowing about 4,700 feet across the installation from southwest at the intersection of Jones Bridge Road and Wisconsin Avenue, northeast to the base boundary where it crosses beneath the I-495. The northwest portion of NSA Bethesda, outside of the Stoney Creek watershed, drains to another smaller tributary of Rock Creek outside the installation boundary (U.S. Navy 2012a) (Figure 2-10).

Other surface water at NSA Bethesda includes a small unnamed tributary to Stoney Creek that is piped under the USUHS campus into University Pond and exits the installation just east of Gate 3 on Jones Bridge Road, and several man-made ponds including Lake Eleanor, University Pond, and five additional stormwater management ponds.

2.8.4.1 Lake Eleanor

Lake Eleanor is a spring fed pond located near the western edge of the property in the historically protected scenic view area. The pond provides open water habitat for waterfowl and other types of wildlife. Geese are regularly attracted to the pond to such an extent that their excrement has created a nuisance. The pond is also fed by runoff from the maintained lawn areas, and, therefore, is susceptible to pollution from any toxic substances used for the maintenance of turf areas. This pond does not currently have an aeration system and suffers from algal blooms and stagnation.

2.8.4.2 University Pond

University Pond is located between USUHS and Jones Bridge Road. This pond was created when the USUHS was built in the mid-1970s. It is fed almost entirely by off-campus surface runoff in a small intermittent stream that flows under Jones Bridge Road. The pond is filled with sediment and drains from the top so debris accumulates on the bottom. There also may be fertilizer or herbicide runoff from the golf course south of Jones Bridge Road, however, no herbicides or pesticides were detected during stormwater sampling efforts in 1997 (U.S. Navy 2000). The pond is aerated to reduce algal blooms and eutrophication. A fish kill occurred in the 1990s and although the pond is aerated, it is not expected to support a self sustaining fish population.

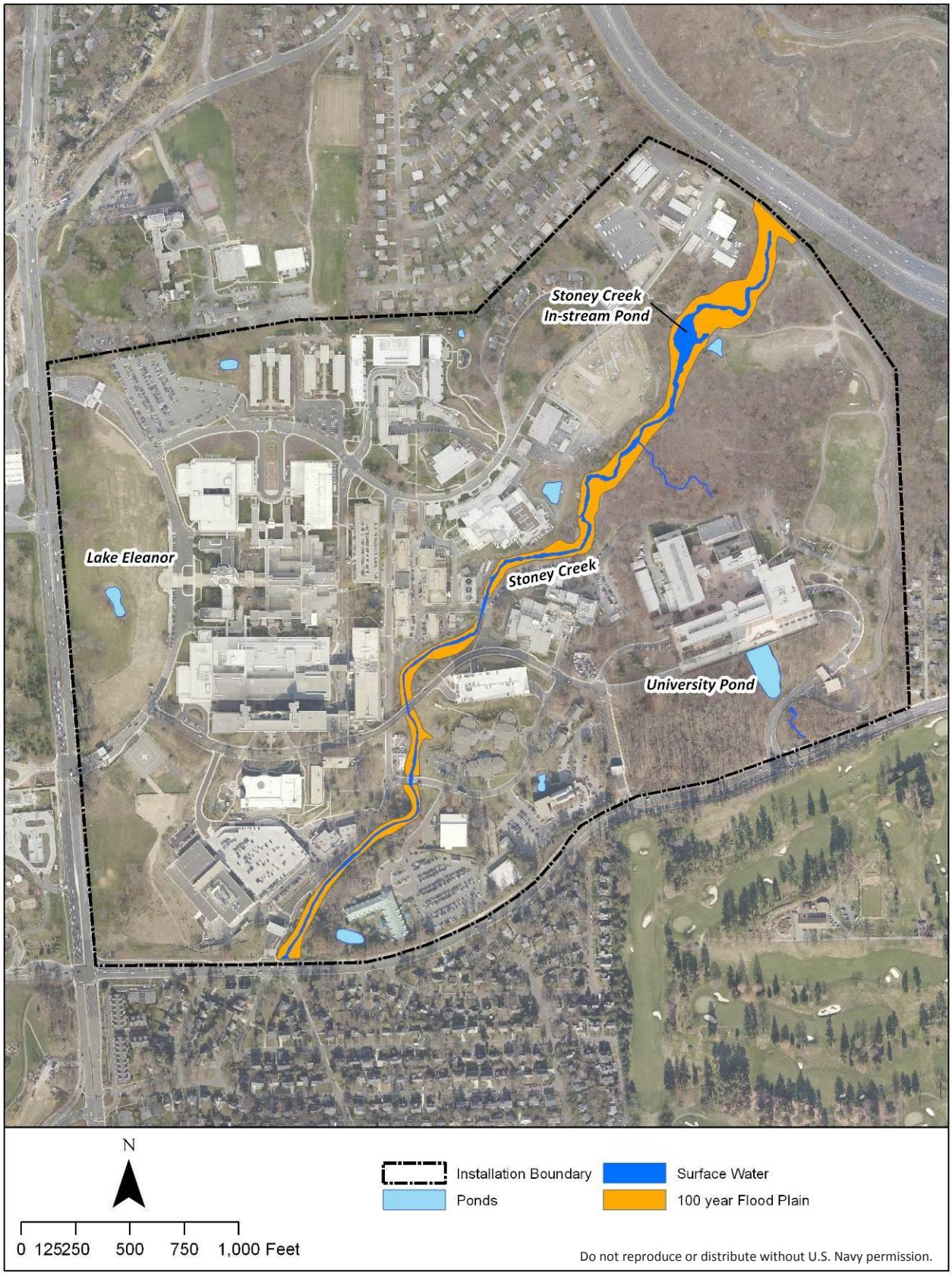

Figure 2-10. NSA Bethesda Aquatic Habitats

2.8.4.3 Stoney Creek In-stream Pond

The Stoney Creek in-stream pond and its immediate perimeter are wetlands that support few aquatic and wetland plant species. The area is highly disturbed, but likely attracts a variety of wildlife including macroinvertebrates, amphibians, reptiles, birds, and mammals. However, it does not maintain a population of fish as indicated by the absence of fish above the dam during previous stream sampling (U.S. Navy 2000).

2.8.4.4 Wetlands

No base-wide wetland delineations have been conducted, however, in 2008; a wetland assessment around the perimeter of University Pond determined there is approximately 0.03 acre of nonpersistent palustrine emergent wetland along the northeastern edge of the pond (U.S. Navy 2008a). The Stoney Creek in-stream pond was also identified as a wetland by the National Wetland Inventory (NWI) and is classified as a 0.27 acre permanently flooded unconsolidated bottom palustrine impoundment (USFWS 2013). There are several additional areas along Stoney Creek, one directly south of South Palmer Road and two north of Stone Lake Road, that were considered potential wetlands in the 1999 NNMC INRMP (U.S. Navy 2000), but have not been verified and are not included on Figure 2-10. A wetland survey is scheduled for the spring and summer of 2015.

NSA Bethesda is not within any 100-year floodplain as defined by the Federal Emergency Management Administration (FEMA) flood insurance rate maps for Montgomery Co., Maryland (FEMA 2006a and 2006b). Stoney Creek however, does have a floodplain that is generally constrained by steep topography along its extent through the base, but does experience overbank flooding in areas during heavy rain events.

2.8.4.5 Groundwater

The recent 2013 Final Environmental Impact Statement (EIS) for the development of medical facilities and university expansion summarizes the known groundwater conditions at NSA Bethesda (U.S. Navy 2013b). Groundwater at the installation occurs in shallow, rock-fractured aquifers at a depth ranging from 10 to 50 feet below the natural ground surface. Boring data from properties adjacent to NSA Bethesda indicate it is most frequently encountered at 20 to 30 feet below the surface. Groundwater flow in the area is generally to the north, and the recharge zone for the shallow aquifer is located in the upland south of Lake Eleanor, near Jones Bridge Road. Several sources recharge and maintain the water level in Lake Eleanor, the majority of which is from rain water and infiltration from the shallow aquifer, with some limited contribution by a spring.

2.8.5 Flora and Vegetative Communities

The natural forested areas at NSA Bethesda consist of mature mixed hardwood forests with dense overstories, sparse to moderate shrub layers, and sparse to moderate herbaceous layers, depending on site conditions. The forested areas are generally dominated by tulip poplar, white oak (*Quercus alba*), northern red oak (*Q. rubra*), and American beech on dry to mesic sites; and boxelder (*Acer negundo*), sycamore *(Platanus occidentalis*), and sweetgum (*Liquidambar styraciflua*) on wetter sites and floodplains. Common understory trees include dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), red maple (*Acer rubra*), and American holly (*Ilex opaca*). Shrub composition varies greatly by site condition and location. Several of the steep slopes adjacent to Stoney Creek support masses of mountain laurel (*Kalmia latifolia*), whereas other areas have scattered shrubs such as witchhazel (*Hamamelis virginiana*), spicebush (*Lindera benzoin*), and several viburnums (*Viburnum acerifolium*, *V. dentatum*, and *V. prunifolium*). A large variety of spring wildflowers, including bloodroot (*Sanguinaria canadensis*), spring beauty (*Claytonia virginica*), early saxifrage (*Saxifraga virginiensis*), cut-leaved toothwort (*Dentaria laciniata*), mayapple (*Podophyllum peltatum*), and rue anemone (*Thalictrum thalictroides*) have been observed in early spring visits (U.S. Navy 2009a).

Because numerous non-native ornamental plants were planted within or have escaped to the natural areas and the high degree of disturbance surrounding them, all of the forested areas at NSA Bethesda also have moderate to dense levels of invasive plant species.

2.8.6 Fauna

Although largely developed, NSA Bethesda contains areas of both natural and landscaped vegetation that provide habitat for many of the typical urban wildlife species inhabiting this region. A terrestrial vertebrate faunal survey conducted in 1999 (U.S. Navy 2000) documented the wildlife species of NSA Bethesda. This was followed in 2007 and 2008 by a biological survey to document migratory birds, threatened and endangered species, benthic macroinvertebrates, and nuisance wildlife species at NSA Bethesda (U.S. Navy 2009b). To date, 83 bird, 15 mammal, 4 amphibian, 4 reptile species, and 21 invertebrates have been documented at the installation (Appendix 9).

Larger terrestrial species found on the installation include mammals such as whitetail deer (*Odocoileus virginianus*), domestic dog (*Canis lupus*), and red fox (*Vulpes vulpes*). Raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus niger*), and beaver (*Castor canadensis*) are medium-sized mammals that have been observed. Smaller mammals include several species of shrew, white footed mouse (*Peromyscus luecopus*), pine vole (*Microtus pinetorum*), and the big brown bat (*Eptesicus fuscus*) and little brown bat (*Myotis lucifugus*). Several other species including long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), and gray fox

(*Urocyon cinereargenteus*) have been mentioned in NSA Bethesda reports (U.S. Navy 2000, 2012a, 2012b), but were not documented in the 1999 or 2007 - 2008 surveys.

NSA Bethesda is located within the Atlantic Flyway, one of four major migratory flight routes in North America (USFWS 2011) and supports a wide diversity of migratory and resident bird species. Species that frequently inhabit urban environments and are abundant at NSA Bethesda include American robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), Canada goose, northern cardinal (*Cardinalis cardinalis*), and mourning dove (*Zenaida macroura*). Woodland species that occur at NSA Bethesda include Carolina wren (*Thryothorus ludovicianus*), Acadian flycatcher (*Empidonax virescens*), wood thrush (*Hylocichla mustelina*), hermit thrush (*Catharus guttatus*), and eastern wood-pewee (*Contopus virens*). Wetland birds are great blue heron (*Ardea herodias*), wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), belted kingfisher, and green heron (*Butorides virescens*). Raptors noted on the installation include red-shouldered hawk (*Buteo lineatus*) red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatusand*), Cooper's hawk (*Accipiter cooperii*), and American peregrine falcon (*Falco peregrines anatum*). As with several mammal species, numerous bird species have been cited in reports, but were not confirmed in recent surveys. Included are broad-winged hawk (*Buteo platypterus*), screech owl (*Megascops asio*), and great horned owl (*Bubo virginianus*).

The forested, landscaped, and riparian areas at NSA Bethesda are also habitat to amphibians such as red-backed salamander (*Plethodon cinereus*), northern two-lined salamander (*Eurycea bislineata*), and green frog (*Rana clamitans*). Reptiles observed inhabiting these areas include the, eastern banded water snake (*Nerodia fasciata*), eastern box turtle (*Terrapene carolina*), and black rat snake (*Elaphe obsoleta*). Species previously noted, but not documented in recent surveys include eastern spadefoot toad (*Scaphiopus holbrookii*), spotted salamander (*Ambystoma maculatum*), American toad (*Bufo americanus*), chorus frog (*Pseudacris triseriata*), Fowler's toad (*Bufo fowleri*), eastern hognose snake (*Heterodon platirhinos*), copperhead (*Agkistrodon contortrix*), eastern mud turtle (*Kinosternon subrubrum*), and six-lined racerunner (*Cnemidophorus sexlineatus*).

During a 1997 stream study three locations of Stoney Creek and one tributary were seined for fish. In two upstream locations and the tributary locations above the dam, no fish were present. At the furthest downstream location, below the dam and approximately one mile above Rock Creek, 234 fish were collected (U.S. Navy 2000).

The dominant species captured below the dam was blacknose dace (*Rhinichthys atratulus*). This species is a small minnow, about two to three inches long, that is characteristic of small streams and brooks, and is predominantly a pool dweller. The other species sampled were creek chub (*Semotilus atromaculaus*), green sunfish (*Lepomis cyanellus*), white sucker (*Catostomus commersoni*), and brown bullhead (*Ameiurus nebulosus*). All of the species collected are native

to the watersheds of this region except for the green sunfish, which is an introduced species. The blacknose dace, creek chub, and green sunfish species are tolerant and pioneer species; these species are dominant in fluctuating environments and have a relatively high tolerance for anthropogenic stress.

In addition to the fish discussed above, other species using these areas primarily include amphibians and invertebrates such as worms, snails, insects, and crustaceans (U.S. Navy 2000). Macroinvertebrate benthic species observed on the installation in the 2008 survey of Stoney Creek documented 21 taxa (identified to family, genus, or species) at five sample sites (U.S. Navy 2009b).

2.8.7 Resources of Special Interest

Except for occasional transient individuals, no state or federally proposed or listed endangered or threatened species or their critical habitat are known to exist at NSA Bethesda (U.S. Navy 2000; U.S. Navy 2009b; U.S. Navy 2013b). Two observations of American peregrine falcon, which is ranked as in need of conservation (I) by the MDNR, occurred in the fall and winter surveys of 2007. A number of other bird species that occur at NSA Bethesda are also considered rare or species of conservation concern by the MDNR Wildlife and Heritage Service, Natural Heritage Program. At least 10 documented species are listed as highly state rare or state rare for nonbreeding or highly state rare or state rare for breeding (MDNR 2010a). Sharp-shinned hawk is ranked as highly state rare or state rare for breeding; dark-eyed junco (*Junco hyemalis*), yellow-crowned night heron (*Nyctanassa violacea*), golden-crowned kinglet (*Regulus satrapa*), and winter wren (*Troglodytes troglodytes*) are ranked as state rare for breeding; gray catbird (*Dumetella carolinensis*) and chipping sparrow (*Spizella passerine*) are ranked as highly state rare for nonbreeding; pine siskin (*Carduelis pinus*), and American goldfinch (*Carduelis tristis*) are ranked as highly state rare or state rare for nonbreeding; and fox sparrow (*Passerella iliaca*) is ranked as state rare for nonbreeding. A number of watch list species also occurred; however, these are not actively tracked by the Wildlife and Heritage Service in Maryland.

An additional 11 species were observed that are listed as Partners in Flight (PIF) priority species for the Mid-Atlantic Piedmont Region. Tier I – High Continental Priority species are those that are of conservation concern throughout their range and include wood thrush (*Hylocichla mustelina*). Tier II – High Regional Priority species are those with a high priority in the physiographic region for which there is a high responsibility for conservation and include Acadian flycatcher (*Empidonax virescens*), green heron (*Butorides virescens*), eastern towhee (*Pipilo erythrophthalmus*), scarlet tanager (*Piranga olivacea*) and sharp-shinned hawk (*Accipiter striatus*). Tier III are species that are federally listed under the ESA of which none are known to occur at NSA Bethesda. Tier IV species are those that are listed by the state as threatened, endangered, or species of concern. Included are sharp-shinned hawk, Cooper's hawk (*Accipiter*

cooperii), red-shouldered hawk (*Buteo lineatus*), veery (*Catharus fuscescens*), great blue heron (*Ardea herodias*), and brown creeper (*Certhia americana*).

The MDNR also lists 21 birds and one reptile, eastern box turtle (*Terrapene Carolina*), that occur at NSA Bethesda as species of greatest conservation need (GCN) in Maryland (MDNR 2005)

All conservation status and rankings are identified for the flora and animal species known to occur at NSA Bethesda in Appendices 9 and 10, respectively.

2.8.8 Ecosystem Services

An ecosystem is a dynamic and natural complex of living organisms interacting with each other and with their associated physical environment (DoDI 4715.03). Ecosystem services are the processes that occur in the environment that provide goods or services beneficial to human health and livelihood. These include such services as clean air and water, timber, flood attenuation, fish and wildlife habitat, carbon sequestration, pollination of crops and native plants, and scenic landscapes, which provide cultural services such as spiritual, recreational, and cultural benefits. Ecosystem services in a DoD context are centered on sustaining healthy landscapes needed for effective military testing and training, with particular management of ecosystem services aimed at positively contributing to the long-term sustainability of the military mission. It is DoD policy to consider all benefits provided by ecosystems before engaging in activities that may have a negative impact on the services they provide. All DoD natural resources conservation program activities must further work to guarantee DoD continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of the resource base and the ecosystem services it provides, in accordance with the Sikes Act (DoDI 4715.03).

Ecosystem services at NSA Bethesda are primarily provided by the natural terrestrial and aquatic habitats on the installation; however, the base's extensive mowed lawn and landscaped habitat also provide some benefits. Vegetated areas at NSA Bethesda absorb precipitation and slow runoff, thereby reducing flooding and erosion, capture moisture that aids in recharging groundwater supplies, and are important to nutrient cycling in soil. They also filter pollutants that may otherwise enter surface waters, provide wildlife habitat, and mediate near-ground air temperatures compared to hard surfaces such as buildings and pavement that absorb and radiate heat. The forested areas and landscape trees specifically contribute positively to the atmosphere by increasing carbon sequestration, which reduces greenhouse gas contributing to global warming, and produce oxygen. Stoney Creek, Lake Eleanor, wetlands, and the man-made ponds at NSA Bethesda serve to attenuate flood damage at the installation and provide habitat to terrestrial and aquatic wildlife while also recharging groundwater. Natural landscape features at NSA Bethesda also benefit the mission by aiding the recovery of patients.

The highly developed nature of NSA Bethesda in combination with substantial presence of invasive plant species makes it unlikely any state or federally designated rare, threatened, or endangered species occur at the installation. Because NSA Bethesda is already highly developed, there would be only a limited need for off-base ecosystem services such as mitigation banking, in-lieu fee programs, conservation banking, or recovery crediting as described below.

2.8.8.1 Mitigating Loss of Ecosystem Service

Appropriate tools and projects shall be used to mitigate for any loss in quality or quantity of a given ecosystem service at NSA Bethesda. All NEPA analyses conducted for base activities should be reviewed for potential effects to the ecosystem services provided by the installation's natural resources, and how their loss may affect mission and operational capabilities over the long-term.

A variety of off-base efforts including mitigation banking, in-lieu fee programs conservation banking, and recovery crediting are available to support ecosystem services on-base, and to help DoD more effectively meet its legal requirements. One tool available to installation personnel for managing ecosystem services is ecosystem banking, which occurs through conservation easements, crediting, or prescriptive management of natural assets. An ecosystem bank is a parcel of off-base land containing natural resources that is conserved and managed to protect the value of those natural resources, and that is used to offset negative impacts to on-base land resources. Ecosystem banks can be established through the acquisition, protection, restoration, creation, and prescriptive management of off-base properties for specific natural assets. Examples of natural assets that are bankable include water quality, streams, wetlands; threatened, endangered, and at-risk species; carbon sequestration, and archeological resources. Other tools that are or may be available to installation personnel include wetland mitigation banking, habitat conservation banking, air emissions reduction credits, carbon trading, renewable energy credits, and water quality trading.

2.8.9 Climate Change Vulnerability Assessment

Climate change is any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). The magnitude and rate of future climate change will depend on factors such as the rate of increase of greenhouse gases in the atmosphere, how strongly climate features like temperature, precipitation, and sea level respond to atmospheric greenhouse gas concentrations, and other the natural influences on climate from sources such as volcanic activity, changes in the sun's intensity, and changes in ocean circulation patterns (EPA 2013a).

DoD recognizes climate change will play a significant role in its ability to fulfill its mission in the future as it will affect both built and natural infrastructure, which impact readiness and environmental stewardship responsibilities at installations across the nation. As part of as part of

its annual Strategic Sustainability Performance Plan (SSPP), DoD has released its Climate Change Adaptation Roadmap (CCAR) detailing its plan for managing the effects of climate change on its operations and infrastructure in the short and long term (DoD 2012). The CCAR identifies several potential high-level climate change impacts to the DoD mission and operations including rising temperatures, changes in precipitation patterns, increases in storm frequency and intensity, rising sea levels and associated storm surge, and changes in ocean temperature, circulation, salinity, and acidity. However, more comprehensive and region/installation-specific vulnerability assessments are needed to determine what adaptive responses are the most appropriate at individual installations.

Climate change vulnerability assessments are a means of preparing for and coping with the effects of climate change (Glick et al. 2011). A vulnerability assessment is a key element in identifying which species or systems are likely to be most strongly affected by projected changes in climate and provides a framework for understanding why particular species or systems are likely to be vulnerable, often depending on factors such as exposure, sensitivity, and adaptive capacity. Vulnerability assessments of natural systems are conducted at the biological levels of species, habitats, and ecosystems, and should consider the current context of existing stresses such as habitat fragmentation and invasive species in addition to climate projections (Glick et al. 2011). Such an assessment informs conservation planning by identifying climate-related threats and resulting stresses, which then become part of the decision-making process undertaken to identify and prioritize conservation strategies.

In Maryland, the Maryland Commission on Climate Change (MCCC) developed a Climate Action Plan that assessed Maryland's vulnerability to climate change impacts including sea level rise, increased storm intensity, extreme droughts and heat waves, and increased wind and rainfall events (MCCC 2008). The assessment indicates Maryland has experienced considerable shoreline erosion and deterioration of coastal wetlands, which are a critical component of its bays and estuaries as a result of sea level rise in the 20th century. The State's analysis also indicates the biodiversity of plants and animals associated with Maryland's forests is likely to decline and habitat alterations resulting from climate change may force out 34 or more bird species, including the emblematic Baltimore oriole, although more southerly species may replace them. Maryland forests will likely absorb more carbon dioxide (CO_2) and retain more carbon in wood and soils as atmospheric CO_2 increases, but this would depend on the specifics of how climate changes and factors such as the age of the forest and the degree of fertilization by nitrogen deposition. The oak-hickory forest type that presently characterizes most of the Piedmont, in which NSA Bethesda is located, is likely to transition to an oak-pine forest, with predicted shifts 250 miles northward under a low emissions scenario and twice that under high emissions conditions. Aquatic ecosystems will likely be degraded by flashier runoff and increased temperatures; intensified rainfall events and warmer surfaces (roads, roofs, etc.) would result in rapid increases in stream temperatures, limiting habitat suitability for native fishes and

other organisms. Higher peak flows and degraded streams would also transmit more nutrients and sediments to the Chesapeake Bay and its tidal tributaries, contributing to water quality impairment. The State of Maryland is proactively planning for future climate changes by developing a climate plan and recently passed the Greenhouse Gas Emissions Reduction Act of 2009 (GGRA) aimed at reducing greenhouse gas emissions to 25 percent below 2006 levels by 2020 (MCCC 2010).

2.8.9.1 Planning for Climate Change

Effects of climate change will likely be incremental and challenging to distinguish and assess. The analysis to assess potential impacts should be predictive in nature, relying on models to plan for probable complex and indirect changes that are likely to happen in the future. Addressing impacts to protected species and species of concern from global climate changes and developing modifications to natural resources management strategies to address them will require an adaptive process of developing, validating and improving forecast models needed for management. Steps in planning for climate change impacts to natural resources include:

- Conducting a vulnerability assessment of natural resources of interest,
- Developing common regional goals,
- Addressing already existing climate variability to identify trends,
- Participating in regional efforts to adapt to or mitigate for climate change, including monitoring impacts and identifying migratory pathways to support species movement and habitat shift,
- Updating of BMPs to address the risks posed by climate change to unique landscapes, ecosystems and habitats, and
- Using regional conservation partnerships and alliances to share information and collaborate across jurisdictions.

Training courses aimed at increasing knowledge of climate science and climate change as they relate to resource management are available for natural resources managers through such means as the USFWS National Conservation Training Center. Courses in vulnerability assessments, climate smart conservation, and planning for climate change would be applicable to natural resources management at NSA Bethesda.

National Conservation Training Center courses are available online or in the classroom at: http://nctc.fws.gov/courses/programs/climate-change/catalog.html

2.8.9.2 Climate Change Assessment Tools

A number of climate change modeling, vulnerability assessment, and sustainability tools are available to natural resources managers at NSA Bethesda.

The Nature Conservancy's Climate Wizard is available at: http://www.climatewizard.org/

The Nature Conservancy's Climate Wizard is web-based program that provides access to climate change information to assess how climate has changed over time and to project what future changes are predicted to occur in any given area of interest. This program allows the user to:

- View historic temperature and rainfall maps,
- View future predictions of temperature and rainfall, and
- View and download climate change maps.

The NatureServe Climate Change Vulnerability Index can help identify plant and animal species that are particularly vulnerable to the effects of climate change. This index can be used to predict whether a species will likely experience a range contraction and/or population reductions due to climate change. A subsequent pilot index, The NatureServe Climate Change Vulnerability Index for Ecosystems and Habitats, has been developed to explore assessing climate change vulnerability at the ecosystem level.

The NatureServe Climate change Vulnerability Index can be accessed at: https://connect.natureserve.org/science/climate-change/ccvi And http://www.natureserve.org/conservation-tools/data-maps-tools/climate-change-vulnerability-index-ecosystems-and-habitats

The Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP), DoD's environmental research programs, are also developing the science, models, tools, and methods necessary to identify vulnerable assets, assess impacts, and determine appropriate adaptive responses to climate change. Through SERDP, DoD has initiated pilot projects intended to develop and test assessment approaches and decision-making frameworks for climate adaptation appropriate for military installations.

The SERDP website provides guidance and tools for the performance of climate vulnerability assessments on DoD installations: http://www.serdp.org/Tools-and-Training/Resource-Conservation-and-Climate-Change/Climate-Change-Science-and-Tools2

3.0 RESOURCES MANAGEMENT AND MILITARY MISSION SUSTAINABILITY

3.1 Integrating Natural Resources Management and Military Mission

A primary goal of natural resources management at NSA Bethesda is to preserve and sustain conditions that are compatible with the military mission. This INRMP provides management recommendations for sustainable land use that supports the military mission by maintaining an environment in which personnel can continue to provide the administrative and logistical support to tenant unit personnel. Implementation of this INRMP will also help ensure the natural resources conservation program and military operations are integrated and all legal requirements concerning natural resources are met.

3.1.1 Operations Planning and Review

This INRMP was developed in coordination with all current base planning documents and has been reviewed by the installation Commanding Officer, Publics Works Officer, and Facility Planning to ensure support of the base mission and operations.

3.1.2 Environmental Awareness

NSA Bethesda has an active environmental awareness campaign that takes advantage of different means of publicity. Articles or notices of activities can be placed on the Environmental Support section of the CNIC website. Bulletin boards in various locations at NSA Bethesda are also utilized by the natural resources and environmental education office to apprise the personnel of projects and programs concerning natural resources and recycling. Injured service members and their families are particularly invited to participate in base activities, to the maximum extent possible.

The CNIC NSA Bethesda website is used to provide environmental information: http://www.cnic.navy.mil/regions/ndw/installations/nsa_bethesda.html.

Events such as Earth Day, National Public Lands Day (NPLD), International Migratory Bird Day, and National Pollinator Week present opportunities to inform the base employees, residents, and service members and their guests in environmental issues of importance at NSA Bethesda. Volunteers may be involved with a wide range of projects such as:

- Trash clean-up,
- Invasive plant removal,
- Native treee and native vegetation planting,
- Wildlife habitat improvement or restoration activities,
- Wetland, streamside, or shoreline restoration, and

- Interpretive trail building and/or maintenance.

Earth Day is widely celebrated by the DoD with numerous activities being sponsored around the region at many bases. The Navy Energy, Environment, and Climate Change website offers materials and support for initiating Earth Day events. Earth Day is celebrated on April 22, but may have related activities throughout the month. A base-wide cleanup with a focus along Stoney Creek is a regular feature at NSA Bethesda. Volunteers pick up trash from the stream and its banks, and place it in bags provided by and hauled away by the PWD.

The Navy Energy, Environment, and Climate Change website offers materials and support for initiating Earth Day events at: http://greenfleet.dodlive.mil/ENVIRONMENT/EARTH-DAY/.

NPLD is another annual event celebrated on thousands of public lands nationwide. To participate, a site must be registered on the NPLD website and promoted locally. Promotional posters and rack cards that provide basic information about National Public Lands Day as well as site specific information are provided by the National Environmental Education Foundation.

The National Environmental Education Foundation provides resources for NPLD events at: http://www.publiclandsday.org/about

National Pollinator Week was designated as the final week in June by the U.S. Senate in 2007. The Pollinator Partnership is a major organizer of events to recognize this week and provides information on pollinators and annual events. The DoD Natural Resources Conservation Compliance Program helped charter the pollinators working group, which provides DoD-specific information regarding workshop schedules and funding opportunities for pollinator conservation.

The Pollinator Partnership provides resources for National Pollinator Week: http://www.pollinator.org/index.html

And the DoD Pollinators working group can offer DoD specific guidelines: http://www.dodpollinators.org/index.html

3.1.3 Sustainability Challenges

The rapid level of development at NSA Bethesda that has resulted from BRAC actions presents the greatest challenges to ecosystem integrity and sustainability. The installation master plan and IAP place importance on maintaining any remaining natural habitat as an important component of the base mission and recommend locating new land uses in existing areas, rather than develop undeveloped sites. Following this recommendation as well as implementing the habitat

enhancement projects recommended in this INRMP will help ensure the continued sustainability of the remaining natural resources at NSA Bethesda.

3.2 Encroachment

Internal encroachment issues at NSA Bethesda that may impede the performance of the mission identified in the installation EAP and summarized in Section 2.6 of this INRMP include noise, competition for air and land space and other scarce resources, air quality, water quality, cultural resources, anti-terrorism/force protection setbacks, and ER sites. Several other off-installation encroachment issues also threaten the Navy's capability to fully maximize its mission potential. Included are traffic congestion, development along the installation's northern border, and excessive noise created by heavy traffic.

3.2.1 Encroachment Partnering

Coordination with various state, federal, and local agencies and entities that approve Navy plans, enforce environmental regulations, and oversee the external development and zoning processes is often required to meet regulatory requirements and maintain community relations. Frequent encroachment partners include:

- MDE
- Maryland Department of Transportation
- Maryland Historical Trust
- Maryland National Capital Parks Planning Commission
- Maryland State Highway Administration
- Metropolitan Washington Council of Governments
- Montgomery County Department of Transportation
- National Capital Planning Commission
- National Park Service (NPS)
- SHPO
- USFWS
- Washington Metropolitan Area Transit Authority

3.2.2 Encroachment Management

The installation EAP addresses encroachment issues at NSA Bethesda. A primary recommendation for managing encroachment is for NSA Bethesda to employ a full-time Community Planning Liaison Officer (CPLO) position to coordinate interagency and neighbor communications. Ideally, the CPLO should have training and support from subject matter experts in coordinating the encroachment program.

3.2.3 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. Natural resources activities that reduce soil erosion; protect and restore land and waterways from invasive nonnative species infestation; and promote the protection and enhancement of wetlands and floodplains help achieve no net loss of the NSA Bethesda mission. The green spaces and forested areas at NSA Bethesda are also recognized as providing an essential healing environment for injured service members. Protection of these areas is therefore critical to ensuring no net loss to the installation's mission.

3.3 National Environmental Policy Act

Pursuant to NEPA of 1969, 42 USC §4321 et seq., and in accordance with the regulations of the Council on Environmental Quality (CEQ) that implement NEPA procedures (40 CFR Parts 1500-1508), all federal agencies must 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 5090.1D 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.

3.3.1 Levels of Documentation

CEQ regulations prescribe three levels of NEPA documentation: categorical exclusions (CATEX), EAs, or EISs, depending on the expected significance of impacts from a proposed action and its alternatives.

3.3.1.1 Categorical Exclusions

A CATEX includes a category of actions that do not individually or cumulatively have a significant effect on the human environment, do not result in any significant change from existing conditions, or whose effect is primarily economic or social, and therefore do not require an EA or an EIS. Procedures on how to record a CATEX and the current list of 45 CATEXs are provided in OPNAVIST 5090.1D Reference (c), Chapter 10, Section 10-3.14.

3.3.1.2 Environmental Assessments

An EA is a concise public document for which a federal agency is responsible that serves to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact (FONSI) and aids an agency's compliance with NEPA when no EIS is necessary. It may further facilitate preparation of a statement when one is necessary. An EA must include brief discussion of the need for the proposal, alternatives for the action, environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted. OPNAVIST 5090.1D, Reference (c), Chapter 10, Section 10-3.15 provides guidance on procedures, a list of actions that would generally require and EA, and a description of the core components of an EA.

3.3.1.3 Environmental Impact Statements

An EIS is an environmental document prepared for major federal actions that may have a significant impact on the quality of the human environment. According to 40 CFR part 1502, "The primary purpose of an EIS is to serve as an action-forcing device to insure that the policies and goals defined in NEPA are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment". A list of actions that would require preparation of an EIS and detailed Navy guidance on EIS procedures are provided in OPNAVINST 5090.1D1D Reference (c), Chapter 10, Section 10-3.16.

3.3.2 Site Approval Process

In order to facilitate early planning, a site approval request (SAR) is required for all Navy projects and non-Navy projects sited on Navy-controlled land holdings. At NSA Bethesda, all new work must go through the site approval process. New land or building proposals are submitted on a site approval form, 11010.31 to the Asset Management (AM) group. Site approvals are routed through AM, coordinated with installation Utilities, the Facilities Engineering and Acquisition Department (FEAD) and then forwarded to the Assistant Public Works Officer (APWO) for review. The APWO will approve the request and forward it to the PWO for review and approval. Depending on the nature of the request, additional approval from the ICO may be required. This is determined by the planning group when the proposal is submitted. The level of NEPA documentation for a proposed action is also identified during the SAR process.

3.3.3 NEPA Analysis on INRMPs

Implementation of an INRMP is considered 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 would be covered under the original NEPA documentation and therefore neither additional NEPA analysis nor an opportunity for public comment should be necessary unless there has been a major change in installation mission or program scope. However, a Memorandum for the Record or updated FONSI may be required to identify the previous NEPA document being relied on. An INRMP revision, however; which may result in a significant environmental impact, including those not anticipated by the parties to the INRMP when the plan was last approved and/or reviewed does require new or supplemental NEPA analysis.

The NEPA process may be used to meet DoD's INRMP public review requirements and to document the decision to formally implement this INRMP. The NEPA process, however, will satisfy Sikes Act public comment requirements only if the public is provided a meaningful opportunity to comment upon the draft INRMP as part of the NEPA process. Absent some extraordinary circumstance, the public should be afforded a minimum of 30 days to review and comment upon the draft INRMP, whether as part of the NEPA process or through some other process. An EA was developed for the implementation of this INRMP and the FONSI is included as Appendix 19.

3.3.4 Mitigation Measures

The purpose of mitigation is to reduce or eliminate potential negative impacts of an action on affected resources. CEQ regulations (40 CFR part 1508.20) state that mitigation includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action,
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation,
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment,
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and
- Compensating for the impact by replacing or providing substitute resources or environments.

Regulations established by CEQ state that all relevant reasonable mitigation measures that could alleviate the environmental effects of an action must be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies. This serves to alert agencies or officials who can implement these extra measures, and will encourage them to do so.

3.4 Consultation Requirements

As a federal agency, DoD must comply with numerous environmental laws and mandates designed to prevent or minimize the negative impacts of government activities on human health

and the environment. Many of these laws including the ESA, Bald and Golden Eagle Protection Act (BGEPA), CWA, Coastal Zone Management Act (CZMA), MBTA, MMPA, and Magnuson-Stevens Fishery Conservation and Management Act require consultation with a designated federal regulatory agency such as USFWS, National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), or the U.S. Army Corps of Engineers (USACE) if a federal action has the potential to adversely impact a regulated resource.

3.4.1 Endangered Species Act

Under the ESA, each federal agency must consult with the USFWS or NOAA Fisheries to ensure that its actions are not likely to threaten the continued existence of any threatened or endangered species or result in the destruction or adverse modification of habitat of such species. Section 7 of the ESA requires federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species. Federal agencies are required to consult with the USFWS or NOAA Fisheries if an action may affect a listed species. Federally listed threatened and endangered species known to occur in Montgomery County, Maryland are listed in Appendix 11. There are currently no federally listed threatened or endangered species known to occur at NSA Bethesda, therefore no federal agency consultation regarding these resources is required.

3.4.2 Bald and Golden Eagle Protection Act

The BGEPA prohibits the taking, possession, and transportation of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) and their parts, nests, and eggs for scientific, educational, and depredation control purposes, except as allowed by a valid permit issued by the USFWS. In September 2009, the USFWS issued a final rule authorizing limited take and establish permit provisions for bald and golden eagle under the BGEPA where the take to be authorized is associated with otherwise lawful activities (74 Federal Register [FR] 46836). No bald or golden eagles are known or expected to occur at NSA Bethesda, therefore no federal agency consultation regarding these resources is required.

3.4.3 Clean Water Act

Under Section 404 of the CWA, discharge of dredge and fill material into waters of the United States, including wetlands, is prohibited unless a permit is issued by the USACE. Section 401 of the CWA requires additional certification from the appropriate state regulatory agency. MDE oversees impacts to state waters and wetlands, including isolated wetlands in Maryland. Military construction (MILCON) and other activities with the potential to disturb wetlands must be reviewed individually with regard to wetland impacts, state and federal permits are sought as needed. Any future activity at the installation with potential to impact wetlands will be coordinated with the Maryland Joint Evaluation Board, Permits and other authorizations will be sought as required by the individual action.

3.4.4 Coastal Zone Management Act

The federal 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. Maryland's coastal zone includes 16 counties and Baltimore City and excludes Montgomery County (MDNR n.d. a). As such, there are no requirements for NSA Bethesda under the CZMA or Maryland's enforceable policies.

3.4.5 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 (75 FR 9282). 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.

3.4.6 Marine Mammal Protection Act

The MMPA established a moratorium on the taking of marine mammals in waters or on lands under the jurisdiction of the United States (16 USC §1361). No marine mammals are known or expected to occur at NSA Bethesda or in the immediate area, therefore no consultations would be required under the Marine Mammal Protection Act.

3.4.7 Magnuson-Stevens-Fishery Conservation and Management Act

The Magnuson-Stevens-Fishery Conservation and Management Act 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. No EFH has been designated at NSA Bethesda or in the immediate vicinity; therefore no consultations would be required under the Magnuson-Stevens-Fishery Conservation Management Act.

3.5 State Wildlife Action Plan

The Maryland Wildlife Diversity Conservation Plan (WDCP) was developed and is implemented by the MDNR Wildlife and Heritage Service (MDNR 2005). The WDCP is a 10-year strategic

The Maryland WDCP is available online: http://www.dnr.state.md.us/wildlife/Plants_Wildlife/WLDP/divplan_final.asp

plan that is required for continued funding through the State Wildlife Grant Program administered by the USFWS. The WDCP was developed with extensive input from other state and federal agencies, non-governmental organizations, and private citizens.

The WDCP focuses on species and habitats of GCN in Maryland; however, it is also an action plan for the conservation of all of the state's wildlife. A total of 502 GCN wildlife species and 35 key wildlife habitats are assessed; threats are identified, and conservation actions, and research needs are recommended. The WDCP identifies significant threats including habitat loss, degradation, fragmentation, disturbances (both natural and anthropogenic), pollution, and outlines conservation actions and information needs for GCN species and key habitats.

3.5.1 Geographic Area or Habitats of Interest

The Maryland WDCP describes 35 key wildlife habitats associated with the state's species of GCN. The only key wildlife habitat type currently known to occur on NSA Bethesda is mesic deciduous forest. Mesic deciduous forests represent a broad group of forested habitats that occur throughout much of Maryland. In general, mesic forests are comprised of mixed canopies of tulip poplar, American beech, oaks, and hickories and understories of flowering dogwood, pawpaw (*Asimina triloba*), and American hornbean (*Carpinus caroliniana*). Many of the oaks and other associated trees of these forests vary by region. Threats to the remaining areas of mesic deciduous forest that are relevant to NSA Bethesda include:

- Conversion to other land uses or forest types that results in loss of habitat,
- Incompatible management practices that result in degradation of habitat,
- Development and land use, including roadways and trails that results in forest fragmentation and isolation,
- Deer over-browsing or other causes that result in loss of forest structural diversity,
- Invasive species that result in degradation of habitat, and
- Human disturbance that results in degradation of habitat.

Other key wildlife habitats that could be developed or enhanced at NSA Bethesda are nontidal emergent wetlands and nontidal shrub wetlands. Nontidal emergent wetlands are inland freshwater wetlands. Nontidal shrub wetlands are inland freshwater wetlands dominated by shrubs and small trees (< 8 m tall). They usually exist as small patch plant communities (< 10 ha) or as transitional or ecotonal habitats within larger freshwater wetland systems.

3.5.2 Species of Greatest Conservation Need and Priority Actions

The WDCP identifies a large number of conservation actions to address problems facing Maryland's at-risk species and key wildlife habitats. Twenty-four overarching state-wide actions recommended include coordination; education and outreach; enforcement; habitat management;

land protection; planning; regulations, policy and law; and species management. Additional specific recommendations are made for individual taxon and/or key wildlife habitats. Management actions recommended in this INRMP that are generally aimed at habitat improvement will benefit a number of GCN species, as identified in the Maryland WDCP. Twenty bird species of GCN have been documented at NSA Bethesda and are identified in Appendix 9. Specific recommendations provided in this INRMP that support state conservation efforts include:

- Conserving existing blocks of contiguous forest,
- Leaving snags to enhance existing habitat (when not a safety issue),
- Invasive species control,
- Vegetation restoration,
- Mapping and protecting wetlands, and
- Shallow water habitat enhancement.

3.6 Other Land Use Plans

3.6.1 USFWS Plans

There is no USFWS property in the immediate vicinity of NSA Bethesda, therefore these plans are not directly relevant to this INRMP.

3.6.2 Bureau of Land Management Plans

There is no Bureau of Land Management property in the immediate vicinity of NSA Bethesda, therefore these plans are not directly relevant to this INRMP.

3.6.3 U.S. Forest Service Plans

There is no U.S. Forest Service property in the immediate vicinity of NSA Bethesda, therefore these plans are not directly relevant to this INRMP.

3.6.4 National Park Service Plans

There is no NPS property in the immediate vicinity of NSA Bethesda, therefore these plans are not directly relevant to this INRMP.

3.6.5 State Forest Plans

There is no State Forest property in the immediate vicinity of NSA Bethesda, therefore these plans are not directly relevant to this INRMP.

3.6.6 Local or Regional Comprehensive Community Plans

NSA Bethesda is located within or in proximity to several land use policy, planning, or regulation areas that could have an impact on land uses within the installation. Two plans include NSA Bethesda within their planning area: the Maryland-National Capital Park and Planning Commission's (M-NCPPC) Planning Area 35, Bethesda-Chevy Chase from 1990 and the National Capital Planning Commission's Comprehensive Plan for the National Capital from 2004. Three additional plans also mention NSA Bethesda and affect land uses that are near the installation: the Bethesda Central Business District Sector Plan from 1994, the Woodmont Triangle Amendment to the Bethesda Central Business District (CBD) from 2006, and the 2003 NIH Master Plan Update (U.S. Navy 2013b).

NSA Bethesda must take these regional and local zoning plans into account and coordinate with the appropriate level of planner to ensure any actions at NSA Bethesda are assessed for impacts to surrounding communities as well as to ensure that development is within guidelines of the master plan for the federal facilities. The landscaped buffer zones along NSA Bethesda's borders with neighboring communities in particular should be reconfirmed so as to preserve the open space character of the site as development in the CBD of Bethesda intensifies (M-NCPPC 1990).

The M-NCPPC Montgomery County Parks also has an extensive system of parks and trails in the vicinity of NSA Bethesda, including a portion of Rock Creek Regional Park that lies just north of the Capital Beltway on the installation's northern border. As Stoney Creek drains into Rock Creek at the park boundary, any activities on NSA Bethesda with potential to impact the creek should be communicated to park managers.

3.7 Public Access and Outreach

3.7.1 Public Access and Outdoor Recreation

The NSA Bethesda natural areas and recreational facilities are open to active duty and retired military, reservists, DoD employees, family members, and contractors. The base is not open to the general public. The recreational facilities are managed and operated by MWR.

3.7.2 Public Outreach

Public outreach efforts have centered on recent BRAC actions and the Medical Facilities Development and University Expansion at NSA Bethesda. NSA Bethesda has consistently participated in the Walter Reed BRAC Integration Committee (WRBIC, formerly the MCBIC – Montgomery County BRAC Implementation Committee). This is a group consisting of Federal, State, Local planning and transportation entities as well as representatives from local home owners associations near NSAB. Public service activities are coordinated through the NSA Bethesda Public Affairs Office, who is responsible for publishing notices of intent and public scoping meetings.

3.8 Partnerships

The development of partnerships with state and federal natural resources agencies as well as local conservation and academic institutions makes such expertise available to natural resources personnel to accomplish set goals and objectives. An added benefit of cooperating with volunteers and conservation groups to assist with natural resources projects is that it fosters good community relationships and allows the volunteers to become invested in the area's natural resources. The following is a list of groups and agencies that have formed significant partnerships with the NSA Bethesda natural resources program:

- The USFWS is a primary stakeholder in the development and review of this INRMP and provides assistance in matters that concern the conservation, protection, and management of fish and wildlife species.
- The Maryland Natural Heritage Program provides information and guidance related to threatened and endangered species information.
- U.S. Geological Survey provides assistance on pollinator surveys on and around the installation.

4.0 NATURAL RESOURCES MANAGEMENT PROGRAM ACTIONS

4.1 Forest Management

NSA Bethesda supports approximately 56 acres of forested habitat; however, small tree clumps and woodlands scattered throughout the developed portions of the base are included in that acreage. The largest forested areas are those situated to the north and south of the USUHS campus (Figure 4-1). These larger forested areas at NSA Bethesda date to the original land purchase in the 1930s (see photo page 2-5) and are well over 100 years old. Other smaller forested areas such as the buffer along the Stoney Creek corridor are included.

The forested areas are recognized as mission-critical at NSA Bethesda as they provide an essential healing environment for injured service members and their families and guests. The NSA Bethesda IAP and Installation Master Plan recommend the wooded areas be protected and expanded to the extent practical, as they offer an invaluable natural and visual resource for employees and visitors (U.S. Navy 2010a and 2012). Preservation of the mature wooded area adjacent to Jones Bridge Road (Woodland 3) is also important for preserving the character of the Hawkins Lane Historic District, a state-designated historic area, which is located immediately to the east of NSA Bethesda (U.S. Navy 2009b). In addition, a significant number of ecosystem functions including providing wildlife habitat, soil and water protection, nutrient cycling, climate amelioration, and carbon sequestration, as well as services such as spiritual, recreational, and cultural benefits are provided by the facility's forested areas.

The primary goals of forest management at NSA Bethesda are to:

- Conserve and enhance existing forested areas to maximize ecosystem services, and
- Ensure a safe forest environment for the enjoyment of the NSA Bethesda community, injured service members and their families and guests.

4.1.1 Forest Management Surveys

The NSA Bethesda forested areas were surveyed as part of a floral inventory conducted in 1999 in support of the 2000 Draft INRMP (U.S. Navy 2000) and were again assessed in 2008 as part of a survey for native and invasive plant species (U.S. Navy 2009a). No timber inventories or commercial assessments have been conducted as commercial forest management would not be consistent with the military mission or installation and regional land use planning.

The floral inventory included detailed descriptions of the wooded corridor of Stoney Creek and six woodland areas. Since the 1999 survey, invasive species have become the common factor in all of the forested areas and there is no practical management benefit for treating the forested areas as discrete units, therefore each contiguous forest block will be treated as a single unit in the following forest survey summary.

Figure 4-1. Areas of Contiguous Forest at NSA Bethesda

Woodland 1 is a 5.6-acre triangular patch of woodland along the northeast boundary of the installation between Perimeter Road and a former golf fairway, now a mowed field. Large white oaks and red oaks (several estimated at 90 - 100 feet in height) dominate this small woodland. The gentle northwest-facing slope contains rich, moist soil supporting masses of spring beauty, star chickweed (*Stellaria pubera*), cut-leaved toothwort, and trout-lily (*Erythronium americanum*), which were found during the 1999 survey, but were not observed in the 2008 survey. Trout-lily and lady fern (*Athyrium felix-femina*), both usually found along the floodplains of rivers and streams, indicate a particularly moist soil at this site. Unfortunately, this area adjoins the storage area for grounds maintenance materials and a portion of this area previously served as a nursery stock storage area, and therefore has various nonnative tree species such as Japanese maple (*Acer palmatum*) and barberry (*Berberis* sp). The area is further damaged by the presence of invasive non-native species such as English ivy and winter creeper (*Euonymus fortunei*).

Woodland 2 includes approximately 13.6 acres and is traversed by a paved trail that connects the northeast side of the installation with the USUHS campus. This woodland contains numerous very large trees including white oak (one tree is approximately three feet in diameter), red oak, and tuliptree. Major understory trees in the woods are sassafras and red maple. The shrub layer contains mapleleaf viburnum, a showy spring flowering shrub that grows in well-drained, acidic soils and a stand of mountain laurel (*Kalmia latifolia*), another showy shrub that is fairly common locally. Several kinds of woodland wildflowers occur in the woods wherever the invasive species are less dominant. Spring beauty, rue-anemone (*Anemonella thalictroides*), smooth Solomon's seal (*Polygonatum biflorum*), white wood aster (*Aster divaricatus*), bloodroot (*Sanguinaria canadensis*), star chickweed, black cohosh (*Cimicifuga racemosa*), smooth yellow violet (*Viola pensylvanica*), and common blue violet (*V. papilionacea*) all occur in small numbers. Also noteworthy is a large stand of broad beech fern (*Phegopteris hexagonoptera*), which although not rare, is not a common fern in Piedmont woodlands.

Mapleleaf Viburnum in Woodland 2

The west-facing slope between the two foot bridges that cross Stoney Creek is notable for a lack of invasive species and for some unusual native plants. This small area is dominated by American beech and white oak with native shrubs of witchhazel and black haw viburnum (*Viburnum prunifolium*). Many wildflowers occur on the slope including wild sarsaparilla *(Aralia nudicaulis*), a northern species usually found within the Piedmont region of Maryland

only in cool forests. Other native flowers on this slope are spring beauty, false Solomon's seal (*Smilacina racemosa*), spotted wintergreen (*Chimaphila maculata*), and bluestem goldenrod (*Solidago caesia*).

The combination of large trees and forest-dwelling wildlife indicates that this area was once a healthy, intact natural habitat. Forest interior birds such as red-bellied woodpecker and Eastern wood peewee were noted several times during the 1999 flora survey. However, the dominance of the invasive, non-native plants is so prevalent now that very few native plants can compete.

Woodland 3 includes 7.4 acres south of the USUHS campus adjacent to Jones Bridge Road. This woodland contains mature woods with many large trees. Several tuliptrees are over 100 feet tall and about three feet in diameter. Spicebush is the dominant native shrub, which indicates a rich, moist soil. However, the invasive bush honeysuckle (*Lonicera maackii*) has crowded out spicebush in many places. The terrain is very hilly. A paved path wanders through these woods, but it is not well maintained and doesn't appear to be used as much as the trail north of the University. These woods are not quite so damaged by invasive plants as the woods to the north. There are several patches of wildflowers such as Jack-in-the-pulpit (*Arisaema triphyllum*) and black cohosh, as well as many of the spring ephemerals noted in Woodland 2, and large colonies of sensitive fern (*Onoclea sensibilis*) and broad beech fern.

Woodland 4 consists of the 3 acre area of steep banks north of Stoney Creek. The area has a mature hardwood forest cover that is underlain by bush honeysuckle, English ivy and various nonnative species. Slopes in this area are generally greater than 15 percent and erosion hazard is great.

Woodland 5 includes the Stoney Creek stream corridor between Stone Lake Road and Jones Bridge Road. This 4.3-acre area contains a diversity of native and naturalized plant species mixed with cultivated plants. The overgrown thickets near the stream provide good habitat for birds and other wildlife. Several plants valuable as wildlife food grow here, including poison ivy (*Toxicodendron radicans*) American pokeweed (*Phytolacca americana*), common milkweed (*Asclepias syriaca*), black cherry (*Prunus serotina*), and American holly. This stream corridor also contains many invasive vine species and other nonnative plants near the stream, with grassy lawns and specimen trees closer to the bordering roadways. The open grassy areas contain planted specimens of native trees such as tulip poplar, white oak, black walnut (*Juglans nigra*), black willow (*Salix nigra*), and white pine (*Pinus strobus*), as well as non-native trees such as Norway spruce (*Picea abies*) and European larch (*Larix decidua*).

4.1.2 Forest Management Strategies

Forest management strategies in urban forests with no commercial potential are generally limited to forest health management and hazardous tree management. Forest health issues at NSA Bethesda include invasive plant infestations, over-browsing by whitetail deer, and forest pests

and diseases. Forest diseases and insect pests, hazardous tree management, and enhancement strategies are discussed below. Management strategies that address invasive species will be discussed in detail in Sections 4.7.

4.1.2.1 Forest Pests and Diseases

Gypsy Moth

Gypsy moth (*Lymantria dispar dispar*) is native to western Europe and was introduced into the U.S. in 1869. Severe gypsy moth infestation can result in loss of species diversity, degradation of natural habitat, and a loss of aesthetic value of landscape resources. The U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection services (APHIS) has imposed a gypsy moth quarantine on all or part of 18 states in the eastern United States including all of Maryland, which regulates the interstate movement of regulated articles and outdoor household articles (APHIS 2011). Although it has been a serious forest pest in the past, recent outbreaks in Maryland have been minimal (Montgomery County 2011). Natural and introduced controls, including predators and viral and fungal diseases, have kept populations low in recent years. Aerial spraying for gypsy moths has been carried out in past years at NSA Bethesda as a method of control within the forested areas. NSA Bethesda must coordinate with the NAVFAC Head Quarters (HQ) Forester to participate in the regional MOU with the U.S. Forest Service (USFS) to participate in and arrange for periodic fly-overs to assess damage from gypsy moths.

Photo credit: John H. Ghent, U.S. Forest Service

Gypsy Moth Females with Egg Masses and Adult Gypsy Moth Caterpillar

Emerald Ash Borer

The emerald ash borer (*Agrilus planipennis*) is an exotic pest from Asia that infests and kills forest and landscape ash trees (*Fraxinus* spp.). It was first discovered in the U.S. in Michigan in 2002 and is now known to occur in 19 states (APHIS 2013). The adult beetles eat ash foliage, but causes little damage, whereas the larvae feed in the cambium between the bark and wood, producing galleries that eventually girdle and kill branches and entire trees (USFS 2004). The Maryland Department of Agriculture placed all of Maryland's counties west of the Susquehanna

River and the Chesapeake Bay, including Montgomery County, under a quarantine to prohibit the movement of ash trees and wood out of the quarantined area. The quarantine includes all hardwood firewood, nursery stock, green lumber, and other material living, dead, cut, or fallen, (e.g., logs, stumps, roots, branches) of the genus Fraxinus, including any piece thereof; or uncomposted ash chips and uncomposted ash bark chips larger than one inch in diameter in two dimensions (MDNR 2012). Treatment for emerald ash borer may be desirable if detected in high-value trees or trees of ecological significance. Several tests for herbicide treatment of infested ash trees have shown good results in controlling damage from this pest. One study suggests that a single injection of emamectin benzoate may control emerald ash borer for three years (Herms et al. 2009).

Photo credit: U.S. Forest Service 2004

Emerald Ash Borer Second, Third, and Fourth Stage Larvae and Adult

Sycamore Anthracnose and Dogwood Anthracnose

Two forest diseases that can cause forest health problems include sycamore anthracnose (caused by the fungus *Gnomonia platani*) and dogwood anthracnose (caused by several fungal agents). To date, these organisms have not been a problem at NSA Bethesda, but should be watched for, as they are able to cause severe damage to shade and forest trees. Cold, wet spring conditions increase outbreaks and severity of both of these fungal diseases.

Symptoms of sycamore anthracnose include shoot dieback and blighted areas on leaves that usually run along the veins. In severe outbreaks, nearly total defoliation can occur, but trees recover as daytime temperatures increase. Sanitation (raking fallen leaves and twigs, pruning out cankered branches back to healthy wood) can help to reduce the amount of reinfection. For high-value sycamores, arborists have successfully controlled sycamore anthracnose using trunk injections of a systemic fungicide. Injections are performed in late summer (early September) when trees are in full leaf, and protection can last up to three years (University of Maryland Extension 2013).

Early symptoms of dogwood anthracnose are spots that usually appear on leaves and flower bracts in mid to late May. Typical leaf spots are tan with dark purple borders and are variable in

size and shape. Blighted gray and drooping leaves hang on the twigs. Symptoms appear during cool, wet weather and often diminish as the summer gets hotter and drier. The fungus spreads from the leaves to twigs and limbs. Diseased trees produce numerous epicormic shoots, or water sprouts, on the trunk and lower limbs. Cankers appear on the main trunk and eventually the tree dies. Seedlings also can be killed by the fungus (MDNR n.d. a).

Miscellaneous Insect Pests and Diseases in Hardwoods

Eastern tent caterpillar (*Malacosoma americanum*), forest tent caterpillar (*Malacosoma disstria*), fall and spring cankerworm (*Alsophila pometaria* and *Paleacrita vernata*) and fall webworm (*Hyphantria cunea*) are common pests of hardwood species; however, they do not generally cause mortality and are more of an aesthetic issue than forest health issue.

4.1.2.2 Hazardous Tree Management

Because of the age of the forest at NSA Bethesda, broken limbs and fallen trees are a common occurrence and can be a safety hazard for people using the trails. In addition, trees that are on steep eroding slopes can be a danger to other trees in the vicinity as well as to passersby. Periodic monitoring, particularly following heavy rain events, is necessary to identify and initiate removal of hazard trees, which if left unattended could cause damage to persons or property. It is critical that tree removal and pruning is performed only by trained personnel or qualified tree care professionals. Woody debris may be left in the woods as long as it is several feet or more from the trails.

Leaving dead trees (snags) standing in the wooded areas, where they will not become a hazard, is an ideal way to maintain habitat for many bird and small mammal species that eat the insects that inhabit dead trees and rely on natural cavities for nesting. Several species of woodpeckers, owls, eastern bluebirds (*Sialia sialis*), Carolina chickadee (*Poecile carolinensis*), American kestrel (*Falco sparverius*), and numerous other species nest in tree cavities, which they excavate themselves or which were excavated by another cavity nesting species. Several mammal species including flying squirrels, grey squirrels, and chipmunk nest and/or store food in snags. Fallen trees are also beneficial to a host of wildlife species including salamanders, lizards, ground foraging birds, and small mammals, and will be left in place in wooded areas.

4.1.2.3 Forest Enhancement

Because of the dense whitetail deer population at NSA Bethesda, one method of enhancing forest health and diversity would be to exclude deer from a few select areas in order to allow for the recovery and establishment of native vegetation. The use of deer exclosures generally consists of installing an 8-foot tall minimum galvanized wire mesh or propylene mesh that is stretched between posts. Two 4-foot sections can be combined to create an 8-foot fence. Walk-thru gates should be installed to provide access. High tensile electric wire fencing is a less expensive alternative that may also be used, but requires more maintenance once it is set up. Generators

used to power remote electric fences can also have problems that lead to power outages and allow deer access.

4.1.3 Forest Management Actions

As no commercial forestry operations are recommended at NSA Bethesda, forest management is limited to forest health monitoring and hazardous tree management.

Recommended actions are to:

- Monitor and identify hazard and storm-damaged trees for clean-up, as needed. Ensure all personnel involved in tree felling are certified arborists,
- When hazard trees are removed from landscaped areas, replace with native species. Coordinate with appropriate species identified in the IAP for that zone, when practicable.
- Conduct annual gypsy moth egg mass surveys to assess the level of infestation for the coming season. Coordinate with the NAVFAC HQ Forester to implement MOU with USFS or Montgomery County to participate in regional control measures,
- Conduct a survey of ash trees and map locations. Periodically inspect for evidence of emerald ash borer. Coordinate with the NAVFAC HQ Forester to treat high value trees such as those that are considered important landscape trees or a major component of the forest ecosystem,
- Monitor sycamore and dogwood trees for signs of anthracnose. Coordinate with the NAVFAC HQ Forester to treat high value trees such as those that are considered important landscape trees or a major component of the forest ecosystem, and
- Identify and establish temporary fencing around locations that can be enhanced with a variety of native species and serve as a seed bank for long-term forest regeneration.

4.2 Vegetation Management

In addition to the larger forested woodland areas described in Section 4.1.1, there are a variety of landscaped areas, street trees, lawns, and small vegetated buffer areas that occur along fence rows, beside roadways, and generally following the perimeter of NSA Bethesda. The expansive lawn located on the west side of the installation is particularly important as it is noted as a historic landscape within the base's historic district (U.S. Navy 2013a). As with the base's forests, these vegetated areas provide a host of environmental, aesthetic, and cultural benefits, and are an integral aspect of the healing mission and teaching mission at NSA Bethesda.

The goal of vegetation management is to provide an attractive, safe environment, while promoting sustainability through minimizing the use of energy, water, fertilizer, and herbicides. Grounds maintenance practices must also prevent the installation from contributing to pollution

of receiving waters, such as Stoney Creek, from sedimentation and excess nutrients and pesticides.

4.2.1 Vegetation Surveys

The floral surveys conducted at NSA Bethesda that were conducted in support of the 2000 INRMP (U.S. Navy 2000) and in 2008 as part of a biological survey (U.S. Navy 2009a) include an extensive inventory and characterization of the semi-natural and natural areas of the installation. In addition, a street tree survey conducted in support of the 2010 IAP (U.S. Navy 2010a) provides a comprehensive inventory of street trees along many of the major NSA Bethesda streets. Together, inventories and incidental observations by qualified biologists have identified over 160 plant species at NSA Bethesda (Appendix 8).

4.2.2 Vegetation Management Strategies

4.2.2.1 Beneficial Landscaping

Areas landscaped with trees and shrubs improve quality of life for NSA Bethesda personnel, patients, and their visitors by improving curb appeal and providing a more natural, pleasant environment to live and work in. Landscaping with trees and shrubs also has environmental and economic benefits, which are derived from the ameliorating effects trees and shrubs have on harsh environmental factors, such as wind, rain, and sun. Trees and shrubs that are planted in appropriate locations reduce energy consumption by shading buildings, providing windbreaks, and cooling the air through transpiration. Benefits from landscape vegetation can be maximized by planting deciduous trees on the south, east, and west sides of buildings to provide shade during the summer but allow sun in the winter, and using evergreen buffers on the windward side of buildings to reduce wind.

A key guidance on landscape maintenance practices on federal properties is the 1994 Presidential Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837). This memorandum requires federal agencies to incorporate beneficial landscape practices to all federal grounds, federal projects, and federally funded projects, to the extent practicable. The concept of beneficial landscaping emphasizes:

- Use of regionally native plants,
- The design, use, and promotion of construction practices that minimize adverse effects on the natural habitat,
- Prevention of pollution by reducing fertilizers and pesticides, using Integrated Pest Management (IPM) techniques, recycling green waste, and minimizing runoff,
- Implementation of water and energy efficient landscaping practices, and

- Creation of 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 term beneficial landscaping describes practices that integrate native vegetation into the landscape and minimize the adverse effects that landscaping has on the natural environment. The use of regionally native plant species, which are generally better suited for local site conditions than non-native species, reduces the need for intensive maintenance and the use of fertilizers and pesticides. Using a variety of native trees and shrubs that offer structural diversity and flower at staggered times will also enhance wildlife value for birds and native pollinators in the developed areas of the base.

4.2.2.2 Landscape Planning

A number of sites are identified for tree planting in the NSA Bethesda IAP. Avoiding conflicts between landscape plants and infrastructure, such as utilities, buildings, walkways, and roads at these sites is an important planning element. Planting large trees too near buildings, utility lines, or other infrastructure is a common problem in urban settings and occurs frequently at NSA Bethesda. In these situations, trees often suffer from lack of root space, poor underground water flow, and disfiguration from frequent and poor pruning practices. A useful rule of thumb for estimating space requirements for a species is to allow the same amount of space for the roots as the crown diameter the mature tree is expected to be. Trees growing in crowded situations also have the potential to cause damage to infrastructure and should be considered for removal and replacement with better placed or smaller-sized trees, shrubs, or perennial herbaceous plants. All new planting plans should be reviewed for appropriate planting material sizing.

Grouping trees and shrubs in fairly compact, mulched beds is a method of maximizing the amount of water available to the planted material. Supplemental water can be limited to the planted area, reducing waste. Mulch helps to reduce competition from weeds and reduces moisture lost through evaporation. Using an irregular pattern with spacing of 7 to 15 feet for trees (depending on their mature size) and slightly closer spacing for shrubs creates a naturalistic appearance that is suitable for many planting sites. Planting in beds also reduces mowing time by allowing the mower to go around one large bed rather than individual plants and reduces mower damage to individual trees and shrubs.

4.2.2.3 Site Preparation

New plantings at NSA Bethesda are most likely to occur on previously developed and disturbed sites rather than in the naturally vegetated sites. The soil and subsoil on such sites are generally extremely compacted and further site preparation is often needed prior to establishing new vegetation. The goal of the site preparation activity is to improve the survival of the new plantings by improving soil conditions and reducing or eliminating competing vegetation, if

present. Discing, mowing, and herbicide application are some of the common methods of site preparation.

Discing can enhance water infiltration and facilitate root development of new plants by loosening surface soils and dislodging much of the competing rooted vegetation. One disadvantage of discing is that it eliminates the existing vegetation's root mat, making soils more erodible in the short term. Also, if there is a dense mat of turf grasses, discing may have to be repeated several times during a growing season to completely eliminate competing vegetation. Mowing at a low height (even scalping the soil surface) will temporarily reduce competition and also allow brush mats or mulch to be applied more easily.

Herbicide applications can reduce or eliminate competing vegetation. Broadcast herbicide applications should be avoided on sloped lands to reduce erosion potential. Spot spraying the planting locations would be an effective alternative; however, planting locations need to be identified in advance. Herbicide label instructions must be read carefully and followed. On sites adjacent to water bodies, only herbicides approved for use in wetlands should be used. All site preparation activities should be considered with respect to their potential to increase runoff to adjacent waterways.

4.2.2.4 Soil Amendments

Soil amendments, such as lime, fertilizer, and organic matter, are often used to improve nutrient availability, reduce soil acidity, and alter the physical character of the soil. The addition of soil amendments is a considerable expense and should not be routinely recommended for all planting sites. Selecting planting stock appropriate to a site's condition, when possible, is a more cost-effective alternative. One or more plant species can usually be found that can tolerate soil texture and nutrient availability of most soils. Fertilizers should not be added directly to planting holes for trees and shrubs.

State cooperative extension offices will typically conduct soil tests to analyze soil parameters and suitability at little cost. Soil tests are recommended if soil conditions are not known or if site history suggests the potential for contamination.

On sites that have extremely poor soils because fill material has been used or the topsoil has been removed, the addition of some soils amendments may be beneficial. Organic matter, in particular, can facilitate plant establishment by improving moisture and nutrient availability. Organic matter may be introduced as organic compost, topsoil, or fine mulch. In extremely barren soils, the absence of mycorrhizae may be another factor that limits plant survival. Mycorrhizal fungi are generally present in the soil and on the surface of roots that transform nutrients into forms that are more readily available for plant uptake. Inoculation with mycorrhizal fungi may be beneficial on sites where significant soil disturbance, such as removal of topsoil, has occurred. However, if soil organic matter is lacking, a food source for the fungi

will be absent and they will be likely to die out. The cost should be weighed carefully against the import and incorporation of topsoil or compost, which will likely contain abundant populations of fungi.

4.2.2.5 Selection of Plant Materials

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

A variety of native tree, shrub, and herbaceous species that are appropriate for use in the Piedmont region are listed in Appendix 18. Plants that are particularly attractive to deer should also be avoided (Appendix 18, enclosure 2). On sites where there is low native regeneration or the threat of invasive re-establishment or erosion is high, the use of an aggressive, highly competitive grass is recommended. In accordance with Department of Defense Manual (DoDM) 4715.03 - INRMP Implementation, all landscaping materials including plants and seeds must be evaluated and approved by the NSA Bethesda natural resources media manager or NAVFAC Natural Resources Program Manager.

In addition to native plant nurseries, a potential source of native herbaceous species is the Maryland Native Plant Society: http://www.mdflora.org/.

4.2.2.6 Planting

The planning process should allow for planting in the appropriate season. The type of planting stock used, in part, determines the appropriate time for planting. Bare-root seedlings should be planted in the spring before the emergence of new leaves. Larger woody material is best planted in the late fall after leaves have dropped. At this time transpiration is minimal and root growth increases. Since roots are often damaged in the transplanting process, planting during the fall

allows additional time for root development before the summer months when transpiration peaks. Groundcovers can be planted at any time, as long as there is adequate rainfall or available supplemental watering.

Proper tree planting is another vital element of landscaping. Using correct planting methods can increase a tree's ability to become established quickly and improve its health and longevity. Planting technique differs somewhat with the type of material being planted, though the goal of each is to provide an environment that encourages root growth. Important guidelines that apply to most types of planting stock are:

- Dig the planting hole three to five times greater in diameter than the root ball of the material to be planted and only as deep as the root ball.
- Do not bury the roots too deeply or they will not be able to get enough oxygen.

To ensure the greatest chance of survival, tree and shrub planting should be performed by trained natural resources personnel or qualified tree care professionals.

4.2.2.7 Post-planting Care

Ensuring adequate post-planting care including watering, weed control, and removal of any stakes, wraps, and guy wires, is essential to the survival of new plantings. Ensuring adequate soil moisture immediately after planting and during the first two years of establishment is the key factor in planting success. Weakly watering during dry to average periods of rainfall is essential. Over-watering however, can deprive the tree of air and should also be avoided.

Reducing competition from weeds can be achieved by mowing around planted materials. Preventing damage from mowers and string trimmers, however, is a significant problem for landscape managers. Wounds in a tree's bark make it more susceptible to disease and pest infestations and reduce its chance of survival.

Placing trunk guards around the base of trees is a method of protecting them from mower damage. Flexible plastic trunk guards can be purchased from forest supply companies or homemade trunk guards can be made from hardware cloth. The plastic guards are more practical because they expand as the tree grows. Care must be taken to remove guards as trees grow as they can cause girdling and suckering when left in place too long. Prohibiting the attachment of signs, fences, or other materials to trees will also help prevent avoidable damage to urban trees.

Mulch can also be an effective method of reducing weeds while protecting trees from mower damage, when used properly. Mulch protects trees by reducing weed growth around the plant's base, which reduces the need to mow near the plant. Mulch should be applied to a weed-free area around the root mat in a layer about three to four inches thick. Mulch should not be applied too close to the tree trunk or too deeply as this creates an environment that promotes fungal growth and decay.

Because of the dense whitetail deer population at NSA Bethesda, the use of deer exclosures may be required to prevent deer browse. To protect individual trees and shrubs from deer-browse, a woven wire cage should be installed around new plantings.

4.2.2.8 Mowed Lawns

The lawns at NSA Bethesda are mowed to present a neat and attractive appearance. Grassy areas generally are planted with fescue or Bermuda grasses. Maintaining lawn grass at a height of approximately three inches and restricting mowing during dry periods are other recommended practices for lawn care. Beneficial landscaping practices that could be implemented include reducing the amount of mowed lawn by increasing the use of native trees, shrubs, and ground covers; however in disturbed urban environments such as NSA Bethesda, ceasing mowing without ensuring desirable vegetation is well established will lead to infestation by aggressive invasive species. Mulching around planted material and continued mowing or use of herbicides to control invasive species are highly recommended practices.

4.2.3 Vegetation Management Actions

In accordance with the Presidential Memorandum on Beneficial Landscaping, Navy policy, and the NSA Bethesda IAP, recommended vegetation management actions are to:

- Replace street trees and landscaped materials as they die or are removed for development, safety purposes, or through invasive plant control efforts. Locations that provide tree planting opportunities at NSA Bethesda are presented in Figure 4-2. Replacement should be a minimum of 1:1 with native species. Include a mix of trees and shrubs that flower and fruit throughout the season to provide benefits for birds and native pollinators (see Appendix 18, enclosure 1).
- Ensure the NSA Bethesda Natural Resources Media Manager or NAVFAC Natural Resources Program Manager is given the opportunity to review landscaping plans and modify as necessary to meet native plant requirements.

Additionally, routine grounds maintenance activities should take migratory and resident bird populations into consideration when performing maintenance such as tree trimming, pruning, or removing trees. Such activities should be timed to avoid disturbing nesting birds.

4.3 Wetland Management

Intact, functioning wetlands are of extreme importance to the health of the ecosystem and the human environment because of services such as flood control, pollution abatement, erosion control, and fisheries habitat that they provide. The goals of wetlands management at NSA Bethesda are to:

- Ensure compliance with existing state and federal wetland regulations,

Figure 4-2. Locations with Opportunity for Planting

- Maintain no net loss of installation wetlands, and
- Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Other than individual site assessments, no base-wide planning level or jurisdictional wetland delineation has been conducted. In order to ensure no net loss of wetlands, at a minimum, a planning level survey should be conducted and added to the installation geographic information system (GIS) geodatabase.

4.3.1 Federal, State, and Other Regulations

A large number of federal state, and local laws regulate land uses and actions that have the potential to impact wetlands and water quality. Wetlands are primarily regulated by the CWA, EO 11990 – Protection of Wetlands, and Maryland state regulations. In addition, the Navy considers wetland protection a top priority as reflected by their "No Net Loss" wetland policy.

Section 404 of the CWA regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other waters of the United States. The USACE is the federal agency authorized to issue Section 404 Permits for certain activities conducted in wetlands or other United States waters. Exemptions for discharges of dredged or fill material are provided for certain activities such as normal farming or forestry activities if the activity is part of an established operation. Activities that bring an area into farming or forestry, however, are not considered part of an established operation and do require appropriate permits.

Section 401 of the CWA requires additional certification from the appropriate state regulatory agency. In accordance with Section 401, federal agencies must obtain a water quality certificate from the state for any action requiring a federal license or permit. MDE oversees impacts to state waters and wetlands, including isolated wetlands in Maryland. Construction and other activities with the potential to disturb wetlands must be reviewed individually with regard to wetland impacts, and appropriate permits sought as needed.

To obtain the necessary permits, the Navy must submit a joint federal/state application to the Regulatory Services Coordination Office of the MDE, Water Management Administration. The Regulatory Services Coordination Office determines what type of permit is necessary and forwards the application to the appropriate governmental agencies. The review procedures and application package materials required vary depending on the size and type of project being proposed. Activities that are likely to cause more than minimal impact to wetlands require a USACE Standard Permit (Individual Permit), which is reviewed by the USACE, MDE, and local authorities, and is subject to public review.

A General Permit may be issued for activities that are similar in nature and would have only minimal individual or cumulative adverse environmental effects. General permits can be issued on a nationwide (nationwide permit) or regional (regional general permit) basis (EPA 2012b).

The USACE Baltimore District Engineer has implemented a Maryland State Programmatic General Permit (MDSPGP)-4. This regional permit is designed to continue to authorize certain activities previously covered by the nationwide permit program and institute an integrated federal and state regulatory process (USACE 2011). It is applicable to actions that will not individually and/or cumulatively result in direct or indirect impacts to more than 1.0 acre of waters of the United States, including jurisdictional wetlands, and/or 2,000 linear feet of streams.

As part of the MDSPGP-4 permit evaluation process used to authorize a particular project proposing to impact state waters (including wetlands), applicants must (1) establish that avoidance of impacts to state waters, including wetlands is not practicable; (2) demonstrate that all practicable efforts to minimize unavoidable impacts to state waters, including wetlands, have been taken in project design and the construction plan; and (3) provide a plan for compensation for all unavoidable impacts that will result in a loss greater than 5,000 square feet of wetlands and/or 200 linear feet of stream channel (USACE 2011).

4.3.2 Wetland Management Actions

NSA Bethesda avoids impacts to all waters of the U.S. and wetlands to the greatest extent practicable and follows all state and federal wetland regulations to ensure no net loss of wetlands occurs. Further measures to protect and enhance the functions and values of wetland communities that could be undertaken by the installation are to:

- Conduct a base-wide wetland delineation with a jurisdictional determination from the USACE and incorporate the results into the installation GIS,
- Plant areas of mowed lawn that abut the University Pond, in-stream pond of Stoney Creek, and Lake Eleanor with a variety of native wetland vegetation that requires little or no additional maintenance (Figure 4-3). Tall vegetation would have the additional benefit of deterring Canada geese from using the ponds.
- Maintain the shallow water wetland area adjacent to the Stoney Creek in-stream pond by periodically removing litter and debris and controlling invasive species, and
- Improve the appearance and ecosystem function of base streams and wetlands through incorporating appropriate sediment and erosion control BMPs.

4.4 Soil and Water Management

Sound 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/vegetative

Figure 4-3. Wetland Management Activity Locations

management, wetlands management, forest management, and fish and wildlife management, as well as other environmental compliance program elements.

The goals of soil and water management at NSA Bethesda are to:

- Protect real estate from depreciation by implementing appropriate land use practices, and
- Reduce or eliminate any contribution of pollution through waste disposal or erosion and sedimentation.

4.4.1 Soil Surveys

Montgomery County soil survey was conducted by the USDA, Natural Resources Conservation Service (NRCS) in 1995. Most of the soils at NSA Bethesda developed in place by weathering of the underlying rock metamorphic rocks, particularly schist and gneiss, and are generally very deep and well drained (NRCS 1995). Exceptions to the well-drained soils are the hydric soils. Hydric soils are defined by the National Technical Committee for Hydric Soils as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. The Baile silt loam (Figure 4-4, Table 4-1) is the only soil at NSA Bethesda that is entirely classified as hydric, though all of the soils are on the national list of hydric soils because of potential Baile inclusions (NRCS 2012).

NSA Bethesda soils data are now available online on the USDA, NRCS Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Several of the soil types at NSA Bethesda are also classified as prime farmland, which is land that has the best combination of physical and chemical characteristics to meet the food and fiber needs of the country (NRCS 2013b). Farmland of state importance includes land that does not meet the criteria for prime, but is considered to be of statewide importance for agricultural production. Prime farmland and farmland of state importance are regulated under the Farmland

Protection Policy Act (FPPA [7 USC §4201 et seq.]). The FPPA restricts actions of the federal government that would cause the irreversible conversion of prime and unique farmland to nonagricultural uses. Construction for national defense purposes however, is not subject to the FPPA. Previously developed farmland is also not regulated (NRCS 2013a).

Urban land and urban land complexes comprise 34 percent of NSA Bethesda. Urban land includes areas that have greater than 75 percent impervious surface and comprises the medical core, USUHS, AFRRI, Bachelor's Enlisted Quarters, the utility area, and Navy Exchange. Urban land complexes are soils that are intermingled with urban land and it is not practical to map the units separately. County soils surveys, however, are not updated frequently and do not always reflect the current level of urban land and urban land complexes.

The predominant soil types on the property is Glenelg silt loams, map symbols 2B and 2C in Figure 4-4 and Table 4-1, which occur on 15.8 and 28 percent of the base on ridgetops and sideslopes, respectively. Glenelg soils are deep, well drained, and well suited to agricultural and forestry purposes. They provide high available water capacity so that plants living in them are not as subject to drought as are sandy or shallow soils. It is suitable for most building purposes but, due to its high available water capacity, is subject to frost action so that building foundations and roadways require positive drainage. Erosion hazard is moderate on sites with less than 8 percent slopes, but severe on sites with 8 to 15 percent slopes.

Gaila silt loam, map symbol 1B, is similar to Glenelg and occurs on broad ridge tops and side slopes on 3.1 percent of the base. It also is deep, well drained, and well suited to agricultural and forestry purposes and is good for most building purposes, but has only moderate available water capacity. Erosion hazard is moderate on sites with less than 8 percent slopes, such as those that occur at NSA Bethesda.

Brinklow-Blocktown channery silt loam, map symbol 16D, occurs on nearly 10 percent of the base and is distinguished from Glenelg and Gaila soils by depths to bedrock of only 20 to 40 inches and slopes in excess of 15 percent. Where the depth of this soil is especially shallow, the water availability is very low so that plants suffer moisture stress during droughts. Special care must be taken when using heavy equipment or excavating near trees in this soil because the roots systems are shallow. Erosion hazard is severe on sites with less than eight percent slopes and greater.

Baile silt loam and Glenville silt loam, map symbols 5A and 6A, are soils that occur in the swale that drains the front lawn between the hospital and Rockville Pike and Stoney Creek. Baile is classified as hydric on the national list of hydric soils, whereas Glenville may have Baile components that are hydric. Only plants that are tolerant of saturated soils should be planted in Baile soil. The Glenville soil is more suitable for a range of plants, but the shallow depth to the water table limits the depths to which tree roots may grow. High water tables and slow permeability are limitations for many uses on these soils. Heavy equipment use and excavations near trees growing in these soils should be avoided.

4.4.1.1 Sediment and Erosion Control Plans

Because of the relatively steep terrain and high to moderate erosivity of some of the soils at NSA Bethesda, erosion and sedimentation can be significant water quality issues. Soil disturbing activities that have the potential to cause soil erosion and adversely affect water quality are regulated by both state and federal laws. Section 401 of the CWA requires an applicant for any federal permit covering any activity that may result in a discharge into the state's waters first obtain state certification to ensure that the project will comply with state water quality standards. Ground disturbing activities at NSA Bethesda must be consistent with Maryland's erosion and sediment control and stormwater management guidelines. Construction projects with more than

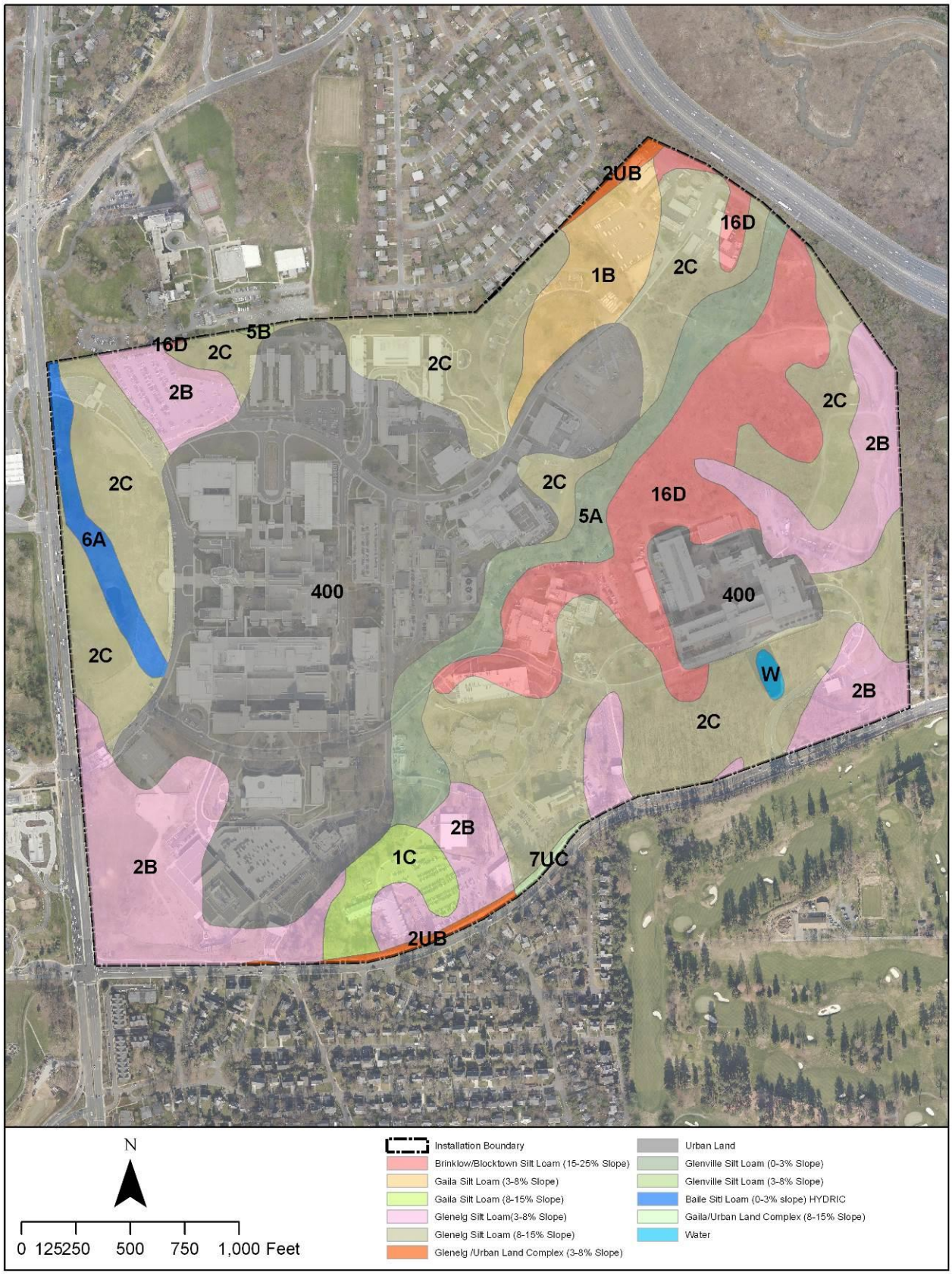

Figure 4-4. Soils at NSA Bethesda

Table 4-1. NSA Bethesda Soils Series

Map Symbol	Soil Series		Acres	Percent Cover
Hydric Soils				
6A	Baile silt loam, 0 - 3 % slopes	Deep, poorly drained, in upland depressions and along drainage ways, Depth to water table 0-6 inches, High available water capacity, Low erosion hazard	3.5	1.5
Non-Hydric Soils				
1B	Gaila silt loam, 3 - 8 % slopes	Deep, well drained soils on broad ridge tops and side slopes, Moderate available water capacity, Moderate erosion hazard, Prime farmland	7.5	3.1
1C	Gaila silt loam, 8 -15% slopes	Very deep, well drained soils on steep side slopes in uplands, Moderate available water capacity, Moderate erosion hazard	4.4	1.8
2B	Glenelg silt loam, 3 - 8 % slopes	Deep, well drained soils on broad ridge tops and side slopes, High available water capacity, Moderate erosion hazard, Prime farmland	38.0	15.8
2C	Glenelg silt loam, 8 - 15 % slopes	Deep, well drained soils on side slopes in uplands, High available water capacity, High erosion hazard, Farmland of statewide importance	67.4	28.0
2UB	Glenelg-Urban land complex, 0 - 8 % slopes	Deep, well drained Glenelg soils intermingled with and Urban area, High available water capacity, Moderate erosion hazard	1.5	0.6
5A	Glenville silt loam, 0 - 3 % slopes	Deep, moderately well drained or somewhat poorly drained soils on low areas on uplands and along drainage ways, Moderate available water capacity, Low erosion hazard	12.2	5.1
5B	Glenville silt loam, 3 - 8 % slopes	Deep, moderately well drained or somewhat poorly drained soils in low areas on uplands and along drainage ways, Moderate available water capacity, Low erosion hazard	0.1	0.1
7UC	Gaila-Urban land complex, 8 - 15 % slopes	Deep, well drained, Gaila soils intermingled with urban areas, High erosion hazard	0.3	0.1
16D	Brinklow-Blocktown channery silt loams, 15 - 25 % slopes	Well drained soils on moderately steep side slopes in uplands, Severe erosion hazard	23.4	9.7
400	Urban land	Areas with more than 75 percent impervious surface	82.2	34.1
W	Water		0.4	0.2

Sources: NRCS 1995, 2012, and 2013

5,000 square feet of earth disturbance require a sediment erosion control plan and stormwater management plan and/or waiver application be submitted to MDE, Water Management Administration for review and approval. Prior to construction at any site, a General Permit for Construction Activity must be obtained that includes an approved sediment and erosion control plan. If the amount of disturbed ground exceeds one acre, a National Pollutants Discharge Elimination System (NPDES) Program permit is also required.

Sediment and erosion control plans must include site-specific BMPs for controlling runoff, erosion, and sedimentation during construction and demolition activities. BMPs include, but are not limited to, protective devices preventing surface drainage flows, erosion control matting, rip-rap, and sediment traps. The application of appropriate BMPs depends on specific ground conditions in the disturbed areas.

4.4.2 Water Quality Surveys

Annual site surveys are conducted by the stormwater program manager at NSA Bethesda as required by the MS4 General Permit, to assess the effectiveness of BMPs and the SWMAP. Minimum control measures and an implementation schedule are provided in the SWMAP. In addition the installation stormwater manager conducts frequent inspections of construction sites to ensure compliance with the approved sediment and erosion control plans.

A condition assessment conducted for Stoney Creek (U.S. Navy 2010b) identified several stream bank erosion issues that occurred because of increased stormwater flow. The assessment evaluated existing conditions, alternatives for stabilizing or repairing deficiencies, and prioritized recommendations for preventing further deterioration. It was recommended that a long-term solution for Stoney Creek be considered to address stormwater issues comprehensively, rather than relying on continuing repairs and stabilization measures (U.S. Navy 2010b).

4.4.3 Soil and Water Management Practices and Strategies

Section 202c, of EO 13508 - Chesapeake Bay Protection and Restoration assigns DoD as the lead agency to strengthen stormwater management practices at federal facilities and on federal lands within the Chesapeake Bay watershed and to develop stormwater best practices guidance. As summarized in the *Chesapeake Bay Strategy FY2013 Action Plan* (Federal Leadership Committee for the Chesapeake Bay 2012) "DoD will continue to complete stormwater management assessments at installations in the Chesapeake Bay watershed. These assessments present opportunities to strengthen stormwater management by identifying structural and non-structural BMPs, erosion control, and infrastructure maintenance and repair opportunities. Using these assessments, installations can determine the appropriate stormwater management controls to reduce pollutant loadings, improve stormwater quality and meet Chesapeake Bay TMDL requirements. BMPs to be implemented will be prioritized to achieve load reductions required to comply with the Chesapeake Bay TMDL."

The majority of pollutants expected to be generated at NSA Bethesda are those associated with urban runoff, such as oil and grease, heavy metals, nutrients (phosphorus and nitrogen), fecal coliform, trash, and sediment. Many of the pollutant sources at NSA Bethesda, including parking lots, paved areas, building rooftops, and maintained landscapes have increased due to recent base development activities and may continue to increase under future development plans. Implementing the Navy's LID Policy for Storm Water Management would improve the quality of stormwater runoff and help meet the Navy's commitment to EO 13508.

As noted in the *Chesapeake Bay Strategy FY2013 Action Plan,* management strategies for both soil erosion and stormwater management are integral to fulfilling the Navy's commitment to Chesapeake Bay protection and restoration.

4.4.4 Soil and Water Management Actions

Most soil and water management actions are overseen by the Environmental Division's Stormwater Program at NSA Bethesda; however, there are areas where the natural resources program can support the stormwater program and improve water quality. Recommended management actions to improve water quality goals are to:

- Implement native vegetation plantings as recommended in Section 4.3.3 in the installation's three largest ponds, Lake Eleanor, University Pond, and the Stoney Creek in-stream pond,
- Install an aeration system such as a bubbler in Lake Eleanor to reduce algal blooms and eutrophication of the pond. As Lake Eleanor is an integral part of the installation's historic landscape, any modifications to the pond would require approval from the SHPO at the Maryland Historic Trust. A subsurface bubbler system placed on the pond bottom would cause little disturbance to the surface water and would likely be approved.
- Conduct an assessment of the Stoney Creek corridor, Stoney Creek and its tributaries, and base ponds to identify additional restoration sites for sediment and erosion control and stream improvement.

4.5 Coastal or Marine Management

NSA Bethesda is not within the Maryland Coastal Zone (MDNR 2013) and has no marine resources, therefore this section is not applicable.

4.6 Floodplain Management

Floodplains perform important natural functions, including temporary storage of floodwaters, moderation of peak flows, maintenance of water quality, groundwater recharge, and prevention of erosion. Floodplains also provide habitat for wildlife, recreational opportunities, and aesthetic benefits. The goals of floodplain management at NSA Bethesda are to:

- Ensure compliance with existing state and federal wetland regulations, and
- Protect and enhance the functions and values of floodplains, to the greatest extent practicable.

As with wetlands, the USACE and MDE regulate discharges of dredged or fill materials within 100-year floodplains and a joint federal/state application, *Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland*, must be submitted to the Regulatory Services Coordination Office MDE. 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. EO 11988 specifically directs federal agencies to:

- Avoid actions located in or adversely affecting floodplains unless there is no practicable alternative,
- Take action to mitigate losses if avoidance is not practicable,
- Establish a process for flood hazard evaluation based upon the 100-year base flood standard of the National Flood Insurance Program, and
- Issue implementing procedures.

4.6.1 Floodplain Management Strategies

The implementing procedures as described by Floodplain Management Guidelines for implementing EO 11988 (FEMA 2012) provides an eight-step decision-making process for carrying out the EO's directives. This eight-step process is to: (1) determine if a proposed action is in the base floodplain; (2) provide for public review; (3) identify and evaluate practicable alternatives to locating in the base floodplain; (4) identify the impacts of the proposed action; (5) minimize threats to life and property and to natural and beneficial floodplain values and restore and preserve natural and beneficial floodplain values; (6) reevaluate alternatives; (7) issue findings and a public explanation; and (8) implement the action. If floodplain disturbance is unavoidable, NEPA documentation must be developed describing the impacts before any ground-disturbing activities are undertaken.

4.6.2 Floodplain Management Actions

In order to minimize negatives impacts on floodplains as a result of development or other base activities at NSA Bethesda, the recommended management action is to:

- Follow the implementing procedures outlined by EO 11988 during the review of all projects.

4.7 Invasive Species Management

NSA Bethesda has a relatively diverse natural flora that provides a valuable resource to wildlife and the DoD personnel, including injured service members, their dependents, and guests that live and work on the base. The health and viability of the native ecological community, however, are under extreme stress from the abundance of invasive species that occur. Invasive species are any species that are not native to a given ecosystem, and whose introduction causes or is likely to cause economic or environmental harm and/or harm to human health (EO 13112 - Invasive Species, February 1999). Many invasive species displace or otherwise harm native species and can alter ecosystem processes and 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 ESA are at risk primarily because of nonnative, invasive species (Pimental et al. 2005). EO 13112 specifically addresses the control of invasive non-native species on federal lands and requires federal facilities, to the extent practicable and permitted by law, to:

- Prevent the introduction of invasive species,
- Detect, respond rapidly to, and control populations of such species in a cost-effective and environmentally sound manner,
- Accurately monitor invasive species populations,
- Provide for restoration of native species and habitats that have been invaded,
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control,
- Promote public education on invasive species, and
- Not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species.

In addition to the requirements of EO 13112, the Federal Noxious Weed Act of 1974 (7 USC §2814) provides for the control of noxious plants on lands under the control or jurisdiction of the federal government. Section 15 of the Act requires federal land management agencies to develop and establish a management program for control of undesirable plants that are classified under federal or state law as undesirable, noxious, harmful, injurious, or poisonous where similar programs are being implemented on state and private lands in the same area. Canada thistle (*Cirsium arvense*) is the only known species that has been identified at NSA Bethesda that is listed as a noxious weed in the state of Maryland. Bull thistle (*Cirsium vulgare*), plumeless thistle (*Carduus acanthoides*), musk thistle (*Carduus nutans*), shattercane (*Sorghum bicolor*), and Johnsongrass (*Sorghum halepense*) are also classified as noxious weeds in Maryland (Maryland Department of Agriculture n.d.) and may occur as well.

The primary goal of invasive species management is to control or eliminate invasive plant populations to the greatest extent practicable in order to promote ecosystem integrity and provide a peaceful, healing environment for the installation's patients, guests, and employees.

4.7.1 Invasive Species Surveys

The initial floral surveys conducted in support of the 2000 Draft INRMP included identifying both native and non-native species that occurred at NSA Bethesda (U.S. Navy 2000). Several subsequent studies that identified and recommended treatment for a number of areas infested with invasive, nonnative plant species were conducted between 2005 and 2007 (U.S. Navy 2005, 2006, 2007). A second survey to reassess the occurrence and extent of invasive plant infestations and develop a management plan for continued invasive plant control at NSA Bethesda was conducted as part of a more comprehensive biological survey effort in 2008 (U.S. Navy 2009b). During this assessment, significant infestations of invasive species were mapped using a Trimble GeoExplorer® global positioning system (GPS) unit, with sub-meter accuracy. Point and polygon data were collected during the survey. A management plan was developed for over 47 acres in 15 mapped zones (U.S. Navy 2009b; Figure 4-5).

English Ivy, 2008

Invasive vine species including English ivy (*Hedera helix*), Oriental bittersweet (*Celastrus orbiculatus*), porcelainberry (*Ampelopsis brevipedunculata*), winter creeper (*Euonymus fortunei*), and mile-a minute (*Polygonum perfoliatum*) were found to be prevalent throughout the forested areas of the base. An ornamental shrub, bush honeysuckle (*Lonicera maackii*) was also found to be the dominant understory species throughout the forest. These and other invasive species observed at NSA Bethesda are listed in Table 4-2.

4.7.2 Invasive Species Management Strategies

The extent and density of invasive species that occur at NSA Bethesda make their total eradication improbable and prohibitively expensive. A long-term program of control and the gradual reduction of area impacted by invasive species is a more practical plan with more likelihood of success. A strategy that focuses on preventing and identifying new infestations and continuing to control the principal infestations should be implemented. The primary steps in the management strategy at NSA Bethesda include:

- Preventing the introduction of invasive species to the greatest extent practicable,
- Detecting and monitoring of invasive species populations,

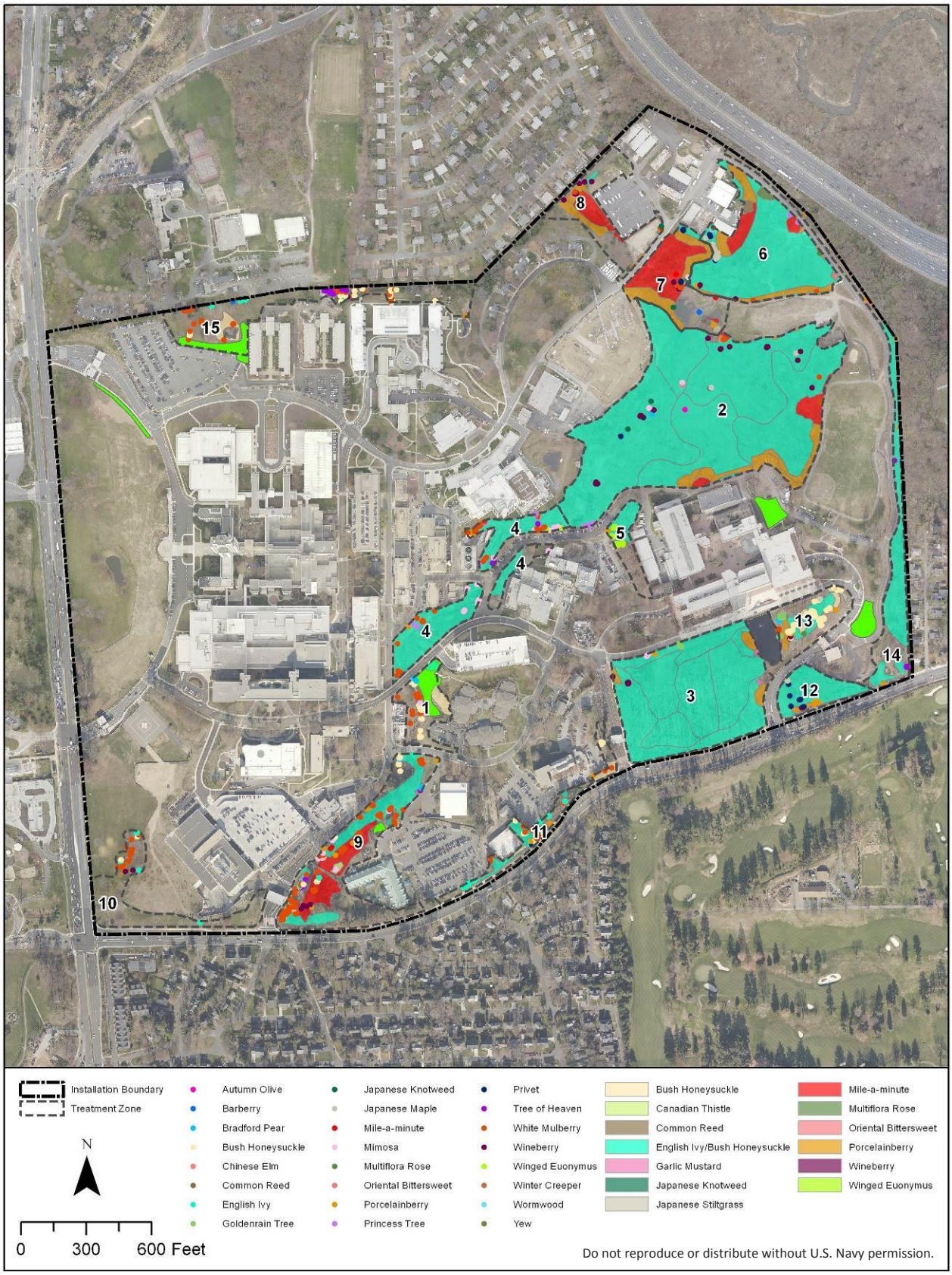

Figure 4-5. Invasive Species at NSA Bethesda

Table 4-2. High Priority Invasive Plant Species Observed at NSA Bethesda*

Common Name	Scientific Name
Trees	
Japanese Maple	*Acer palmatum*
Tree of Heaven	*Ailanthus altissima*
Mimosa	*Albizia julibrissin*
Goldenrain Tree	*Koelreuteria paniculata*
White Mulberry	*Morus alba*
Princess Tree	*Paulownia tomentosa*
Cherry, ornamental	*Prunus* spp.
Bradford Pear	*Pyrus calleryana*
Chinese Elm	*Ulmus parvifolia*
Shrub/Subshrubs	
Barberry	*Berberis* spp.
Autumn Olive	*Elaeagnus umbellata*
Winged Euonymus	*Euonymus alatus*
Privet	*Ligustrum* spp.
Bush Honeysuckle	*Lonicera* spp.
Japanese Knotweed	*Polygonum cuspidatum*
Multiflora Rose	*Rosa multiflora*
Wineberry	*Rubus phoenicolasius*
Vines	
Porcelainberry	*Ampelopsis brevipedunculata*
Oriental Bittersweet	*Celastrus orbiculatus*
Winter Creeper	*Euonymus fortunei*
English Ivy	*Hedera helix*
Japanese Honeysuckle	*Lonicera japonica*
Mile-a-minute	*Polygonum perfoliatum*
Periwinkle	*Vinca minor*
Broadleaf Herbs	
Garlic Mustard	*Alliaria petiolata*
Wormwood	*Atemisia absinthium*
Canada Thistle	*Cirsium arvense*
Fig buttercup	*Ranunculus ficaria*
Burdock	*Rumex crispus*
Graminoids	
Japanese Stiltgrass	*Microstegium vimineum*
Common Reed	*Phragmites australis*
Bamboo	*Phyllostachys* sp.

*Additional non-native species are identified in Appendix 8

- Controlling existing invasive species,
- Restoring native species and habitats that have been invaded,
- Public education on invasive species, and
- Proper disposal of vegetative material.

A combination of these strategies is recommended at NSA Bethesda, though the consistent, long-term implementation of any program will be essential for its success.

4.7.2.1 Prevention

Preventing the introduction of invasive species is considered the first step in their control. Disturbance to an environment is the main avenue for the introduction of invasive species; however disturbance is largely unavoidable at highly developed facilities such as NSA Bethesda, where growth and development are nearly continually ongoing. To help prevent or reduce accidental introductions from disturbance, the following methods are recommended (USFS 2001):

- Incorporate weed prevention and control into project layout, design, alternative evaluation, and project decisions,
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds,
- Ensure fill used in construction projects and other materials likely to transport nonnative species are as free as possible of nonnative species plant propagules,
- Where feasible, control nonnative plant species established on neighboring lands before they become established, and
- Where project disturbance creates bare ground, consistent with project objectives, reestablish vegetation to prevent conditions to establish weeds.

It is also important to avoid planting non-native species as landscaping plants unless they are clearly shown to be noninvasive. A lag time generally occurs between the introduction of a new species and its becoming a problematic weed; therefore, avoiding the use of non-native species site-wide is strongly recommended. Any non-native plants included on planting plans may be rejected by the NSA Bethesda Natural Resources Media Manager during the review process.

4.7.2.2 Detection and Monitoring Protocols

Early detection and rapid response are considered the principal strategies to successful invasive plant management (Federal Interagency Committee for the Management of Noxious and Exotic Weeds 2003). Detection strategies may include the use of remote imaging, random surveys, and roadside surveys. Such techniques are appropriate for use on large land areas when the goal is to

detect nascent infestations before they become fully established. For small land areas such as NSA Bethesda, pedestrian surveys and GPS mapping provide the most accurate and useful information for detecting and assessing invasive species infestations.

When mapping invasive species infestations, it is preferable, when possible, to delineate the extent of infestation of an individual species or species with similar physical characteristics rather than a combination of species and to assign a value representing the density of infestation. A cover class classification system that uses relatively broad intervals of percent cover is recommended (Table 4-3). This information is important to developing treatment priorities and cost estimates.

Table 4-3. Cover Classification

Cover Class	*Percent Cover*
1	0 – 5
2	5 – 25
3	25 – 50
4	50 – 75
5	75 – 100

Follow up monitoring is especially important in assessing the spread of invasive species populations and/or the effectiveness of control efforts. All areas treated under this management plan should be monitored annually until control objectives are achieved. If objectives are not being met within the prescribed timeframe, the prescribed treatments need to be reassessed. Precise treatment areas must be mapped or delineated in the field for future monitoring purposes. Invasive species that have been identified, but not treated, should also be monitored periodically (approximately 2-3 year intervals) to assess site conditions. If the population is determined to be spreading, treatment options should be considered.

4.7.2.3 General Control Methods

In accordance with DoD policy on pest management, invasive species management should employ the principles of IPM to help minimize use of pesticides. The objective of IPM is to use ecologically, economically, and socially sound strategies to control or keep pests at tolerable levels. In IPM, the full range of pest control options (biological, mechanical, and chemical) may be employed after careful consideration of the pest's biology, the damage or infestation thresholds that require action, and the impacts each control alternative will have on the environment.

Biological Control

Biological controls involve the use of natural enemies that limit the spread of plants or other animals through parasitism, predation, disease, or feeding. The use of biological controls would

require coordination with APHIS, which is responsible for controlling introductions of species brought into the United States for biological control of plants, as well as approval from NAVFAC HQ. In some cases the natural enemy of the invasive species becomes itself a problem species by attacking native species thus increasing disturbance and the overall problem. Instances of biological control however have occurred in Maryland due to accidental or intentional releases for several major invasive species at NSA Bethesda.

Photo credit: Tom Kent @florafinder.com

Rose Rosette Disease on Multiflora Rose

Rose rosette disease is transmitted by a native mite (*Phyllocoptes fructiphilus*). The disease kills infected roses within two to three years and has caused a fatal epidemic in multiflora rose from the Great Plains as far east as Queen Annes County, Maryland. However, rose rosette disease may also infect native roses and plums, as well as commercially important plants in the rose family such as apple and ornamental roses. Symptoms of rose rosette disease in multiflora rose include production of bright red lateral shoots; enlarged stems and stipules; dense, yellowish, dwarfed foliage; and premature development of lateral buds producing many compact lateral branches forming witches' brooms (Van Driesche et al. 2002).

Euonymous leaf notcher (*Pryeria sinica*), first identified in Virginia in 2003, has recently been observed as close as Glenn Dale, Maryland (Maryland Invasive Species Council 2009). The larvae of this moth species appears to feed specifically on members of the plant family Celastraceae, which includes three common invasive species at NSA Bethesda: winged euonymus, winter creeper, and Oriental bittersweet.

Euonymous Leaf Notcher Larvae and Adult

Mechanical Control

Mechanical controls include mowing, cutting, pulling, and girdling to manage and eradicate invasive species. Small infestations may often be controlled by hand pulling, grubbing with a hoe, or by using other mechanical devices. However, such methods cause soil disturbance, which can encourage reinvasion, incursions by other pests, and potentially increased soil erosion. These methods are also generally not practical in eradicating large infestations unless combined with chemical controls. Using a combination of mowing or cutting and a selective application of herbicide on targeted invasive plant species is often the most effective approach.

Chemical Control

Herbicide use is the most commonly used method of controlling invasive species. Because of environmental risks, herbicide treatments that rely on selective application methods, which minimize the release of the herbicide into the environment, are generally preferred over broadcast methods. These methods help avoid or minimize impacts to desirable, non-target species and are more consistent with the Navy's policy on IPM and reduction in pesticide use (DoDI 4150.7). Direct foliar sprays, basal bark applications, and cut-surface (also called cut-stump) treatments are the selective application methods that are generally recommended for control of invasive species at NSA Bethesda.

Site characteristics are also important to consider before applying any chemical controls. The presence of surface water or shallow ground water (as in wetlands) requires the use of an herbicide approved for aquatic situations in order to protect water quality and aquatic resources. Areas adjacent to housing, day care facilities, schools, or recreational areas should use herbicides with low residual effects or a method that reduces drift and non-target contamination.

Any herbicide used at NSA Bethesda must be on the installation's list of approved pesticides as provided by the installation Integrated Pest Management Plan (IPMP) (U.S. Navy 2013e). All installation pest management personnel who apply or supervise the application of pesticides must be trained and certified within two years of employment in accordance with DoD Pest Management Training and Certification Program (DoDM 4150.07-M) and all contract pesticide applicators must hold a current Pesticide Applicator Certificate and License issued by the Maryland Department of Agriculture. All herbicide use must be reported using the NAVFAC online pesticide reporting system. A username and password will be assigned to each user by the system manager. The pounds of active ingredient (PAI) applied will be calculated for each operation based on inputs. Data required to be entered include:

Herbicide use must be reported via the Navy online herbicide reporting system: https://clients.emainc.com/PestManagementNET/PesticideLogon.aspx

- Application date,
- Applicators name,
- Site name,
- Operation,
- Pesticide trade name,
- Pesticide active ingredient,
- EPA registration number,
- Area treated (acres),
- Quantity of pesticide applied (undiluted), and
- Quantity of dilutant.

4.7.2.4 Habitat Restoration

Site restoration is an important step in the eradication of invasive species. In areas where the existing vegetative cover is severely reduced, the establishment or release of fast growing native plants that will out-compete any surviving nonnative plants is required. Planting, seeding, or natural regeneration are appropriate methods of establishing native vegetation. Vegetation establishment was discussed in Section 4.2 and site-specific restoration plans for recently treated areas are in Appendix 15. Lists of appropriate native plants for landscaping and cover grasses are in Appendix 18. Because of the dense whitetail deer population at NSA Bethesda, planting species that are less favored by deer may reduce the impact of deer browsing on the landscape vegetation. A list of landscaping plants and their palatability by deer is also in Appendix 18. In some instances, the use of deer exclosures, as discussed in Section 4.2 may be required to prevent deer browse and allow native species time to become established.

4.7.2.5 Education and Outreach

Education is an important aspect of preventing and controlling the spread of invasive species. Educating the public on the ecological impacts caused by invasive species and how to recognize and avoid spreading them are appropriate topics for Earth Day and Public Lands Day events.

If volunteer labor is available, a volunteer work day to cut and pull invasive species may be organized. Strict supervision would be required however, to ensure only target species are removed. Volunteer activities such as this cannot be expected to eradicate established populations of invasive species, but they may be helpful in reducing biomass and the cost of chemical treatment, cleaning up unsightly tangles of vines and weeds, and most importantly, educating the community about invasive species.

Providing information to grounds maintenance personnel on the ecological impacts caused by invasive species and how to recognize and avoid spreading them may be more important at NSA Bethesda than educating the general public. Developing a poster or informative brochure illustrating the worst offenders at NSA Bethesda may be a useful way to provide this information. In addition, providing oversight to landscaping plans and information on alternatives to invasive nonnative species for landscaped areas will also further prevent the introduction and spread of these species at NSA Bethesda.

4.7.2.6 Disposal of Vegetative Material

Vegetative debris piles at maintenance yards and unauthorized dumping are frequently sources of invasive plant materials, which spread into the surround natural areas. Proper disposal of non-native vegetative material is a critical aspect of invasive plant control and disposal of landscaping plants and other debris in natural areas is strictly forbidden. All plant material that may be contaminated with invasive species seed, roots, tubers, or other viable vegetative structures should be disposed of in a dumpster and hauled off-site, or chipped and composted. Any compost material should be sterilized before use. Solarization, which involves covering an area with black plastic film in order to trap heat and raise soil temperatures to kill plants or seeds, is an effective, economical method of sterilization.

4.7.3 Invasive Species Management Actions

Invasive plant species surveys and control efforts were initiated at NSA Bethesda in 2005 for a limited number of species and in limited areas. Portions of the base were cleared of porcelainberry, bush honeysuckle, and Japanese knotweed using mechanical methods only (U.S. Navy 2005). Large bush honeysuckles were retained to provide aesthetic, landscape, and erosion control benefits. Follow-up operations, including the use of herbicides, were conducted on the initial treatment areas plus three additional areas in the fall of 2006. In 2007 and 2008, the treatment area and number of targeted species were increased again (Greenskeeper 2009).

After 2008, invasive species control efforts have been implemented in accordance with the 2009 invasive species management plan. From 2010 – 2012, approximately 18 acres in 10 zones were included in the treatment area. Target species included porcelainberry, mile-a-minute, mugwort, Canada thistle, burdock, and patches of oriental bittersweet (U.S. Navy 2012d). In 2012, treatment was begun on approximately 18 acres of forest infested with English ivy, winter creeper, and periwinkle. Follow-up treatments were continued for two years to ensure adequate control was achieved. In 2013, an additional 8.5 acres were targeted for removal of invasive vine species, bamboo, common reed, and Japanese knotweed.

In order to meet invasive plant management goals the following actions are recommended:

- Continue annual treatments of invasive plant species as prioritized by the NSA Bethesda natural resources and NAVFAC environmental specialists. Treatments should be

conducted for a minimum of three years or until follow-up monitoring indicates management objectives identified for each project in Appendix 15 have been met.

- Develop and implement habitat restoration plans for each treatment site, as necessary. Habitat restoration may include the use of deer exclosures to reduce browse pressure on new plantings.
- The NAVFAC Environmental Specialist must be given the opportunity to review landscaping plans to prevent the planting of invasive non-native species.
- Invasive species control measures should be incorporated in landscaped areas into grounds maintenance contracts.
- Volunteer participation in invasive plant removal for Earth Day, National Public Lands Day, or other annual events should be organized.

4.8 Fish and Wildlife Management

The Sikes Act is the primary federal law governing wildlife management on military installations. This act provides for cooperation by the DoD with the USFWS and state wildlife agencies in planning, development, and maintenance of fish and wildlife resources on military reservations and requires the cooperative development and implementation of an INRMP on installations with sufficient natural resources. The MBTA, MMPA, BAGEPA, ESA, and Magnuson-Stevens Fishery Conservation and Management Act are other primary statutes that relate to fish and wildlife management.

The goals of fish and wildlife management at NSA Bethesda are to:

- Conserve and promote the conservation of fish and wildlife and their habitats,
- Maintain and enhance habitat for resident and migratory bird species, and
- Balance wildlife population levels with biological and cultural carrying capacities.

4.8.1 Fish and Wildlife Surveys

A terrestrial vertebrate faunal survey conducted in 1997 and 1999 (U.S. Navy 2000) documented the wildlife species of NSA Bethesda. This was followed in 2007 and 2008 by a biological survey to document migratory birds, threatened and endangered species, benthic macroinvertebrates, and nuisance wildlife species at NSA Bethesda (U.S. Navy 2009b). To date, 82 bird, 15 mammal, 4 amphibian, 4 reptile species, and 21 invertebrates have been documented at the installation (Appendix 9).

During a 1997 stream study, three locations on Stoney Creek and one tributary were seined for fish. In two upstream locations and the tributary locations above the dam, no fish were present.

At the furthest downstream location, below the dam and approximately one mile above Rock Creek, 234 fish were collected (U.S. Navy 2000).

The 1999 survey involved 13 days of trapping and observations during the winter, spring, and summer. Live traps and pitfalls were set and monitored for one or two nights to sample small mammals. Mist nets were operated for two to three hours after dusk on two summer nights to sample bats. Amphibians and reptiles were sampled by turning over rocks and logs during the day and frogs were identified at night by their distinctive calls. Still and slow moving bodies of water were searched for breeding amphibians in March with no success. On every visit direct observation of large mammal species, their tracks and feces were recorded.

From November 2007 through November 2008 monthly point count surveys were conducted to document resident and migratory bird species at NSA Bethesda. The survey followed standard guidelines presented in the U.S. Forest Service Handbook for Monitoring Birds, PSW-GTR-144 (Ralph et al. 1993). In preparation for conducting the surveys, a 24-point survey route that traversed each available habitat type was established. Five additional survey points were established for night-time owl surveys in areas considered most likely to support owls. Morning surveys were conducted using 3-minute point count methodology at the 24 pre-established survey points, beginning at sunrise and completed by four hours post-sunrise. Start time, wind speed, cloud cover, temperature, and finish time were recorded at the beginning and end of each survey. Plot number, bird species identified by its American Ornithological Union four letter code, the number of individuals, and whether the bird was on the plot (i.e., within 100 meters) or flying over were recorded at each survey point.

Evening surveys were begun at sunset and were conducted using a call playback method at the six pre-established points. Recorded calls were played for barred owl (*Strix varia*), eastern screech-owl (*Megascops asio*), great horned owl (*Bubo virginianus*), northern saw-whet owl (*Aegolius acadicus*), and long-eared owl *(Asio otus*). The survey consisted of playing a continuous series of calls for several minutes followed by a few minutes of silence to listen for responses for each species at the five locations. Owl surveys were conducted monthly from November 2007 through April 2008.

4.8.2 Fish and Wildlife Management Strategies

NSA Bethesda is located in a densely developed portion of Maryland, has little undeveloped acreage, and therefore has limited opportunity for wildlife management. Migratory bird management, habitat enhancement, nuisance wildlife control, and educating the public on wildlife issues are the primary fish and wildlife management issues of importance at NSA Bethesda.

4.8.2.1 Migratory Bird Management

Migratory birds are a large, diverse group of birds that utilize breeding grounds in the United States and Canada and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. The MBTA, 16 USC §703-711 is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds their eggs, parts, and nests unless permitted by regulation. As of November 2013, 1,026 species were included on the list of migratory birds (78 FR 65844). Nonnative species such as house sparrow, European starling, rock pigeon, and mute swan are not protected by the MBTA.

The Final Rule on Take of Migratory Birds by the Armed Forces (50 CFR Part 21) allows for the incidental take of migratory birds by DoD during military readiness activities. 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 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 of 2001. This EO encourages incorporation of comprehensive migratory bird management objectives in agency management plans and requires federal agencies to enter into a MOU on migratory birds with the USFWS.

4.8.2.2 Habitat Enhancement

Because of the level of development at NSA Bethesda, the conservation and enhancement of any remaining natural habitat is important to protecting the installation's wildlife resources. Further efforts that focus on maintaining a diversity of habitat types that provide year-round food and cover (coniferous vegetation) as well as seasonal food and cover (mast producing deciduous vegetation) provide the greatest benefits for wildlife. Supplemental plantings of native trees and shrubs in maintained open areas and around buildings and recreational areas as discussed in

Section 4.2.4, where consistent with current and planned land uses, would help enhance habitat diversity and meet wildlife management objectives.

Artificial Nest Boxes

Artificial nest boxes may be used for enhancing habitat conditions for a number of bird and wildlife species in areas where there are few natural cavity trees or where competition from aggressive nonnative species such as house sparrows and European starlings is great. If they are not properly watched and maintained however, nest boxes can unintentionally increase populations of nonnative invasive species by providing additional nesting habitat. Placement of structures that benefit insectivorous birds in urban and housing areas also provides a benefit to people as these birds consume thousands of insects a day and provide enjoyment for human observers.

The University of Maryland College of Agricultural and Natural Resources has informative publications on maintaining bird nest boxes and other structures: http://extension.umd.edu/topics/environment

Eastern bluebirds, tree swallows (*Tachycineta bicolor*), Carolina wren, house wrens (*Troglodytes aedon*), purple martins (*Progne subis*), various owls, wood ducks, mice, squirrels, and bats are species that commonly utilize artificial structures. More than a dozen bird species that occur at NSA Bethesda are cavity nesters and could benefit from the installation and maintenance of artificial nest boxes (Table 4-4). Nest box construction and placement should consider the availability of appropriate habitat and structural requirements for the intended species. Other important considerations in nest box construction are competition from European starlings and house sparrows and predation by raccoons and cats. Closing nest boxes by plugging the entrance following nesting season and opening in mid-March and evicting house sparrows or European starlings that are seen to use the house are important measures that help ensure nesting success. Predator guards should be installed on all nest boxes.

4.8.2.3 Nuisance Wildlife Management

Nuisance wildlife are wildlife that, because of their feeding or nesting habits, interfere with the military mission or well-being of domestic animals, other wildlife, or humans. The primary nuisance wildlife species at NSA Bethesda are Canada geese and whitetail deer (U.S. Navy 2009). The Facilities Support Contract Manager is responsible for pest management in the building and housing areas at NSA Bethesda. Raccoons can be another nuisance species; however, when reported in buildings and residential areas, they are controlled by the Facilities Support Contract Manager and are not considered a natural resources issue.

DoDI 4150.07, DoD Pest Management Program, requires all federal, state, and local permits be obtained for pest management, including nuisance wildlife. Contractors that supply pest management services must also be permitted by Maryland laws and regulations to operate as a

pest management business. In Maryland, permits are required for the control of all nuisance wildlife species, except nutria, woodchuck, European starlings (*Sturnus vulgaris*), house sparrows (*Passer domesticus*), and pigeons (*Columba livia*); and mice, rats, moles, and voles when they are causing damage to personal property (MDNR 2008). The state of Maryland issues a Wildlife Damage Control permit to control other nuisance wildlife.

4.8.2.4 Canada Geese

Historically, migrant Canada goose populations arrived in the conterminous United States and left in the spring. In recent decades, however, resident Canada goose populations have been increasing throughout the United States including in urban environments where the abundance of open water ponds and grassy lawns provides ideal year-round habitat. Canada geese can become a nuisance causing lawn damage, soiling sidewalks and pond water, and exhibit aggressive behavior during the nesting season. Large amounts of fecal droppings around the facility, which can be carried into the hospital on shoes, increase the transmission of fecal coli form bacteria and are a public health issue. It also contributes to excess nutrients in the surrounding water resources, which can lead to water quality problems. Resident, or non-migratory, Canada geese are those that nest within the lower 48 states and the District of Columbia during the months of March through June, or that reside there during the months of April through August (APHIS 2009). Migrant Canada geese are those that nest in Alaska and northern Canada and fly south to overwinter in the lower 48 states.

Canada Goose and Goslings

The Canada goose is a migratory bird species that is protected under the MBTA. This federal law prohibits capturing or killing Canada geese outside of legal hunting seasons. However, in 2006, the USFWS revised regulations that pertain to resident Canada geese by issuing the Resident Canada Goose Nest and Egg Depredation Order (50 CFR 21.50). The regulation allows landowners to remove Canada geese at airports, in agricultural areas, and in other areas where they are causing conflicts with human populations. The Nest and Egg Depredation Order, is a change that allows natural resources managers to destroy resident Canada goose nests and eggs when necessary to resolve or prevent injury to people, property, agricultural crops, or other interests. Under this order no permit is required, but the landowner must register with the USFWS in order to conduct this activity. The landowner or land manager (including employees that may conduct the work) must register each year prior to taking nests and eggs. Nests and eggs may be taken only between March 1 and June 30. Each registered landowner must then return to the website by October 31 to report the number of nests with eggs destroyed, and the date and

Table 4-4. Description of Nesting and Habitat Requirements for Cavity-Nesting Birds with Potential to Occur at NSA Bethesda

Common Name	Scientific Name	Nesting Habitat	Box Height	Hole Size	Minimum Spacing
American Kestrel	*Falco sparverius*	pastures, fields, meadows, or orchards with mowed or grazed vegetation; place boxes on lone trees in fields, on trees along edges of woodlots, and on farm buildings	10-30ft	3" diameter	1/2 mile
Barn Owl	*Tyto alba*	open areas like fields, deserts and marshes which are in close proximity to hollow trees, cliffs, riverbanks, or man-made structures, including barns, bridges and other accessible sites, and which support healthy rodent populations	20-2 ft	6" round	100 ft
Carolina Chickadee	*Poecile carolinensis*	forests, woodlots, and yards with mature hardwood trees, forest edges, meadows, area should receive 40-60% sunlight, hole should face away from prevailing wind; 1" wood shavings can be placed in box	5-15 ft	1 1/8" round	1 box per 10 acres
Carolina Wren	*Thryothorus ludovicianus*	forests with thick underbrush, forest edges, woodland clearings, open forests, shrub lands, suburban gardens, parks, backyards; near trees or tall shrubs	5-10 ft	1 1/2" round	200 ft
Eastern Bluebird	*Sialia sialis*	open field or lawn; orchards; open, rural country with scattered trees and low or sparse ground cover; entrance hole should face open field, preferring east, north, south, and then west facing directions	3-6 ft	1 1/2" diameter	300 ft
Eastern Screech Owl	*Otus asio*	forests, parks, woodland clearings, forest edges, wooded stream edges, under a tree limb; add 2"-3" of wood shavings in box	10-30ft	3" round; north facing	100 ft
Great Crested Flycatcher	*Myiarchus crinitus*	deciduous or mixed deciduous-coniferous forests, forest edges, woodlots, orchards, parks, on post or tree at forest edge	3-20 ft	1 9/16" round	1 box per 6 acres

Table 4-4. Description of Nesting and Habitat Requirements for Cavity-Nesting Birds with Potential to Occur at NSA Bethesda (cont'd)

Common Name	Scientific Name	Nesting Habitat	Box Height	Hole Size	Minimum Spacing
House Wren	*Troglodytes aedon*	variety of habitats, farmland, openings, open forests, forest edges, shrub lands, suburban gardens, parks, backyards; near trees or tall shrubs	5-10 ft	1 1/4" round	50 ft
Northern Flicker	*Colaptes auratus*	pastures, groves, woodlots, orchards, fields, meadows, woodland clearings, forest edges, urban parks, on pole or tree at forest edge or along fence rows bordering crop fields; box should be completely filled with wood chips or shavings	6-30 ft	2 1/2" round; southeast facing	200 ft
Purple Martin	*Progne subis*	broad open areas (meadows, fields, farmland, swamps, ponds, lakes, rivers) with unobstructed space for foraging on flying insects; there should be no trees or buildings within 40 feet of the martin pole in any direction; houses should be painted white	10-15 ft	2 1/8" round	100 ft
Tree Swallow	*Tachycineta bicolor*	open fields near water, expansive open areas, marshes, meadows, wooded swamps; on a post in open areas near tree or fence	5-15 ft	1 3/8" round east facing	30-100 ft
Tufted Titmouse	*Baeolophus bicolor*	deciduous forest, thick timber stands, woodland clearings, forest edges, woodlots, riparian and mesquite habitats; spaced one box per 8 acres, hole should face away from prevailing wind	5-15 ft	1 1/4" round	1 box per 8 acres
White-breasted Nuthatch	*Sitta carolinensis*	deciduous woodlands, mature forests, woodlots, near open areas, forest edges, orchards, often near water; hole should face away from prevailing wind; 1" wood shavings can be placed in box	5-20 ft	1 3/8" round	1 box per 25 acres

Source: http://www.birds.cornell.edu/nestinginfo/bios/sp_accts/wbnu

location (USFWS 2008). The installation NR program manager currently maintains the Nest and Egg Depredation Order for NSA Bethesda. Egg and nest depredation are conducted per the depredation order requirements to safe guard patient health at NSA Bethesda. Various methods of deterring Canada geese are available to the NSA Bethesda Natural Resources Media Manager. An integrated approach that includes several of the following approaches is recommended.

- Habitat modification,
- Exclusion,
- Harassment, and
- Population control.

Habitat Modification and Exclusion

Habitat modification and exclusion techniques can be effective in discouraging geese from settling in an area and preventing access to ponds and favored grazing and loafing areas. Any habitat modification or exclusion device must be consistent with the IAP, and historic district constraints around Lake Eleanor. Canada geese prefer gentle, grassy slopes on pond banks that enable them to easily walk into and out of the water to feed or rest. Therefore, creating and maintaining a vegetated buffer 15 to 20 feet wide along the banks of University Pond, and other stormwater retention ponds would reduce access from the ponds and help deter geese from settling in the areas around the ponds.

Exclusion could also include installing temporary fencing around the ponds. Woven wire, wooden or plastic snow fencing, chicken wire, silt fencing, netting, mylar tape, or several strands of heavy fishing line or wire at least three feet in height should be used. Fencing works best during the summer molt (from mid-June to mid-July), when geese are unable to fly and must walk between feeding and resting areas.

Harassment

Harassment techniques such as frightening geese from the area with loud noises and pyrotechnics or boom cannons are another method of goose management. These methods may not be suitable for use in the hospital/urban setting of NSA Bethesda and are not recommended. Creating and using recorded distress calls can be successful if they are altered frequently and used constantly. The use of trained dogs is also very effective in keeping geese away from specific areas. These methods may be labor-intensive and not be practical for use at NSA Bethesda.

Population Control

Population control involves lethal measures of reducing the number of geese by hunting or destroying Canada goose eggs or nests. Because the Canada goose population at NSA Bethesda

generally resides in locations in the ponds and open lawns that are visible to the on- and off-base public, public hunting is not a recommended control option. However, as geese are relatively easy to catch during the molting season, capture and euthanasia is a practical alternative. Since 2012, NSA Bethesda has contracted APHIS-Wildlife Services (WS) to conduct annual Canada goose control efforts.

Nest and egg destruction are another practical technique that has been utilized at NSA Bethesda. Beginning in 2007, NSA Bethesda began implementing Canada goose population control under the USFWS Nest and Egg Depredation Order. The NSA Bethesda Environmental Specialist is registered with the Resident Canada Goose Registration service and has completed an annual report of activity to the USFWS in accordance with permit conditions.

Population Monitoring

Conducting monthly Canada goose surveys from March-August will provide critical information on the effect of control efforts on the resident goose population at NSA Bethesda. An annual survey using predetermined survey point locations or a subset of plots that are expected to have the best results for Canada geese may established. A 2007-2008 baseline survey indicated the number of geese observed during the monthly point count surveys ranged from a lowest of 7 in September to 137 geese in December when both resident and migrant geese are present (U.S. Navy 2009). Follow up surveys are required to track population trends.

Education and Outreach

Canada geese are large birds that can inflict pain and injury to humans if attacked. Geese are especially aggressive during nesting season and several instances of aggressive behavior are reported each year at NSA Bethesda. Tips on how to avoid being attacked and to whom to report an incident may be published each April as a precautionary measure. Articles or notices can be placed in *Administrative Musings*, which appears bimonthly, the weekly NSA Bethesda *Journal*, and the daily *Plan of the Day*.

Feeding ducks and geese is a common occurrence in public areas where waterfowl occur. Signs with text such as "Keep the Wild in Wildlife – Don't Feed the Geese" are becoming widespread, and the general public is becoming aware of the problems associated with feeding geese. If feeding geese and other waterfowl becomes an issue at NSA Bethesda, such signs could be posted at the ponds and picnic areas.

4.8.2.5 Whitetail Deer

Whitetail deer are the most abundant large herbivores in the United States and eastern Canada. Although whitetail deer populations were small and scattered during the early 1900s, populations have rebounded and are at or exceed biological carrying capacity (BCC) throughout much of their range (Northeast Deer Technical Committee 2009). When the number of deer surpasses the

number that can coexist compatibly with humans as in many urban areas, cultural carrying capacity (CCC) can also be exceeded. With a lack of predators and other control factors, deer populations can expand to levels that have profound impacts on natural ecosystems, cause human/deer conflicts, and reduce deer herd health. Deer population densities in urban and suburban environments are further intensified by loss of habitat from the expansion of residential and commercial development. The resulting concentration of deer on the remaining undeveloped land parcels, such as the forested areas at NSA Bethesda can lead to conflicts between humans and deer.

NSA Bethesda has approximately 80 acres, or about 0.125 square mile of suitable habitat for deer. Incidental field observations of deer conducted in 2007 and 2008 (U.S. Navy 2009a) indicate as many as 9 to 10 deer reside at NSA Bethesda equaling up to 80 deer per square mile. Carrying capacity varies for habitat type and quality and can range from 15 to 50 per square mile depending on ecological value of the habitat and land use. Though no habitat studies have been conducted at NSA Bethesda, the nearby NPS Rock Creek Park has identified a desired deer density goal of 15 – 20 deer per square mile in order to allow for natural forest regeneration and reduce impacts to cultural resources (NPS 2011). However, in order to maintain a viable population, a target population of 30 to 50 deer per square mile (4 to 6 deer) is recommended for NSA Bethesda.

Damage to landscape plantings, natural habitats, and vehicle collisions are frequent results of high deer densities. At NSA Bethesda, several complaints of deer eating flower beds and gardens are received annually, though no collisions have been reported (Brandt 2013). Deer may also be contributing to the degradation of the natural ecological communities as they browse any natural regeneration and are a major vector of invasive species at NSA Bethesda. The best approach to maintaining deer within BCC and CCC is an integrated approach that includes:

- Habitat management,
- Population management, and
- Monitoring.

Habitat Modification

Although deer are generalist foragers and eat most any plant within reach when hungry, they do have preferences for certain plant species. Selecting less palatable herbaceous and woody plants can minimize deer browsing to ornamental plants. By maintaining a diverse landscape in terms of plant species and by planting those that are less favored by deer, the impact of deer browsing on the landscape can be reduced. A list of landscaping plants and their palatability by deer is in Appendix 18.

Population Control

Regulated hunting programs are recognized by wildlife management agencies as the most efficient and effective deer population management tool (Northeast Deer Technical Committee 2009). Regulated hunting programs achieve population management goals by manipulating the size and sex composition of the harvest through hunter bag limits and the issuance of antlerless permits, season type, season timing, season length, number of permits issued, and land-access policies.

Although expensive relative to regulated hunting, sharpshooting programs may be useful in urban and suburban areas by reducing the size of the local deer population where there is not sufficient undeveloped land to support traditional regulated deer hunting programs. A typical sharpshooting program involves the systematic culling of deer by skilled marksmen who are highly trained wildlife professionals. Venison harvested by sharpshooting programs is generally donated to local food banks.

Nonlethal deer population management options available to natural resources managers include contraception and translocation. Capture and translocation has been demonstrated to be impractical, stressful to the deer handled, and may result in high post release mortality (DeNicola et al. 2000). It may also not be feasible because deer populations are high throughout the eastern United States and sites that are capable of receiving deer are scarce.

Implementing a contraception program for whitetail deer is a nonlethal method of population control that has become more tenable in recent years as the U.S. Food and Drug Administration approved the use of GonaCon™ in 2009. GonaCon™ is an immunocontraceptive vaccine that limits the release of sex hormones causing deer to remain in a non-reproductive state as long as a sufficient vaccine level is present in the body. Such immunofertility agents have been successfully employed to control deer reproduction in both captive and free-ranging deer herds. One successful program was conducted by APHIS-WS at the Federal Research Center at White Oak, Maryland using GonaCon™. Results of this study indicated fawning rates were reduced by 86 percent when compared to the reproductive success of untreated does at an adjacent federal facility. GonaCon™ was initially formulated as a two-shot contraceptive agent, but has now been refined so that a single injection can produce infertility for multiple years (Gionfriddo et al. 2006). Limitations to its use are that it must be hand-injected requiring that each animal to be captured and it must be re-administered every 2 to 5 years (Montgomery County Deer Management Work Group 2012).

Population Monitoring

Prior to implementing deer population control measures, a monitoring program to assess baseline population estimates should be conducted. Annual population surveys should then be conducted to assess the effectiveness of the program. A variety of methods for estimating density exist including spotlight surveys, track counts, aerial infrared surveys, and pellet group counting.

4.8.2.6 Feral Pets

Pets that have been abandoned or left behind by owners often become nuisance wildlife on military installations. Feral pets may carry diseases such as rabies, distemper, and feline leukemia (in cats) and pose a serious health threat to humans and other family pets. It is therefore important to ensure that pets are properly vaccinated, tagged, and registered when brought onto NSA Bethesda. In addition, feral animals and loose pets, particularly cats, are known to be very damaging to migratory bird populations and other native wildlife. To reduce impacts to native wildlife, privately owned animals are not permitted to run at large on the installation (SECNAVINST 6401.1B, Veterinary Health Services). Pet owners should also be encouraged to neuter their pets to reduce the occurrence of unwanted animals.

The CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property and OPNAVINST 5090.1D, Reference (c) Chapter 12, Section 12-3.10 state Navy policy on feral pets. Due to the potential of feral or free ranging cat populations to act as disease reservoirs, threatening human health, native wildlife populations and natural ecosystems, Navy commands shall not allow trap, neuter, release or similar programs on their lands. Increasing public awareness on the problems associated with feral cats is a primary factor in controlling feral pet populations. In accordance with Navy policy, NSA Bethesda must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations and must ensure the humane capture and removal, to an appropriate facility, of feral pets if they occur. Installation personnel and residents should understand that feeding feral cats and dogs is an unacceptable practice that may cause feral and other predator populations such as raccoons to increase. Prompt garbage removal and keeping dumpster and refuse receptacles covered with tight-fitting lids are other important practices.

In addition to feral pets, household pets that are allowed to run loose can also harm native species. Therefore Navy policy states that "All pets shall be leashed or otherwise prevented from killing native species or causing harm to natural ecosystems" (DoDM 4715.03-M).

4.8.2.7 Education and Outreach

Education of base personnel and residents can play a significant role in fish and wildlife management at NSA Bethesda. Promoting and distributing educational outreach materials on issues such as the impact free-roaming cats have on native small mammal and bird species, refraining from feeding geese, cats, and other nuisance species, and the benefits of bird nest boxes would support wildlife management goals at the base.

Flyers, posters, and activity registration are available on the PIF website: http://www.dodpif.org/plans/bcp/inrmpbcp.php

4.8.3 Fish and Wildlife Management Actions

Management actions that are recommended to meet fish and wildlife management goals at NSA Bethesda are to:

- Conduct baseline or survey updates for invertebrates, small mammals, herpetofauna, bats, and migratory birds,
- Continue Canada goose population control efforts to maintain low populations of geese and help prevent fowling of public areas,
- Conduct a deer population study to obtain a reliable estimate of the number of deer on the base,
- Implement deer population control if determined necessary by the deer population study,
- Install and maintain artificial nest box structures in a variety of habitat types to enhance habitat for known cavity dwellers that occur on base, and
- Produce and distribute educational materials on feral pets, Canada geese, and bird nest boxes.

4.8.4 Bird Aircraft StrikeHazard Management

Canada geese are the primary focal species for bird aircraft strike hazard (BASH) at NSA Bethesda. The natural resources goose control program has reduced BASH risk by decreasing the goose population over the past few years through a contract with APHIS-WS and through nest removal, as discussed in Section 4.8.2.4. No BASH incidents have been reported at NSA Bethesda (Brandt 2013). The natural resources manager maintains a relationship with the emergency services and installation security to identify and address any potential BASH threats before they become a problem.

4.9 Threatened and Endangered Species Management

The Endangered Species Consultation Handbook is available on the USFWS website: http://endangered.fws.gov/consultations/.

The primary federal regulatory protection for threatened and endangered species on federal lands is the ESA of 1973, as amended. The ESA is federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species to prevent extinction of plants and animals. The law is administered by the Department of Interior USFWS and NOAA Fisheries, depending on the species. Section 7 of the ESA requires all federal agencies, in consultation with USFWS or NOAA Fisheries, to use their authorities to further the purpose of the ESA and to ensure that

their actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat.

In accordance with the ESA, contemplated federal actions with potential to impact a protected species must be assessed via biological assessment to determine whether the proposed action is likely to adversely affect a listed species, proposed species, or designated critical habitat. After review of the biological assessment, the USFWS or NOAA Fisheries issue a biological opinion stating their opinion on whether or not a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The terms and conditions under which incidental take may occur may be identified by the USFWS.

The primary Maryland state law that authorizes and governs the listing of endangered species is the Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01). This Act is supported by regulations (Code of Maryland Regulations 08.03.08), which contain the official State Threatened and Endangered Species list (MDNR 2008a). State regulations prohibit the taking, possession, transportation, exportation, processing, sale, offer for sale, or shipment within the state of endangered species and closely regulate these actions with regard to threatened species. The MDNR Wildlife and Heritage Services is the lead state agency for the identification, ranking, and protection of Maryland's rare species and significant natural areas. Secondarily, MDNR's Fisheries Service maintains an official list of game and commercial fish species that are designated as threatened or endangered in Maryland (Code of Maryland Regulations 08.02.12).

The Maryland Wildlife and Heritage Services website provides information on state and federally listed species: http://dnr.maryland.gov/wildlife/plants_wildlife/nhpintro.asp

Although not strictly bound by state laws, it is Navy policy to protect state-listed species to the greatest extent practicable in order to prevent eventual listing as federally protected species and to honor the partnership established with MDNR for management of fish and wildlife resources at NSA Bethesda. Federally and state-listed threatened and endangered species known to occur in Montgomery County, Maryland are listed in Appendix 11.

Although there are no documented federal or state threatened or endangered species at NSA Bethesda, the goal of threatened and endangered species management at NSA Bethesda is to avoid or minimize any negative impacts that may be documented in the future.

4.9.1 Threatened and Endangered Species Surveys

Three federally listed animal species have been documented in Montgomery County, Maryland, or the District of Columbia, and were considered to have potential to occur at NSA Bethesda. Included are the bog turtle (*Clemmys muhlenbergii*), dwarf wedge mussel (*Alasmidonta*

heterodon), and Hay's spring amphipod (*Stygobromus hayi*). Surveys for each of the three species were to be conducted over five field days during the optimum season for each particular species. However, the site visit to NSA Bethesda indicated that there is no habitat present for the bog turtle. Additional information from the MDNR also indicated there was no potential for the remaining two species to occur either. It was reported that the MDNR has conducted extensive surveys for freshwater mussels, including the federally listed dwarf wedge mussel, throughout Maryland and determined the Bethesda area is not one where dwarf wedge mussel is likely to occur. In addition, Hay's spring amphipod has never been recorded in the State of Maryland (Therres 2008). Surveys conducted in 1999 in support of the 2000 Draft INRMP, monthly avian and floralsurveys conducted from November 2007 through October 2008, and benthic surveys conducted in October 2008 found no state or federally listed species at NSA Bethesda.

4.9.2 Threatened and Endangered Species Strategies

Tracking the status of rare species with the MDNR Wildlife and Heritage Services and maintaining current floral and faunal surveys is recommended as the best management strategy for identifying and protecting any rare, threatened, or endangered species that may occur on the installation.

4.9.3 Threatened and Endangered Species Actions

In order to meet threatened and endangered species management goals:

- The potential presence of rare, threatened, and endangered species should be considered prior to disturbing any remaining natural areas, and as part of future floral and faunal surveys.
- County rare species lists should be consulted and any potentially suitable habitat that occurs on base included in the survey effort.

4.10 Outdoor Recreation

Outdoor recreation is defined by OPNAVINST 5090.1D as any program, activity, or opportunity dependent on the natural environment. Outdoor recreation at NSA Bethesda is managed by MWR and includes 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 tennis courts, lodging facilities, boat-launching ramps, and marinas are generally not included in this definition of outdoor recreation and not discussed in this INRMP. MWR has responsibility for managing many of the organized outdoor recreational facilities.

It is Navy policy to provide outdoor educational and recreational opportunities appropriate to the mission and the resources of Navy bases. The primary goals of outdoor recreation management at NSA Bethesda 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.

4.10.1 Nature Trails

The installation's extensive network of walking trails throughout the wooded areas provides opportunity for outdoor recreation at NSA Bethesda. Birds, wildlife, and a pleasant natural environment can be enjoyed by trail users. The planned accessibility improvements will increase opportunity for use of this resource for all of the base's staff and guests. Installing educational interpretive signs at various locations along the trail is an educational opportunity that could further increase the trails enjoyment. Although the trails are generally in good condition, storm damage frequently impairs access. Prompt debris removal and continued vegetation maintenance such as removal of English ivy and other vines will improve trail conditions and accessibility.

4.10.2 Community Gardens

Prior to 2000 the base supported a community garden in the northeast corner of the installation in an area that has recently been converted to a parking lot. Identifying and establishing an alternative location for a community garden would provide an additional outdoor recreational opportunity and may be therapeutic for the base's wounded warriors. Accessibility, proximity to quarters, water availability, and site suitability (i.e., slope, soils, sunlight) are considerations that must be taken into account when siting a new garden.

4.10.3 Hunting and Fishing

Opportunities for recreational fishing or hunting on the installation are absent. Due to the urban setting, hunting is not permitted. With the possible exception of small, warm water fish in the installation's ponds, there are no game fish present and the ponds are too small to sustain a recreational fishery.

4.10.4 Regulation and Recreation Permits

No regulations or permits are required for participating in outdoor recreational opportunities at NSA Bethesda.

4.10.5 Access and Restrictions

All NSA Bethesda natural areas and recreational facilities are open to active duty and retired military, reservists, DoD employees, family members, and contractors. Recreation facilities such as the ball fields and picnic areas must be scheduled through MWR.

4.10.6 Disabled Access Opportunities

NSA Bethesda has a base accessibility plan (U.S. Navy 2011) that identifies current accessibility conditions and proposed improvements base-wide. Changes to existing pathways and the proposed Stoney Creek trail will provide improved recreational opportunities for wounded warriors and other impaired individuals.

4.10.7 Outdoor Recreation Actions

Management actions that are recommended to meet outdoor recreation management goals at NSA Bethesda are to coordinate with MWR to:

- Maintain the base nature trails,
- Identify and establish an alternative location for a community garden, and
- Provide natural resources support for improvements to trails and other recreational facilities.

4.11 Natural Resources Conservation Law Enforcement

According to OPNAVINST 5090.1D, Reference (c), Chapter 12, Section 12-3.13 conservation law enforcement is the enforcement of laws aimed at protecting natural resources (and recreation activities that depend on natural resources). Military installations with active hunting and fishing programs or with federally protected species may be best served by including conservation law as integral part of a natural resources program. There is little need for conservation law requirement at NSA Bethesda and the installation Security Department handles all law enforcement. If a natural resources violation were to occur, state and/or federal conservation officers would be permitted access to enforce natural resources laws after taking proper safety and security measures.

4.12 Wildland Fire Management

Because of its largely urban environment, there is a low probability of wildland fire occurring at NSA Bethesda. The NSA Bethesda Fire & Emergency Services Department is responsible for all structural and wildfire control at the base.

4.13 Data Management

4.13.1 Navy Conservation Web Site

The Navy Conservation Web site is the Navy's official repository of natural resources information to track INRMP status and implementation measures for regulatory review; generate official reports; record DoN measures of merit and metrics; and centralize and track other documentation. It is a Web-based tool used to submit, compile, and retrieve information about the Natural Resources Conservation Program to obtain and maintain the most current information possible to track the

status of various natural resources programs, have current data to respond to various program inquiries, and generate accurate reports.

4.13.2 Geographic Information Systems Management

Geographic data and information are an integral part of natural resources and environmental protection and planning at NSA Bethesda. A GIS, created in 1996 by Eagan, McAllister Associates, Inc., was maintained by the natural resources program until 2002. The NSA Bethesda GIS is now maintained as part of the NAVFAC GeoReadiness Repository. This repository was developed 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, and regional planning. The GeoReadiness Repository provides a single source of authoritative strategic-level geospatial data for Class I (land) and Class II (facilities) properties. The GeoReadiness Repository enforces the Spatial Data Standards for Facilities, Infrastructure, and Environment. The GeoReadiness Repository provides a resource for sharing existing data and must be kept current by updates from the NSA Bethesda and NAVFAC Washington natural resources managers.

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5.0 IMPLEMENTATION

The Sikes Act requires INRMPs be implemented and the status of implementation reported to Congress, therefore the INRMP must reflect an annual strategy that addresses legal, regulatory, and DoD, DoN, and CNO directive or policy requirements. The INRMP is considered implemented if the installation:

- Actively requests, receives, and uses funds for all "must fund" projects and activities,
- Ensures that sufficient numbers of professionally trained natural resources 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.

5.1 Funding Strategy

All conservation, compliance, and stewardship projects must be entered into the EPR-web system and receive approval up the chain of command to receive funding. Proposed projects necessary to implement this INRMP, an implementation schedule, funding level, and proposed funding source are described in Appendix 15 and 16. Environmental funding priorities are determined by several levels of funding classifications as defined in DoDI 4715.03 and Environmental POM EPR Guidelines (CNIC 2013) as described in the following sections.

5.1.1 Environmental Readiness Levels

Four levels of Navy environmental readiness have been established, which identify the specific types and scope of the capabilities required to provide each level. These Environmental Readiness Levels (ERLs) enable capability based programming and budgeting of environmental funding and facilitate required capability. The four ERLs are summarized from the as defined below:

ERL 4. Environmental Readiness Level 4 are "must fund" conservation requirements that meet recurring natural and cultural resources conservation management or current legal compliance needs. ERL 4 supports all actions specifically required by law, regulation, or EO. Implementation of the INRMP anticipates the execution of all must fund projects and activities in accordance with specific timeframes indentified in the INRMP.

ERL 3. Supports requirements derived from DoD policy, Navy policy, or proactive initiatives that could result in obvious returns on investment and support critical readiness activities by decreasing encumbrances of statutory compliance. These EPRs/proposed efforts are not mandated by law or other federal, state, or local regulations or Eos but would minimize current or future impacts (including costs) to the Navy mission.

ERL 2. Supports proactive initiatives that result in speculative returns on investments and uncertain benefits to the Navy mission. These EPRs/proposed efforts are not mandatory by law or other Federal, state or local regulators, or Eos and should be based on best available scientific or commercial data; or pending Federal, state or local regulations.

ERL 1. Supports investments in environmental leadership and general proactive environmental stewardship.

5.1.2 Navy Assessment Levels

An additional Navy assessment level is assigned to projects to assist in recognizing appropriate funding sources in EPR exhibits. Navy Level 1 requirements are those prescribed by state or federal laws, regulations, and Eos; Level 1 requirements include ERL 4 projects and ongoing efforts. Navy Level 2 requirements are derived from DoD or Navy policy; Level 3 requirements are for pending federal, state, or local regulations; Level 4 requirements meet future requirements; and Level 5 requirements are leadership initiatives that are not required by law, regulation, EO, or policy.

5.1.3 Environmental Funding

Operations and Maintenance, Navy (O&MN) environmental funds are the primary source of resources to support natural resources projects. Compliance activities are funded from an appropriated O&MN account, whereas limited reimbursable funds may be available for stewardship activities. Other special DoD initiatives to fund natural resources projects also become available on a limited basis. In addition, alternate funding sources for special projects and initiatives may be sought from cooperative grants and partnership programs. These grants require a written proposal and often are cost sharing opportunities. Sources of environmental funding. A summary of Navy funding resources and potential alternative sources are listed in Table 5-1.

The Legacy Resource Management Program (Legacy Program) is a special congressionally mandated initiative to fund military conservation projects. The Legacy Program can provide funding for a variety of conservation projects, such as regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, and monitoring and predicting migratory patterns of birds and animals. It is a competitive process that requires the submission of a grant proposal.

Table 5-1. Natural Resources Program Funding Sources

Funding Source	Description	Proposal Deadline
Navy Funding		
Operations and Maintenance Navy (O&MN)	Annual appropriations for the operation and maintenance of the Navy. Includes such costs as operations, civilian salaries and awards, travel, fuel, minor construction projects up to $750K, installation maintenance and operations support.	See POM
Operations and Maintenance, Navy Reserve (O&MNR)	Annual appropriations for the operation and maintenance of the Navy Reserves	See POM
Commercial Forestry Funds	Supports commercial forestry operations at Navy installations or commands incurring obligations for the production and sale of forest products. Forest management program obligations must be related directly to the economic production and sale of forest products and the enhancement, protection, conservation and management of Navy forests. Reimbursable obligations do not include expenses that are for the protection of forests that are incapable of economic production of forest products.	Annual Increment (plan for upcoming fiscal year due no later than 1 May
Forestry Reserve Project Funds	DoD Forestry Reserve Account funds may be used on Navy installations for: improvement of forest lands; unanticipated contingencies in the administration of forest lands and the production of forest; natural resource management that implements approved plans and agreements.	No later than 1 February
Agricultural Outleasing Funds	Available to Navy installations for natural resources conservation projects. These funds may be used for the development, update, and implementation of stewardship projects such as wildlife habitat enhancement, agricultural improvements, and equipment maintenance as listed in the INRMP. Priority is given to funding agricultural outleasing program expenses.	No later than 1 September
Recycling Funds	Installations with a Qualified Recycling Program (QRP) may use proceeds for some types of natural resource projects. Up to 50 % of net proceeds may be used for pollution prevention/abatement projects such as wetlands or riparian forest restoration or outdoor recreation projects such as trail construction and maintenance.	Based on Regional Instructions

Table 5-1. Natural Resources Program Funding Sources (cont'd)

Funding Source	Description	Proposal Deadline
Alternative Funding		
Legacy Resources Management Program (Legacy)	Supports a range of DoD efforts to preserve natural and cultural resources on regional level. Partnerships are generally required. https://www.dodlegacy.org/legacy/index.aspx	Variable, check website
National Public Lands Day	Small grants up to $6,500 available for base-level projects that use volunteers to improve and enhance the public lands. http://www.publiclandsday.org/managers/funding_and_awards.htm	No later than 1 June
Strategic Environmental Research and Development Program (SERDP)	DoD environmental science and technology program that funds environmental research and development through a competitive process. Funding opportunities are offered for four core focus areas: environmental restoration, munitions management, sustainable infrastructure, and weapons systems platforms. http://www.serdp.org/funding/.	Variable, check website
The National Fish and Wildlife Foundation	Offers matching grants for on-the-ground conservation projects for the conservation of fish, wildlife, plants and the habitats on which they depend. Grant programs include Pulling Together, Native Plant Conservation Initiative, and Regional IPM Competitive Grant Program. http://www.nfwf.org/Content/NavigationMenu/Grants/GrantGuidelines/default.htm	Project proposals are received on a year-round, revolving basis with two decision cycles per year.
Chesapeake Bay Program	The Chesapeake Bay Program and its partners offer multiple grant opportunities to help fund restoration projects of all sizes across the Chesapeake watershed. http://www.epa.gov/region03/chesapeake/grants.htm	Variable, check website
USFWS Neotropical Migratory Bird Conservation Act Grants Program	Provides matching grants for the protection and management of neotropical migratory bird populations. Grant requests must be matched by partner contributions at no less than a 3:1 by non-federal funds. http://www.fws.gov/birdhabitat/Grants/index.shtm.	November
USFWS North American Wetlands Conservation Act Grant Program	Supports projects that involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats. Grant requests must be matched by partner contributions at no less than a 1:1 by non-federal funds. http://www.fws.gov/birdhabitat/Grants/index.shtm	Variable, check website
NOAA Community-based Restoration Program (CRP)	Provides financial and technical assistance that helps communities implement sound habitat restoration projects including tidal wetlands, shellfish reefs, submerged aquatic vegetation, and coastal streams. http://www.nmfs.noaa.gov/habitat/restoration/funding_opportunities/funding_ner.html	Variable, check website

5.2 Federal Anti-Deficiency Act

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.).

5.3 Staffing Needs

The Sikes Act requires, to the extent practicable using available resources, the Navy ensure that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out natural resources management programs.

5.3.1 Federal and Contract Personnel

Natural resources management at NSA Bethesda is integrated with other PWD programs. Current positions that relate to natural resources management include:

- Installation Environmental Program Director
- Tank/Air Program Manager
- Drinking/Waste Water Program Manager
- Hazardous Waste – Environmental Restoration
- Stormwater Program Manager
- NEPA and Natural Resources Program Manager

One or more of these positions may be vacant at any given time.

5.3.2 Other Personnel

The GIS specialist within the Asset Management Branch provides invaluable support to natural resources.

5.3.3 Professional Development and Natural Resources Training

OPNAV 5090.1D, Reference (c), Chapter 3 establishes Navy implementing policy guidance regarding environmental training and identifies required training for Navy personnel (including military, civilian, active duty, and reserve) to accomplish all Navy missions in an environmentally responsible manner, and to comply with federal, state, and local laws and regulations.

The Navy Environmental Readiness Training Program (NERTP) was developed to support the ability of the U.S. naval forces to effectively operate in an environmentally responsible manner.

NERTP requirements are documented in the NERTP Navy Training System Plan (NTSP). NTSP lists formal courses, electronic learning, and other training vehicles authorized within NERTP.

A variety of formal Navy environmental training courses are available through the Civil Engineer Corps Officer School (CECOS) at Port Hueneme, California and Naval Safety and Environmental Training Center at Norfolk, Virginia. Any requirement submitted for training outside of these two venues requires detailed justification as to why in cannot be accommodated within these programs. A list of courses offered and billet-specific environmental training requirements are identified in OPNAV 5090.1D, Reference (c), Chapter 3, Table 3-1. All training is based on the availability of funding; therefore, the completion of listed courses below may not be feasible.

Other courses that may be pertinent to natural resources management at NSA Bethesda and are available from commercial vendors include:

- Wetlands Regulations
- Wetlands Delineation & Practicum
- Invasive Species Control
- ESRI GIS Mapping Software

5.4 Cooperative Agreements and Partnerships

Per DoD Instruction 4715.03, DoD installations may enter into cooperative agreements with states, land-grant universities, local governments, nongovernmental organizations and individuals to provide for the maintenance and improvement of natural resources or conservation research on or off DoD installations. A cooperative agreement is used to acquire goods or services to accomplish a public purpose of support or stimulation authorized by Federal statute. Use of a cooperative agreement requires substantial involvement between the federal agency and recipient during performance of the activity. Cooperative agreements authorized by the Sikes Act are not subject to the provisions of the Federal Grant and Cooperative Agreement Act, but must comply with the procedural requirements of the DoD Grant and Cooperative Agreement Regulations. Funds approved for a particular fiscal year may be obligated to cover the costs of goods and services provided under a Cooperative Agreement during any 18-month period beginning in that fiscal year in accordance with the Sikes Act. Cooperative agreements may be executed over a 60-month period. Using cooperative agreements to accomplish projects is an efficient means to implement INRMPs and can be administered through the NAVFAC Washington Regional Natural Resources Office.

5.4.1 Use of Cooperative Ecosystem Studies Units

The Cooperative Ecosystem Studies Unit (CESU) National Network provides coordinated research, technical, and educational assistance to federal agencies and their partners for natural and cultural resources through a network of 17 regional partnerships. As of March 2012, DoD was a member of 15 CESUs. Each CESU is competitively developed under a single cooperative agreement based on the need of INRMP approved projects. DoD and host university/partner universities collaborate on specific projects with the host/partner universities providing space, faculty expertise, students and educational services while DoD provides scientists and funding. CESU objectives include:

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

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

5.5 INRMP Review and Revision Process

INRMPs are long-term planning documents that require periodic reviews of management goals and practices in order to provide the opportunity to incorporate new science and information as well as assess the performance of management actions. In accordance with the Sikes Act, INRMPs must be reviewed and if necessary, revised, at intervals of not more than five years. INRMP revisions are only required when the existing INRMP is determined to be inadequate, installation mission or physical features have changed significantly, following BRAC actions, new species are listed or listed species are identified on the installation, or if the mission intensity or training is dramatically changed or increased. This INRMP revision was necessary to address the significant changes resulting from the realignment of Walter Reed Army Medical Center with NNMC Bethesda under BRAC 2005 and the resulting requirement for numerous new and expanded facilities at NSA Bethesda.

5.5.1 INRMP Revision

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

1. When beginning the revision process, NSA Bethesda, or NAVFAC Washington under the direction of NSA Bethesda, will advise all appropriate internal and external stakeholders of the intent to prepare or revise the INRMP within 30 days of starting such the action. When providing this notification to USFWS and MDNR, the installation should concurrently request that the USFWS and MDNR participate cooperatively in the development or revision of the INRMP.
2. During the draft development process, NSA Bethesda will coordinate with all internal and external stakeholders. NSA Bethesda should notify USFWS and MDNR of its intent to provide a draft INRMP for review and coordination at least 60 days prior to delivering the document.
3. NSA Bethesda will provide the public with an opportunity to review and comment upon the draft INRMP through the NEPA process. The public should be afforded a minimum of 30 days to review and comment.
4. NSA Bethesda will send an initial draft INRMP to the USFWS field office and MDNR for review and comment.
5. The USFWS field office will provide written comments to the installation and to the MDNR director's office and will furnish copies of the letter to the Sikes Act Coordinator at the USFWS regional office.
6. MDNR will provide written comments to the installation and furnish copies of the letter to the Sikes Act Coordinator at the USFWS regional office.
7. NSA Bethesda shall consider all comments received and shall send a final draft of the INRMP to the USFWS regional office and MDNR director's office with a letter documenting the actions taken on the draft comments. NSA Bethesda will furnish a copy of the letter to the USFWS field office.
8. NSA Bethesda will request that the USFWS and the state director provide an opportunity for all appropriate offices and divisions to review the final draft INRMP within 60 days of receipt, unless the participants mutually agree upon a longer review period because the installation has a particularly large or complex INRMP. Written concurrence will constitute "Mutual Agreement."

5.5.2 Annual Reviews

Navy policy requires that INRMPs be reviewed annually by the installation with the cooperation of the appropriate field-level offices of the USFWS, state fish and wildlife agency. Annual reviews will enable project tracking and assessment, will help facilitate adaptive management, and will be used to inform changes to future INRMP updates and revisions. Reviews may be accomplished via correspondence or in a meeting between appropriate parties and is facilitated by the Metrics tool located on the Navy Conservation website.

The annual review is to assess and verify:

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

In addition to requiring mutual agreement from the USFWS and MDNR, The Sikes Act requires any new INRMPs or significant changes to existing INRMPs to be made available to the public for review. In compliance, revisions to this plan will be noticed through the major newspapers in Bethesda and the public will be given a 30-day review period.

5.5.3 Annual Metrics

Metrics have been developed to assess INRMP review and implementation, measure conservation efforts, ensure no net loss of military testing and training lands, understand the conservation program's installation mission support, and indicate the success of partnerships with the USFWS and MDNR. This evaluation is facilitated by the web-based Metrics tool on the Navy Environmental Management Systems (EMS) website. The metrics provide the means to evaluate performance in seven focus areas:

The Metrics tool is available on the Navy EMS Website: https://emsweb.cnic.navy.mil/Common/CustomContent/447

1. Natural Resources Management
2. Listed species and critical habitat

3. Recreational use and access
4. Sikes Act cooperation
5. Team adequacy
6. INRMP implementation
7. INRMP support of the installation mission

Additionally, DoD produces an end-of-year Environmental Management Review to meet Congressional and in house requirements from data derived from the annual metrics review.

The primary deficiency found in past metric reviews for NSA Bethesda is the need to complete and implement an INRMP as many of the metric review questions are based on team adequacy and the INRMP review process. Completing this INRMP and requesting funds for project implementation are expected improve the metrics review outcome significantly in future years. A copy of the previous fiscal year annual metrics review results is in Appendix 5.

The Installation Commanding Officer is required to participate in the annual natural resources program and INRMP metrics review. The Commanding Officer must further send a written report to USFWS and the appropriate state fish and wildlife agency following the annual INRMP metric review no later than 31 January of each year. The report must include the following:

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

5.5.3.1 Streamlined INRMP Update Review

A new tripartite MOU between the DoD, USFWS, and the Association of Fish and Wildlife Agencies was signed in July 2013 that streamlines the review process for INRMP updates. Per the MOU, specific procedures for the streamlined review process will be as follows:

- Installations will contact the appropriate USFWS regional or field office. Usually (but not always), signature authority for INRMPs is at the field office level of Ecological

Services; therefore, installations should contact their local Ecological Services field office first.

- When preparing an updated or revised INRMP for USFWS review, installations will clearly identify all changes made (e.g., highlight, track changes, written summary) when forwarding it for review.
- Once the appropriate USFWS office has received the updated INRMP, the USFWS office will acknowledge receipt and send the installation a proposed timeline for the expedited review with fifteen (15) days. This communication may be electronic, by fax, or in a written letter.
- The reviewing USFWS and state(s) offices will focus their review on those parts of the INRMP that reflect changes from the previously reviewed version, as indicated.
- If acceptable, the USFWS reviewing office will use an addendum to the existing INRMP to acknowledge its review and acceptance of changes, or to indicate what changes require further discussion or modification. This addendum may be used for the state review as well, and will become part of the approved INRMP.

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APPENDIX 1

Acronyms and Abbreviations

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ACRONYMS and ABBREVIATIONS

AFRRI	Armed Forces Radiobiology Research Institute
AOC	Area of Concern
AM	Asset Management
APHIS	Animal and Plant Health Inspection services
APWO	assistant public works officer
AT/FP	Anti-Terrorism/Force Protection
B&B	balled and burlapped
BCC	biological carrying capacity
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CATEX	categorical exclusion
CBD	Central Business District
CCAR	Climate Change Adaptation Roadmap
CCC	cultural carrying capacity
CECOS	Civil Engineer Corps Officer School)
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESU	Cooperative Ecosystem Studies Unit
CFR	Code of Federal Regulations
CMP-NCRM	Comprehensive Master Plan for the National Capital Region Medical
CNIC	Commander, Navy Installation Command
CNO	Chief of Naval Operations
CNRMA	Commander Navy Region Mid-Atlantic
CO_2	carbon dioxide
CPLO	Community Planning Liaison Officer
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DHA	Defense Health Agency
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DoN	Department of the Navy
DEIS	Draft Environmental Impact Statement
EA	Environmental Analysis
EAP	Encroachment Action Plan
EFH	essential fish habitat

ACRONYMS and ABBREVIATIONS (cont'd)

EMS	Environmental Management Systems
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Projects Request
EQR	Environmental Quality Report
ER	Environmental Restoration
ERLs	Environmental Readiness Levels
ESA	Endangered Species Act
ESD	environmental site design
ESTCP	Environmental Security Technology Certification Program
°F	degrees Fahrenheit
FEAD	Field Engineering and Acquisition Department
FEMA	Federal Emergency Management Administration
FONSI	finding of no significant impact
FPPA	Farmland Protection Policy Act
FR	Federal Register
GCN	greatest conservation need
GGRA	Greenhouse Gas Emissions Reduction Act of 2009
GPS	global positioning system
HQ	Head Quarters
IAP	Installation Appearance Plan
INRMP	Integrated Natural Resources Management Plan
IPM	integrated pest management
IPMP	Integrated Pest Management Plan
IPR	Interim Progress Review
IWFLO	Inpatient Warrior and Family Liaison Office
LEED	Leadership in Energy and Environmental Design
LID	low impact development
MBTA	Migratory Bird treaty Act
MCCC	Maryland Commission on Climate Change
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDP	Maryland Department of Planning
MDSPGP	Maryland State Programmatic General Permit
MHS	Military Health System
MILCON	Military construction
MMPA	Marine Mammal Protection Act
M-NCPPC	Maryland-National Capital Park and Planning Commission

ACRONYMS and ABBREVIATIONS (cont'd)

MOA	Memoranda of Agreement
MOU	Memoranda of Understanding
MS4	municipal separate storm sewer systems
NAAQS	National Ambient Air Quality Standards
NAVAIR	Naval Air Systems Command
NAVFAC	Naval Facilities Engineering Command
NAVFAC HQ	Naval Facilities Engineering Command Head Quarters
NEPA	National Environment Policy Act
NERTP	Navy Environmental Readiness Training Program
NHPA	National Historic Preservation Act
NIH	National Institutes of Health
NMCNCR	Naval Medical Command, National Capital Region
NNMC	National Naval Medical Center
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries Service
NPDES	National Pollutants Discharge Elimination System
NPLD	National Public Lands Day
NPS	National Park Service
NRCS	National Conservation Service
NSA	Bethesda Naval Support Activity Bethesda
NWI	National Wetland Inventory
O&MN	Operations and Maintenance, Navy
OPNAVINST	Chief of Naval Operations Operating Instruction
PAI	pounds active ingredient
PIF	Partners in Flight
PM2.5	particulate matter with diameter less than or equal to 2.5 micrometers
POM	Program Objectives Memorandum
PPP	Pollution Prevention Plan
PWD	Public Works Department
O&MN	Operations and Maintenance, Navy
RCRA	Resource Conservation and Recovery Act
REC	Regional Environmental Coordinators
RFI	Facility Investigation
RPM	Remedial Project Manager
SAR	site approval request
SECNAVINST	Secretary of the Navy Instruction
SERDP	Strategic Environmental Research and Development Program
SHPO	State Historic Preservation Office
SSPP	Strategic Sustainability Performance Plan

SWMAP	Stormwater Management Action Plan
SWMU	Solid Waste Management Unit
TMDL	total maximum daily load
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFS	U.S. Forest Service
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USUHS	Uniformed Services University of the Health Sciences
WDCP	Wildlife Diversity Conservation Plan
WRNMMC	Walter Reed National Military Medical Center

APPENDIX 2

Relevant Environmental Laws, Regulations, Policies, Guidance, Instructions and Orders

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Navy Instructions and Policies Related to Natural Resources

OPNAVINST 5090.1D – Environmental Readiness Program

OPNAV MANUAL 5090.1 - Environmental Readiness Program Manual

OPNAVINST 6250.4A –Pest Management Program

OPNAVINST 8000.16, Environmental Security Management

DoD Publications Related to Natural Resources

DoD Directive 3200.15- Sustainment of Ranges and Operating Areas

DoD Directive 4150.7-Pest Management

DoD Directive 4140.1- Material Management Policy

DoD Instruction 4150.07- DoD Pest Management Program

DoD Instruction 4165.57- Air Installations Compatible Use Zones

DoD Instruction 4165.59- DoD Implementation of the Coastal Zone Management Act

DoD Instruction 4700.2- Secretary of Defense Award for Natural Resources and Environmental Management

DoD Instruction 4001.01- Installation Support

DoD Instruction 4715.03-Environmental Conservation Program

DoD Instruction 4715.9-Environmental Planning and Analysis

Department of Navy Procedures for Implementing NEPA (32 CFR 775)

Deputy Under Secretary of Defense Memorandum, Integrated Natural Resource Management Plan Template

Executive Orders (EOs) Related to Natural and Cultural Resources Management

EO 11593 – Protection and Enhancement of the Cultural Environment

EO 11644 – Use of Off-Road Vehicles on the Public Lands

EO 11988 – Floodplain Management

EO 11989 – Off-Road Vehicles on Public Lands

EO 11990 – Protection of Wetlands

EO 12777 – Implementation of the Federal Water Pollution Control Act and Oil Pollution Act

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 12962 – Recreational Fisheries

EO 13112 – Invasive Species

EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13423 – Strengthening Federal Environmental, Energy, and Transportation Management

EO 13514 – Federal Leadership in Environmental, Energy, and Economic Performance

Federal Statutes Related to Natural and Cultural Resources Management

American Indian Religious Freedom Act of 1978 (42 USC 1996)

Animal Damage Control Act (7 USC 426-426b)

Antiquities Act of 1906 (16 USC 431 et seq.)

Archeological and Historical Preservation Act of 1974 (16 USC 469 et seq.)

Archeological Resources Protection Act of 1979 (16 USC 470 et seq.)

Bald and Golden Eagle Protection Act of 1940 (16 USC 668 et seq.)

Base Closure and Realignment Act (Part A of title XXIX of Public Law 101-510; 10 USC 2687)

Clean Air Act, as amended (42 USC 7401 et seq.)

Coastal Zone Management Act of 1972 (16 USC 1451-1456)

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC 9601 et seq.)

Defense Environmental Restoration Program (10 USC 2701)

Endangered Species Act of 1973, as amended (16 USC 1531 et seq.)

Farmland Protection Act (7 USC 4201 et seq.)

Federal Compliance with Pollution Control Standards (42 USC 4321)

Federal Consistency with Approved Coastal Management Programs (15 CFR 930)

Federal Facilities Compliance Act of 1992 (42 USC 6961)

Federal Insecticide, Fungicide, and Rodenticide Act as amended (7 USC 136 et seq.)

Federal Land Policy and Management Act of 1976 (43 USC 1701)

Federal Water Pollution Control Act (Clean Water Act) as amended 1987 (33 USC 1251 et seq.)

Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.)

Fish and Wildlife Coordination Act (16 USC § 661 et seq.)

Forest and Rangeland Renewable Resources Planning Act of 1974 (16 USC 1601 et seq.)

Lacey Act (16 USC 701) and Lacey Act Amendments of 1981 (16 USC 3371–3378)

Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq.)

Management of undesirable plants on Federal lands (7 USC 2814)

Migratory Bird Conservation Act of 1918 (16 USC 715)

Migratory Bird Treaty Act (16 USC 703–711)

Migratory Birds List (50 CFR 10.13)

National Environmental Policy Act of 1969 (42 USC 4321 et seq.)

National Forest Management Act of 1976 (16 USC 1600 et seq.)

National Historic Preservation Act (16 USC 470 et seq.)

National Register of Historic Places (36 CFR 60)

Pollution Prevention Act (42 USC 13101 et seq.)

Resource Conservation and Recovery Act (42 USC 6901 et seq.)

Rivers and Harbors Act of 1899 (33 USC 401 et seq.)

Safe Drinking Water Act (42 USC 201 et seq.)

Sikes Act, as amended 1997 (16 USC 670a – et seq.)

Soil and Water Conservation Act (16 USC 2001 et seq.)

Timber Sales on Military Lands (10 USC 2665)

Wild and Scenic Rivers Act (16 USC 1274 et seq.)

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APPENDIX 3

Tri-Partite Agreement

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MEMORANDUM OF UNDERSTANDING
BETWEEN
THE U.S. DEPARTMENT OF DEFENSE
AND
THE U.S. FISH AND WILDLIFE SERVICE
AND
THE ASSOCIATION OF FISH AND WILDLIFE AGENCIES
FOR A
COOPERATIVE INTEGRATED NATURAL RESOURCE MANAGEMENT PROGRAM
ON MILITARY INSTALLATIONS

A. PURPOSE

The purpose of this Memorandum of Understanding (MOU) is to further a cooperative relationship between the U.S. Department of Defense (DoD), U.S. Department of the Interior – Fish and Wildlife Service (FWS), and state fish and wildlife agencies (states) acting through the Association of Fish and Wildlife Agencies (AFWA) (hereafter referred to as the Parties) in preparing, reviewing, revising, updating and implementing Integrated Natural Resource Management Plans (INRMPs) for military installations.

B. BACKGROUND

In recognition that military lands have significant natural resources, Congress enacted the Sikes Act in 1960 to address wildlife conservation and public access on military installations. The 1997 amendments to the Sikes Act require the DoD to develop and implement an INRMP for each military installation with significant natural resources. A 2012 amendment to the Sikes Act now authorizes the preparation of INRMPs for state-owned National Guard installations used for training pursuant to chapter 5 of title 32 of the United States Code. DoD must prepare all INRMPs in cooperation with the FWS and states. Each INRMP must reflect the mutual agreement of the Parties concerning conservation, protection, and management of fish, wildlife, plants and their habitats on military lands.

INRMPs provide for the management of natural resources, including fish and wildlife and their habitats. To the maximum extent practicable, they incorporate ecosystem management principles, and describe procedures and projects that manage and maintain the landscapes necessary to sustain military-controlled lands for mission purposes. INRMPs also allow for multipurpose uses of resources, including public access appropriate for those uses, provided such access does not conflict with military land use, security requirements, safety, or ecosystem needs, including the needs of fish and wildlife resources. Effective communications and coordination among the Parties, initiated early in the planning process at national, regional, and the military installation levels, is essential to developing, reviewing, and implementing comprehensive INRMPs. When such partnering involves the participation and coordination of all Parties regarding existing FWS and state natural resources management plans or initiatives, such as threatened and endangered species recovery plans or State Wildlife Action Plans, the mutual agreement of all Parties is achieved more easily. INRMPs provide for the conservation

and rehabilitation of natural resources on military lands in ways that help ensure the readiness of the Armed Forces. Thus, a clear understanding of land use objectives for military lands should enable the Parties to have a common understanding of DoD's land management requirements.

This MOU addresses the responsibilities of the Parties to facilitate optimum management of natural resources on military installations. It replaces a DoD-FWS-AFWA MOU for *Cooperative Integrated Natural Resources Management Program on Military Installations* dated January 31, 2006, which expired January 31, 2011.

C. AUTHORITIES

This MOU is established under the authority of the Sikes Act, as amended, 16 U.S.C. 670a-670f, which requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations in cooperation with the FWS and states. The DoD's primary mission is national defense. DoD manages approximately 28 million acres of land and waters under the Sikes Act to support sustained military activities while conserving and protecting biological resources.

The FWS manages approximately 150 million acres of the National Wildlife Refuge System, and administers numerous fish and wildlife conservation and management statutes and authorities, including the: Fish and Wildlife Coordination Act, Migratory Bird Treaty Act of 1918, Endangered Species Act, Marine Mammal Protection Act, Bald and Golden Eagle Protection Act, Anadromous Fish Conservation Act, Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, Federal Noxious Weed Act, Alien Species Prevention Enforcement Act of 1992, North American Wetland Conservation Act, and Coastal Barrier Resources Act.

The states in general possess broad trustee and police powers over fish and wildlife within their borders, including – absent a clear expression of Congressional intent to the contrary – fish and wildlife on federal lands within their borders. Where Congress has given federal agencies certain conservation responsibilities, such as for migratory birds or species listed as threatened or endangered under the Endangered Species Act, the states, in most cases, have cooperative management responsibilities.

The Sikes Act (16 U.S.C. 670c-1) allows the Secretary of a military department to enter into cooperative agreements with the states, local governments, Indian tribes, nongovernmental organizations, and individuals to provide for the maintenance and improvement of natural resources, or to benefit natural and historic research, both on and off DoD installations.

The Sikes Act (16 U.S.C. 670a(d)(2) also encourages the Secretary of Defense, to the greatest extent practicable, to enter into agreements to use the services, personnel, equipment, and facilities, with or without reimbursement, of the Secretary of the Interior or states in carrying out the provisions of this section.

The Economy Act (31 U.S.C. 1535 and 1536) allows a federal agency to enter into an agreement with another federal agency for services, when those services can be rendered in a more

convenient or cost effective manner by another federal agency.

D. RESPONSIBILITIES

The Parties to this agreement hereby enter into a cooperative program of INRMP development, review, and implementation with mutually agreed-upon fish and wildlife conservation objectives to satisfy Sikes Act goals.

1. **The DoD, the FWS and AFWA (Parties) mutually agree:**

   a. To meet at least annually at the headquarters' level to discuss implementation of this MOU. The DoD and FWS will alternate responsibilities for coordinating this annual meeting and any other meetings related to this MOU. Proposed amendments to the MOU should be presented in writing to the parties at least 15 days prior to the annual meeting. The terms of this MOU and any proposed amendments may be reviewed at the annual meeting. The meeting may also review mutual Sikes Act research and technology needs, accomplishments, and other emerging issues.

   b. To participate in a Sikes Act Tripartite Core Group consisting of representatives from the Parties. This Core Group will meet at least quarterly, coordinated by the DoD, to discuss and develop projects and guidance to help prepare and implement INRMPs and to discuss Sikes Act issues of national importance.

   c. To engage in sound management practices for natural resource protection and management pursuant to this MOU with full consideration for military readiness; native fish and wildlife; threatened, endangered and at-risk species; and the environment.

   d. To promote the sustainable multipurpose use of natural resources on military installations – including hunting, fishing, trapping, and non-consumptive uses such as wildlife viewing, boating, and camping – in ways that are consistent with DoD's primary military mission and to the extent reasonably practicable.

   e. To develop and implement supplemental Sikes Act MOUs or other agreements, as needed, at the regional and/or state level.

   f. To recognize the most current DoD and FWS Sikes Act Guidance as the guidance for communication and cooperation of the Parties represented by this MOU.

   g. To post current DoD, FWS, and state Sikes Act guidance documents within 14 days of completion on the following sites:

      i. For DoD: https://www.denix.osd.mil/nr

      ii. For FWS: http://www.fws.gov/habitatconservation/sikes_act.html

      iii. For the states: http://www.fishwildlife.org

h. To cooperatively prepare and conduct full reviews of all new INRMPs in a timely manner.

i. To require the DoD Components and appropriate FWS and state offices to conduct a review for operation and effect of each INRMP no less often than every five years, as required by the Sikes Act, and to document these reviews. As a means of facilitating and streamlining this statutory requirement, use the annual progress review of each INRMP as conducted by each DoD Component per DoD policy.

j. To encourage collaboration in annual progress reviews between representatives from each military installation with an INRMP and appropriate representatives from the other Parties.

    i. The Parties shall discuss the performance of each military installation in meeting relevant DoD Natural Resources Focus Area metrics, and potential improvements to INRMP implementation, such as new projects or management practices.

    ii. Meetings may be in person or by another mutually acceptable means.

    iii. The Parties shall discuss methods and projects that the FWS and states can implement that support INRMP goals and objectives.

k. To streamline and expedite the review of INRMP updates or revisions, and to effectively address review for critical habitat exclusions based on the INRMP conservation benefit, when feasible:

    i. DoD and the FWS will develop and implement a streamlined review process within six months of signature of this MOU that will allow for expedited review and approval (new signatures) of updated sections of each INRMP.

    ii. DoD will provide a means of easily identifying all changes to each updated or revised INRMP when forwarding it for review.

    iii. FWS will focus review on those parts of updated INRMPs that reflect changes from the previously reviewed version.

    iv. FWS and the appropriate states will review all INRMPs with major revisions (e.g., changes required by mission realignments, the listing of new species or other significant action that has the potential to affect military operations or readiness).

    v. DoD, FWS, and the states (acting through AFWA) will continue to seek opportunities to make INRMP review processes more efficient while sustaining and enhancing INRMP conservation effectiveness.

    vi. The DoD Components may submit to the USFWS, a priority INRMP list

to address those installations seeking critical habitat exclusions to facilitate coordination with USFWS Endangered Species office.

vii. To ensure consistency, the Parties accept the following definitions:

a) Compliant INRMP: An INRMP that has been both approved in writing, and reviewed, within the past five years, as to operation and effect, by authorized officials of DoD, DOI, and each appropriate state fish and wildlife agency.

b) Review for operation and effect: A comprehensive, joint review by the parties to the INRMP, conducted no less often than every five years, to determine whether the plan needs an update or revision to continue to address adequately Sikes Act purposes and requirements.

c) INRMP update: Any change to an INRMP that, if implemented, is not expected to result in consequences materially different from those in the existing INRMP and analyzed in an existing NEPA document. Such changes will not result in a significant environmental impact, and installations are not required to invite the public to review or to comment on the decision to continue implementing the updated INRMP.

d) INRMP revision: Any change to an INRMP that, if implemented, may result in a significant environmental impact, including those not anticipated by the parties to the INRMP when the plan was last approved and/or reviewed as to operation and effect. All such revisions require approval by all parties to the INRMP, and will require a new or supplemental NEPA analysis.

l. That none of the Parties to the MOU is relinquishing any authority, responsibility, or duty established by law, regulation, policy, or directive.

m. To designate the officials listed below, or their delegates to participate in the activities pursuant to this MOU.

i. DoD: Deputy Director, Natural Resources Conservation Compliance, ODUSD (I&E) ESOH

ii. FWS: National Sikes Act Coordinator, Fish and Aquatic Conservation

iii. AFWA: Director, Government Affairs

2. DoD agrees to:

a. Communicate the establishment of this MOU to all DoD Components.

b. Take the lead in developing policies and guidance related to INRMP development, updates, revisions, and implementation, and to ensure the involvement, as appropriate, in these processes of the FWS and state fish and wildlife agencies.

c. Ensure distribution of the DoD and FWS Sikes Act Guidance to all appropriate DoD Components.

d. Encourage DoD Components to invite appropriate FWS and state fish and wildlife agency offices to participate in annual INRMP reviews. All such invitations should be extended at least 15 business days in advance of the scheduled review to facilitate meaningful participation by all three Parties. Meetings may be in person or by other mutually agreed upon means.

e. Encourage DoD Components to take full advantage of FWS and state fish and wildlife agency natural resources expertise through the use of Economy Act transfers and cooperative agreements. Encourage DoD Components and FWS to explore the use of the Fish and Wildlife Coordination Act for technical assistance, fish stocking, and other conservation projects. Priority should be given to projects that:

    i. Sustain the military mission.

    ii. Effectively apply ecosystem management principles.

    iii. Consider the strategic planning priorities of the FWS and the state fish and wildlife agency.

f. Encourage DoD Components to give priority to INRMP requirements that:

    i. Sustain military mission activities while ensuring conservation of natural resources.

    ii. Provide adequate staffing with the appropriate expertise for updating, revising, and implementing each INRMP within the scope of DoD Component responsibilities, mission, and funding constraints.

g. Encourage DoD Components to discuss with the FWS and state fish and wildlife agencies all issues of mutual interest related to the protection, conservation, and management of fish and wildlife resources on DoD installations.

h. Subject to mission, safety, security, and ecosystem requirements, provide public access to military installations to facilitate the sustainable multipurpose use of its natural resources.

i. Identify natural resource research needs, and develop research proposals with input from the Parties.

j. Identify opportunities to work with the DoD Components to facilitate:

    i. Cooperative regional and local natural resource conservation partnerships and initiatives with FWS and state fish and wildlife agency offices.

    ii. Natural resources conservation technology transfer and training initiatives

between the DoD Components, federal land management agencies, and state fish and wildlife agencies.

k. Provide law enforcement support to protect fish, wildlife, and plant resources on military installations consistent with jurisdiction and authority.

3. FWS agrees to:

a. Communicate the establishment of this MOU to each FWS Regional Office and appropriate field offices in close proximity to military installations.

b. Distribute the DoD and FWS Sikes Act Guidelines to each FWS Regional Office and appropriate field office in close proximity to military installations.

c. Designate regional and field office FWS liaisons to develop partnerships and help DoD implement joint management of ecosystem-based natural resource management programs, and provide a list of those liaisons to the DoD as needed.

d. Provide technical assistance with the appropriate expertise to the DoD in managing its resources within the scope of FWS responsibilities and funding constraints.

e. Encourage field offices to coordinate current and proposed FWS natural resource initiatives and research efforts with those that may relate to DoD installations, and to provide applicable installations with new and relevant information pertaining to distribution and/or research regarding listed and candidate species and species at-risk.

f. Inform DoD Components and affected installations regarding upcoming and reasonably foreseeable proposed listing and critical habitat designations that may potentially affect military installations in a timely manner before publication of such proposals in the Federal Register.

g. Encourage regional and field offices to expedite pending INRMP reviews that may affect foreseeable proposed listing of threatened and endangered species and critical habitat designations.

h. Provide law enforcement support as appropriate to protect fish, wildlife, and plant resources on military installations within the jurisdiction of the FWS.

i. Identify FWS refuges and other potential federal management areas in close proximity to military installations, and, where appropriate, participate in the joint management of ecosystem-based natural resource management projects that support INRMP and other planning goals, objectives, and implementation.

4. AFWA agrees to:

a. Communicate the establishment of this MOU to each state fish and wildlife agency director and appropriate personnel.

b. Distribute the DoD and FWS Sikes Act Guidelines to each state fish and wildlife agency director and appropriate staff.

c. Facilitate and coordinate with the states to encourage them to:

i. Participate in developing, reviewing, updating, revising, approving and, as appropriate implementing INRMPs in a timely way upon request by military installation personnel.

ii. Designate state liaisons to help develop partnerships and to help DoD installation staff implement natural resource conservation and management programs.

iii. Identify state wildlife management areas in close proximity to military installations and, where appropriate, participate in the joint management of ecosystem-based natural resources projects that support INRMP goals, objectives, and implementation.

iv. Provide technical assistance to DoD installation staff in adaptively managing natural resources within the scope of state responsibilities, funding constraints, and expertise.

v. Identify state personnel needs to develop, review, update/revise, approve, and implement INRMPs, and facilitate the identification of funding opportunities to address the fulfillment of state priorities.

vi. Coordinate current and proposed state natural resources research efforts with those that may relate to DoD installations.

vii. Coordinate with DoD installations to develop new, and implement existing, conservation plans and strategies, including, but not limited to State Wildlife Action Plans; the National Fish, Wildlife and Plants Climate Adaptation Strategy; goals or initiatives of the North American Bird Conservation Initiative (NABCI) and/or Partners in Amphibian and Reptile Conservation (PARC); and the National Fish Habitat Action Plan.

E. STATEMENT OF NO FINANCIAL OBLIGATION

This MOU does not impose any financial obligation on the part of any signatory.

F. ESTABLISHMENT OF COOPERATIVE AGREEMENTS

The Parties are encouraged to enter into cooperative or interagency agreements to coordinate and implement natural resource management on military installations. If fiscal resources are required, the Parties must develop a separately funded cooperative or interagency agreement.

Such cooperative or interagency agreements may also be entered into under the authority of the Sikes Act (16 U.S.C. 670c-l). Interagency agreements may be entered into under the authority of the Economy Act (31 U.S.C. 1535 and 1536). The Parties should also explore opportunities to utilize the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c) to facilitate agreements for FWS technical assistance, fish stocking, and other conservation activities. Each funded cooperative or interagency agreement shall include a work plan and a financial plan that identify goals, objectives, and a budget and payment schedule. A cooperative or interagency agreement to accomplish a study or research also will include a study design and methodology in the work plan. It is understood and agreed that any funds allocated via these cooperative or interagency agreements shall be expended in accordance with its terms and in the manner prescribed by the fiscal regulations and/or administrative policies of the party making the funds available.

G. AMENDMENTS

This MOU may be amended at any time by mutual written agreement of the Parties.

H. TERMINATION

Any party to this MOU may remove itself upon sixty (60) days written notice to the other parties.

I. EFFECTIVE DATE AND DURATION

This MOU will be in effect upon date of final signature, and will continue for ten years from date of final signature. The parties will meet six (6) months prior to the expiration of this MOU to discuss potential modifications and renewal terms.

7-29-13
Date

John Conger
Acting Deputy Under Secretary of Defense
(Installations and Environment)
U.S. Department of Defense

6.24.13
Date

Dan Ashe
Director
Fish and Wildlife Service
U.S. Department of Interior

7-15/2013
Date

Ron Regan
Executive Director
Association of Fish and Wildlife Agencies

APPENDIX 4

Agency INRMP Review Letters

To be inserted as Completed

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APPENDIX 5

Results of Annual Review

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NR Metrics 2012 *NSA Bethesda - NATNAVMEDCEN BETHESDA MD (Main Site)*

Note: Click on the links to the right to jump to a focus area. Please click "Save" to add your draft answers to the database. If you leave and are logged out of the system, your answers will be retained the next time you log in.

Assignment Information

Assigned To:	Clarence Brandt		
Special Area(s):	NATNAVMEDCEN BETHESDA MD (Main Site)		
Due Date:		**Status:**	Incomplete
Sent:	9/26/2012	**Sent By:**	Matt Hawkins (DoD)
Modified:	10/10/2012	**Modified By:**	Clarence Brandt
Completed:		**Completed By:**	
Reviewed:		**Reviewed By:**	

Select "New Item" to add an attendee

Attendees

Name	Organization	Phone	Email	Lead
Clarence Brandt	NAVFAC	2952712	clarence.brandt@navy.mil	Yes
Susan Paul	NAVFAC	(202) 685-8224	susan.paul@navy.mil	

Navy INRMP Status Check/Data Call

1. Has the site been surveyed to determine if significant natural resources exist?

SIGNIFICANT - sources identified as having special importance to an installation and/or its ecosystem. Natural resources may be significant on a local, regional, national, or international scale. All threatened, endangered and at-risk species are significant natural resources that normally will require an INRMP. Installations that actively manage or execute projects for fish and wildlife, forestry, vegetation and erosion control, agricultural outleasing or grazing, or wetlands protection should be evaluated for significance, but normally will require an INRMP. An evaluation for significance should also consider the degree of active management, special natural features, aesthetics, outdoor recreational opportunities, and the ecological context of the installation. (DoDI 4715.03)

Options: Yes, No

Yes

1a. If the site has been surveyed, were significant natural resources found?

Options: Yes, No

Yes

1b. If the site has not been surveyed, please explain why a survey has not been conducted.

2. If significant natural resources were found, is there a compliant INRMP that covers this site?

COMPLIANT INRMP - A complete plan that meets the purposes of the Sikes Act (§101(a)(3)(A-C)), contains the required plan elements (§101(b)(1)(A-J)), and has been reviewed for operation and effect within the past 5 years (§101(2)(b)(2)).

Options: Yes, No

No

Comment:

INRMP awarded in FY12 to be completed FY13.

3. If there is a compliant INRMP for the site, then please enter the name and date of the INRMP that covers this site

Please upload the INRMP and Signature Page to the Conservation Website. Go to the Natural Resources Program Overview page and select the Documents tab.

3a. Name of INRMP

3b. Date of INRMP

4. If there is no INRMP for the site, has funding been requested to develop an INRMP?

Options: Yes, No

Yes

4a. If funding has been requested, what is the expected date to receive funding?

9/30/2012

4b. If no funding has been requested, please explain.

5. Has a 5-year INRMP review for operation and effect been completed for this INRMP?

REVIEW FOR OPERATION AND EFFECT – A comprehensive review by the Parties, at least once every 5 years, to evaluate the extent to which the goals and objectives of the INRMP continue to meet the purpose of the Sikes Act, which is to carry out a program that provides for the conservation and rehabilitation of natural resources on military installations. The outcome of this review will assist in determining if the INRMP requires a revision (§101(f)(1)(A)). The annual review can qualify for the 5-year review for operation and effect, which is legally required by the Sikes Act, if mutually agreed upon by both partners (i.e. USFWS and State).

Options: Yes, No

5a. If a 5-year INRMP review for operation and effect been completed, did the review result in a revision of the INRMP?

REVISION – A substantive change to an INRMP that requires coordination and mutual agreement by the Parties. [List examples of things that would trigger a revision – Navy needs to review current list.] A revision is not minor changes to the INRMP text, work plans, or projects. Rather, these changes are updates that should be made as a result of annual reviews per DoD policy, to ensure the INRMP reflects the current condition of the natural resources and program goals and objectives. (CNO-N45)

Options: Yes, No

5b. If yes, when was State concurrence received?

5c. If yes, when was USFWS regional concurrence received?

5d. If yes, when was Installation Commanding Officer approval received?

5e. If no, please explain why a review for operation and effect has not been completed.

1. Ecosystem Integrity

Focus Area Purpose: *Evaluate the current status, management effectiveness, and trends of the ecosystems at the installation to support and maintain a community of organisms that have a species composition, diversity, and functional organization comparable to those in the respective region.*

Instructions: *The list below contains the ecosystems occurring on the site(s) that were selected during the FY11 NR Metrics data call. Please review the list and update as necessary. Select the red 'X' to delete an ecosystem from the list. Select "New Item" to add an ecosystem and begin answering questions. Select the name of the preloaded ecosystem to answer the questions for the current reporting period. Note: The "Comment on my response" option is available for each question and can be used to (1) provide supplemental information about how you answered a question for future reference or (2) provide feedback to HQ if you have any questions/concerns about a question.*

Assessment of ecosystem integrity

	Ecosystem	Fragmentation	Stressors	Species Populations	Condition

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Are conservation easements, or buffers, in place to provide an ecosystem integrity benefit on the installation?

Options: Yes, No = opportunity exists, but easements/buffers have not been pursued, N/A = no opportunity, development is immediately adjacent to installation

N/A = no opportunity, development is immediately adjacent to installation

Findings

INRMP has not been written habitat has not been determined.

Recommendations

INRMP will determine habitats.

Section Score

2. Listed Species & Critical Habitat

Focus Area Purpose: *Evaluate the extent to which federally listed species have been identified and the INRMP provides conservation benefits to these species and their habitats.*

The list below contains the federally listed species occurring on the site(s) that were selected during the FY11 NR Metrics data call. Species that are not protected under the federal Endangered Species Act (e.g. marine mammals protected solely under MMPA, state listed species, Birds of Conservation Concern, etc.) have been removed from the list. INRMP coverage, status, management of non-federally listed species should be addressed or discussed in the Ecosystem Integrity and/or INRMP Implementation Focus Areas.

Instructions: *Please review the list and ensure that it is correct. To **ADD** a species select "New Item" and search for the species list. Select the name of the preloaded species to answer the questions for the current reporting period. To ADD species that are not on the pre-populated list or to **DELETE** species from the list please contact Mr. Matt Hawkins (matt.hawkins@navy.mil). Note: The "Comment on my response" option is available for each question and can be used to (1) provide supplemental information about how you answered a question for future reference or (2) provide feedback to HQ if you have any questions/concerns about a question.*

***Status codes include**:*

***E** = endangered. A species in danger of extinction throughout all or a significant portion of its range.*

***T** = threatened. A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.*

Assessment of Federally Listed Species and Critical Habitat

	Species	Beneficial Surveys (Habitat)	Beneficial Surveys (Population)	Goals	Critical Habitat	Exemption/Exclusion

Unoccupied Critical Habitat Questions

1. Has unoccupied critical habitat for any federally listed species been designated on the installation?

Options: Yes, No, N/A

N/A

1a. For which species?

User selects from preloaded federal species list.

2. Have management projects addressing unoccupied critical habitat been clearly identified in the INRMP?

Options: Yes, No, N/A

N/A

3. Have management projects addressing unoccupied critical habitat been clearly identified in the EPRWeb?

Options: Yes, No, N/A

N/A

Candidate Species / Species of Special Concern

Sub-Focus Area Purpose: *Evaluates the extent to which USFWS candidate species and NMFS species of special concern species have been identified and the INRMP addresses these species and their habitats or the ecosystems in which they are found.*

Instructions: *The list below should include all USFWS candidate species and NMFS species of special concern species, including USFWS Candidate Notice of Review (CNOR) and Work Plan (WP) lists, which have been documented or are likely to occur on your installation. Please add all species that have been documented or are likely to occur on your installation. To ADD a species select "New Item" and search for the species list. Select the name of the preloaded species to answer the question regarding which management approach benefits the species. To ADD species that are not on the pre-populated list or to DELETE species from the list please contact Mr. Matt Hawkins (matt.hawkins@navy.mil). Note: The "Comment on my response" option is available for each question and can be used to (1) provide supplemental information about how you answered a question for future reference or (2) provide feedback to HQ if you have any questions/concerns about a question.*

Select "New Item" to add a candidate species and begin answering questions.

Candidate Species / Species of Special Concern

Candidate Species	Conservation Benefit

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

Recommendations

Section Score

3. Recreational Use and Access

Focus Area Purpose: *Evaluate the availability and adequacy of public recreational use opportunities, such as fishing and hunting, and access for handicapped and disabled persons, given security and safety requirements for the installation.*

1. Are recreational opportunities available on the installation?

Options: Yes, No: landscape doesn't support recreational opportunities, N/A: security constraints limit/prohibit recreational opportunities

Yes

2. If recreational opportunities are available, are they offered to the public?

Options: Yes, No, NA: Recreational opportunities are not available due to landscape or security constraints.

NA: Recreational opportunities are not available due to landscape or security constraints.

3. If recreational opportunities are available, are they offered to DoD civilian personnel?

Options: Yes, No, NA: Recreational opportunities are not available due to landscape or security constraints.

Yes

4. If recreational opportunities are available, are they accessible by disabled veterans/Americans?

Options: Yes, No, N/A: Recreational opportunities are not available due to landscape or security constraints.

Yes

5. Are Sikes Act fees collected for outdoor recreational opportunities?

Options: Yes, No, N/A: Recreational opportunities do not include hunting and fishing.

N/A: Recreational opportunities do not include hunting and fishing.

6. Are recreational areas and facilities in good condition?

Options: Yes, No, NA: Recreational opportunities are not available due to landscape or security constraints.

Yes

7. Is there an active natural resources law enforcement program on the installation?

Options: Yes, No, N/A: recreational opportunities do not include hunting and fishing

N/A: recreational opportunities do not include hunting and fishing

8. Are sustainable harvest goals in the INRMP effective for the management of the species' population?

Options: Not effective, Minimal effectiveness, Moderate effectiveness, Effective, Highly effective, N/A: Recreational opportunities do not include hunting and fishing

N/A: Recreational opportunities do not include hunting and fishing

9. To what extent did the installation develop and provide public outreach/educational awareness, e.g. environmental educational opportunities, natural resource field trips/tours, pamphlets?

Options: No public outreach provided, Low outreach, Moderate outreach, Good outreach, Excellent outreach, N/A

Moderate outreach

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

Recommendations

Section Score: 0.91

4. Sikes Act Cooperation (Partnership Effectiveness)

Focus Area Purpose: *Determine to what degree USFWS, State Fish and Wildlife Agency, and when appropriate, NOAA Fisheries Service, partnerships are cooperative and result in effective INRMP development and review for operation and effect.*

1. Was the USFWS invited to participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No

1a. By what method was the USFWS invited to participate in the annual INRMP/Natural Resources Program review?

Options: Telephone call, Electronic mail, Official letter, Multiple methods, Other, NA (USFWS was not invited)

1b. Did the USFWS respond to the invitation to participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No, N/A

1c. How many attempts were made to invite the USFWS to participate in the annual INRMP/Natural Resources Program review?

Options: 0-3, 4-6, 7-10, >10, NA (USFWS was not invited)

1d. Did the USFWS participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No

1e. If the USFWS participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect?

Options: Yes, No

1f. If the USFWS did not participate in the annual review, what type of correspondence was received from the USFWS to inform the installation that they were not able to participate?

Options: Telephone call, Electronic mail, Official letter, Multiple methods, Other, NA (USFWS did participate)

1g. If the USFWS did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect? When?

When? User enters date in comment text box below question.

Options: Yes, No

1h. Was a report of the previous year's annual review submitted to the USFWS during this reporting period?

Options: Yes, No

2. Was the State Fish and Wildlife Agency invited to participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No

2a. By what method was the State Fish and Wildlife Agency invited to participate in the annual INRMP/Natural Resources Program review?

Options: Telephone call, Electronic mail, Official Letter, Multiple methods, Other, NA (the State Fish and Wildlife Agency was not invited)

2b. Did the State Fish and Wildlife Agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No, N/A

2c. How many attempts were made to invite the State Fish and Wildlife Agency to participate in the annual INRMP/Natural Resources Program review?

Options: 0-3, 4-6, 7-10, >10, NA (the State Fish and Wildlife Agency was not invited)

2d. Did the State Fish and Wildlife Agency participate in the annual INRMP/Natural Resources Program review?

Options: Yes, No, N/A

2e. If the State Fish and Wildlife Agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect?

Options: Yes, No, N/A

2f. If the State Fish and Wildlife Agency did not participate in the annual review, what type of correspondence was received from the State Fish and Wildlife Agency to inform the installation that they were not able to participate?

Options: Telephone call, Electronic mail, Official letter, Multiple methods, Other, NA (State did participate)

2g. If the State Fish and Wildlife Agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect? When?

When? User enters date in comment text box below question.

Options: Yes, No, N/A

2h. Was a report of the previous year's annual review submitted to the State Fish and Wildlife Agency during this reporting period?

Options: Yes, No, N/A

3. Was NOAA Fisheries Service invited to participate in the annual INRMP/Natural Resources Program review, if applicable?

Options: Yes, No, N/A

3a. By what method was NOAA Fisheries Service invited to participate in the annual INRMP/Natural Resources Program review, if applicable?

Options: Telephone call, Electronic mail, Official letter, Multiple, Other, N/A

3b. Did NOAA Fisheries Service respond to the invitation to participate in the annual INRMP/Natural Resources Program review, if applicable?

Options: Yes, No, N/A

3c. How many attempts were made to invite the NOAA Fisheries Service to participate in the annual INRMP/Natural Resources Program review, if applicable?

Options: 0-3, 4-6, 7-10, >10, N/A

3d. Did NOAA Fisheries Service participate in the annual INRMP/Natural Resources Program review, if applicable?

Options: Yes, No, N/A

3e. If NOAA Fisheries Service participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect, if applicable?

Options: Yes, No, N/A

3f. If the NOAA Fisheries Service did not participate in the annual review, what type of correspondence was received from the State Fish and Wildlife Agency to inform the installation that they were not able to participate? When?

When? User enters date in comment text box below question.

Options: Telephone call, Electronic mail, Official letter, Multiple methods, Other, NA (was not invited)

3g. If NOAA Fisheries Service did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect? When?

When? User enters date in comment text box below question.

Options: Yes, No, N/A

3h. Was a report of the previous year's annual review submitted to NOAA Fisheries Service during this reporting period, if applicable?

Options: Yes, No, N/A

4. What is the level of collaboration/cooperation between Sikes Act partners ?

Sikes Act partners: USFWS, State Fish and Wildlife Agency, and NOAA Fisheries Service, if applicable.

Options: None, Minimal collaboration/cooperation, Satisfactory collaboration/cooperation, Effective collaboration/cooperation, Highly effective collaboration/cooperation

5. How well are installation natural resource management goals and objectives aligned with conservation goals of Sikes Act partners, e.g. USFWS/NOAA Fisheries Service regional goals and State Wildlife Action Plans (SWAPs)?

Options: Not aligned, Somewhat aligned, Completely aligned, N/A: Option for NOAA only

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

INRMP is not written there has been no cordination to date.

Recommendations

Partners will be contacted during the drafting of the INRMP.

Section Score

5. Team Adequacy

Focus Area Purpose: *Asses the adequacy of the natural resources team (the natural resource management professional and installation support staff) in accomplishing INRMP goals and objectives at each installation.*

1. Is there a Navy professional Natural Resources Manager designated by the Installation Commanding Officer?

COs of shore activities holding Class 1 plant accounts shall appoint, by letter, an installation Natural Resources Manager/Coordinator whose

duties include ensuring that the CO is informed regarding: natural resources issues, conditions of natural resources, objectives of the INRMP, and potential or actual conflicts between mission requirements and natural resources mandates. Designated installation POC's are responsible for the inherently governmental decisions made on behalf of the installation and CO with regard to Sikes Act compliance. [OPNAVINST 5090.1C]

Options: Yes, No

Yes

2. Is there an on-site Navy professional Natural Resources Manager?

Options: Yes, No

Yes

2a. Please enter the GS grade level and job series code

Enter the GS grade level and job series code (i.e. GS-0401-12) of each on-site Natural Resources Manager

GS-12 0028

3. Is there adequate installation staff assigned or available to properly implement the INRMP goals and objectives?

staff assigned or available: Defined as NR staff or other reach back EV staff.

Options: Yes, No

Yes

3a. Please enter the GS grade level and job series code

Enter the GS grade level and job series code (i.e. GS-0401-12) of each installation staff member assigned or available to assist the Natural Resources Manager in implementing the INRMP goals and objectives.

GS-12 0028

4. How well do higher echelon offices support the installation natural resources program, e.g. reach back support for execution, policy support, etc.)?

Options: No support, Minimal support, Satisfactory support, Well supported, Very well supported

Well supported

5. The team is enhanced by the use of contractors.

Contractors: Defined as supplemental staff to the onsite NR staff, not contractors working in support of contracted projects.

Options: Disagree, Somewhat agree, Neutral, Agree, Strongly agree, N/A

Agree

6. The team is enhanced by the use of volunteers.

Options: Disagree, Somewhat agree, Neutral, Agree, Strongly agree, N/A

N/A

7. The Natural Resources team is adequately trained to implement the goals and objectives of the INRMP.

Options: Disagree, Somewhat agree, Neutral, Agree, Strongly agree

Agree

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

NR personnel on site requires more training.

Recommendations

NRPM will sign up for clsses in CECOS.

Section Score: 0.89

6. INRMP Implementation

Focus Area Purpose: *Evaluate the execution of actions taken to meet goals and objectives outlined in the INRMP.*

Supplemental Information: *The intent of this Focus Area is to assess how well actions are being implemented to execute the goals and objectives of the INRMP. Actions can include projects submitted via EPRWeb, as well as*

activities executed with alternative funds, not programmed through EPRWeb, or carried out by the use of volunteers or cooperative partnerships with other entities. Only include actions that occurred fully or partially during the CURRENT REPORTING PERIOD, e.g. the PREVIOUS FISCAL YEAR.

***Instructions:** Select a project from the list below (imported from EPRWeb) to begin answering questions. Select the red 'X' to delete a project, if a preloaded project doesn't apply to the site (s) or is not a project that occurred during the current reporting period. In addition, any INRMP actions, e.g. emergent projects, non-funded actions, projects involving volunteers, etc., not preloaded in the table should be entered manually in order to be assessed. Select "New Item" to add additional INRMP actions or missing EPRWeb projects, and begin answering questions. Note: Conservation recommendations identified during regulatory consultations (e.g. ESA Section 7, EFH, etc.), over the past year, may have resulted in the development of emergent requirements. These projects should also be evaluated during this annual review.*

Assessment of INRMP Implementation

	FY	Project #	Title	Spent ($)	Met INRMP Goals	On Schedule	Status	Ecosystem Benefited
			(#12101) Flora, Fauna and Habitat					
	2012	3335514004	Nuisance Wildlife Management	$10,750.00	Somewhat Agree	Yes	Completed	
			(#12103) INRMP - Overarching					
	2012	16812016	NNMC Integrated Natural Resource Management Plan	$157,903.00	Strongly Agree	Yes	Now In-Progress	
			(#12106) Invasives					
	2012	3335514003	Invasive Species Control	$28,750.00	Somewhat Agree	Yes	Now In-Progress	

For each INRMP action executed during the reporting period for the installation, provide the amount of funding spent on listed species related-actions. Note: If a single project benefitted multiple listed species, please break out the funding amount spent per species, e.g. add the same INRMP action for each listed species benefitted. Select "New Item" to add federally listed species that benefitted from various INRMP projects/actions.

Assessment of Listed Species Benefitted by INRMP Implementation

Action	Species	Spent

General INRMP Implementation Questions

1. Do the goals and objectives of the INRMP/Natural Resources Program support other conservation partnerships/initiatives?

Options: Yes, No

Yes

2. Which conservation partnerships/initiatives are supported?

Select all that apply

Chesapeake Bay Initiative, National Military Fish ...

3. To what level are Natural Resource program executions meeting USFWS conservation management expectations?

Options: Dissatisfied, Minimally satisfied, Somewhat satisfied, Completely satisfied, More than satisfied

4. To what level are Natural Resource program executions meeting State Fish and Wildlife Agency conservation management expectations?

Options: Dissatisfied, Minimally satisfied, Somewhat satisfied, Completely satisfied, More than satisfied

5. To what level are Natural Resource program executions meeting NOAA Fisheries Service conservation management expectations, if applicable?

Options: N/A: Not supported, Minimally supported, Satisfactorily supported, Well supported, Very well

supported

N/A: Not supported

6. To what extent has the INRMP/Natural Resources program successfully supported other mission areas? (e.g. encroachment, BASH, range support, port operations, air operations, facilities management, etc.)

Options: Not supported, Minimally supported, Satisfactorily supported, Well supported, Very well supported

Satisfactorily supported

7. Are Cooperative Agreements used to execute natural resources program requirements?

Options: Yes, No

No

8. Describe any obstacles to INRMP implementation

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

Need to write INRMP and coordinate with
partners to implement conservation program.

Recommendations

Complete project 3335512106 as scoped.

Section Score: 0.75

7. INRMP (Natural Resource Program) Support of the Installation Mission

Focus Area Purpose: *Evaluate the level to which existing natural resources requirements support the installation's ability to sustain the current operational mission, ensuring no net loss of mission capability.*

Mission statement

1. The Natural Resources program effectively considers current mission requirements.

Options: Strongly disagree, Disagree, Neutral, Agree, Strongly agree

2. What is the level of coordination between natural resources personnel and other installation departments and military staff?

Options: No coordination, Minimal coordination, Satisfactory coordination, Effective coordination, Highly effective coordination

3. To what extent has the INRMP successfully supported other mission areas? (e.g. encroachment, BASH, range support, port operations, air operations, facilities management, etc.)

Options: Not supported, Minimally supported, Satisfactorily supported, Well supported, Very well supported

4. To what extent has there been a net loss of training lands or mission-related operational/training activities?

Options: Mission is fully impeded; training activities cannot be conducted due to regulatory requirements, Mission/Training activities are somewhat impeded with workarounds due to regulatory requirements, Neutral, No loss occurred, Mission has seen benefits

Please enter Findings and Recommendations in the space provided below. Findings and Recommendations are required if the score for this focus area results in a Yellow or Red score. You will be unable to proceed to the next focus area until Findings and Recommendations have been entered.

If your score is Green, Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Findings

Recommendations

Commanding Officer Signature

Name

Rank

Section Score

Summary

1. As a result of this year's annual review, have any additional actions, such as management recommendations related to regulatory drivers (ACOE permits, EFH Issues, etc.), been identified that should be considered for incorporation into the INRMP?

The purpose of this question is to assess whether the INRMP needs to be updated, either in content or projects to be implemented, as a result of the outcome of the annual review for operation and effect that was conducted.

Options: Yes, No

No

2. In addition to any findings submitted in the 7 Focus Areas please provide any additional or general findings?

3. In addition to any recommendations submitted in the 7 Focus Areas please provide any additional or general recommendations?

4. List the top three accomplishments for the Natural Resources Program during this reporting period.

4a. [1st accomplishment] *

4b. [2nd accomplishment] *

4c. [3rd accomplishment] *

Scorecard

	Focus Area	Final
	1. Ecosystem Integrity	
	2. Listed Species & Critical Habitat	
	3. Recreational Use and Access	0.91
	4. Sikes Act Cooperation (Partnership Effectiveness)	
	5. Team Adequacy	0.89
	6. INRMP Implementation	0.59
	7. INRMP (Natural Resource Program) Support of the Installation Mission	
		0.80

***Legend**: Green (1.00-0.67), Yellow (0.66-0.34), Red (0.33-0.0)*

To finalize your scorecard, please save this form, and then select the Submit button above.

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APPENDIX 6

Updates to Original Plan

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This Integrated Natural Resources Management Plan covers a 5-year period; the plan is required to be updated annually, and reviewed and revised every five years. Updates and revisions are a necessary part of maintaining a proactive management plan. Ecosystem management is a dynamic process; therefore, implementation of management goals and objectives requires prescribed monitoring to measure management success or failure. The knowledge gained from observations and testing provides the framework on which to base revisions to the plan. The section below may be used to document changes to the plan that will improve natural resources management. It is intended to document annual updates, and it is not intended to replace the five-year review and revision process. Annual updates will provide information that will be incorporated into the five-year review. Each entry in this section should reference the plan section and page number that is being updated to facilitate quick cross-referencing.

DATE	SECTION/PAGE	COMMENT	REVIEWER

DATE	SECTION/PAGE	COMMENT	REVIEWER

APPENDIX 7

Landcover Types and Acreage

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Cover Type	**Acres**
Urban Land	
Impervious surface	98.02
Landscape / Mowed Lawn	88.69
Undeveloped Land	
Forested Area	55.61

Source: NSA Bethesda GIS database 2014

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APPENDIX 8

Planning Level Survey Results-Flora

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NSA Bethesda Plant Species List

Common Name	Scientific Name	Origin[1]	Habit[2]	Federal Status[3]	State Status[4]	Global Rank[5]	State Rank[6]
Boxelder	*Acer negundo*	N	T			G5	SNR
Japanese maple	*Acer palmatum*	A	T			GNR	SNA
Norway maple	*Acer platanoides*	A	T			GNR	SNA
Red maple	*Acer rubrum*	N	T			G5	SNR
Silver maple	*Acer saccharinum*	N	T			G5	SNR
Sugar maple	*Acer saccharum*	N	T			G5	SNR
Black bugbane	*Actaea racemosa*	N	H			G4	SNR
Tree of heaven	*Ailanthus altissima*	A	T			GNR	SNA
Mimosa	*Albizia julibrissin*	A	T			GNR	SNA
Garlic mustard	*Alliaria petiolata*	A	H			GNR	SNA
Hazel alder	*Alnus serrulata*	N	S			G5	SNR
Common ragweed	*Ambrosia artemisiifolia*	N	H			G5	SNR
Giant ragweed	*Ambrosia trifida*	N	H			G5	SNR
Porcelainberry	*Ampelopsis brevipedunculata*	A	V			G5	SNA
Indian hemp	*Apocynum cannabinum*	N	H			G5	S5
Wild sarsaparilla	*Aralia nudicaulis*	N	H			G5	SNR
Jack-in-the-pulpit	*Arisaema triphyllum*	N	H			G5	SNR
Absinth wormwood	*Artemisia absinthium*	A	H			GNR	SNA
Common milkweed	*Asclepias syriaca*	N	H			G5	SNR
Lady fern	*Athyrium filix-femina*	N	H			G5	SNR
Garden yellowrocket	*Barbarea vulgaris*	A	H			GNR	SNA
Japanese barberry	*Berberis thunbergii*	A	S			GNR	SNA
Common barberry	*Berberis vulgaris*	A	S			GNR	SNA
Butterfly bush	*Buddleja daidii*	A	S			GNR	SNA
Mockernut hickory	*Carya alba*	N	T			G5	SNR
Bitternut hickory	*Carya cordiformis*	N	T			G5	SNR
Pignut hickory	*Carya glabra*	N	T			G5	SNR
Chinese chestnut	*Castanea mollissima*	A	T			GNR	SNA
Oriental bittersweet	*Celastrus orbiculata*	A	V			GNR	SNA
Hackberry	*Celtis occidentalis*	N	T			G5	SNR
Redbud	*Cercis canadensis*	N	T			G5	SNR
White-cedar sp.	*Chaemycyparis* sp.	A	T			G4	S3
Spotted wintergreen	*Chimaphila maculata*	N	H			G5	SNR
Enchanters nightshade	*Circaea lutetiana*	N	H			G5	SNR
Canada thistle	*Cirsium arvense*	A	H			GNR	SNA
Spring beauty	*Claytonia virginica*	N	H			G5	SNR
Japanese clematis	*Clematis dioscoreifolia*	A	V			GNR	SNA
Hedge bindweed	*Convolvulus sepium*	N	V			G5	SNR
Flowering dogwood	*Cornus florida*	N	T			G5	SNR
Yellow nutsedge	*Cyperus esculentus*	A	G			G5	SNR
Queen Anne's lace	*Daucus carota*	A	H			GNR	SNA
Jimsom weed	*Datura stramonium*	A	H			GNR	SNA

NSA Bethesda Plant Species List (cont'd)

Common Name	Scientific Name	Origin[1]	Habit[2]	Federal Status[3]	State Status[4]	Global Rank[5]	State Rank[6]
Cut-leaved toothwort	*Dentaria laciniata*	A	H			G5	SNR
Hoary tick-trefoil	*Desmodium canescens*	N	H			G5	SNR
Cinnamon vine	*Dioscorea batatas*	A	V			GNR	SNA
Indian strawberry	*Duchesnea indica*	A	H			G5	SNA
Autumn olive	*Elaeagnus umbellata*	A	S			GNR	SNA
Daisy fleabane	*Erigeron annuus*	N	H			G5	SNR
Trout-lily	*Erythronium americanum*	N	H			G5	SNR
Burningbush	*Euonymus alatus*	A	S			GNR	SNA
Winter creeper	*Euonymus fortunei*	A	V			GNR	SNA
American beech	*Fagus grandifolia*	N	T			G5	SNR
White ash	*Fraxinus americana*	N	T			G5	SNR
Green ash	*Fraxinus pennsylvanica*	N	T			G5	SNR
Cleavers bedstraw	*Galium aparine*	N	H			G5	SNR
White avens	*Geum canadense*	N	H			G5	SNR
Ginkgo	*Ginkgo biloba*	A	T			G1	SNA
Gill-over-the ground	*Glechoma hederacea*	A	H			GNR	SNA
Honey locust	*Gleditisia triacanthos*	N	T			GNR	SNR
Witchhazel	*Hamamelis virginiana*	N	S			G5	SNR
English ivy	*Hedera helix*	A	V			GNR	SNA
Jerusalem artichoke	*Helianthus tuberosus*	N	H			G5	SNR
Day lily	*Hemerocallis fulva*	A	H			GNA	SNA
Alumroot	*Heuchera americana*	N	H			G5	SNR
Dwarf St. Johnswort	*Hypericum mutilum*	N	H			G5	SNR
American holly	*Ilex opaca*	N	T			G5	SNR
Spotted jewelweed	*Impatiens capensis*	N	H			G5	SNR
Black walnut	*Juglans nigra*	N	T			G5	SNR
Eastern redcedar	*Juniperus virginiana*	N	T			G5	SNR
Mountain laurel	*Kalmia latifolia*	N	S			G5	SNR
Goldenrain tree	*Koelreuteria paniculata*	A	T			GNR	SNA
Prickly lettuce	*Lactuca serriola*	A	H			GNR	SNA
European larch	*Larix decidua*	A	T			G5	SNA
Privet spp.	*Ligustrum* spp.	A	S			GNR	SNA
Spicebush	*Lindera benzoin*	N	S			G5	SNR
Sweetgum	*Liquidambar styraciflua*	N	T			G5	SNR
Tuliptree	*Liriodendron tulipifera*	N	T			G5	SNR
Liriope	*Liriope* sp.	A	H			GNR	SNA
Japanese honeysuckle	*Lonicera japonica*	A	V			GNR	SNA
Amur honeysuckle	*Lonicera maackii*	A	S			GNR	SNA
Flowering rush	*Luzula multiflora*	N	G			G5	SNR
Ground cedar	*Lycopodium digitatum*	N	H			G5	SNR
Cucumber tree	*Magnolia acuminate*	N	T			G5	SNR
Saucer magnolia	*Magnolia × soulangeana*	A	T			GNR	SNR
Japanese stiltgrass	*Microstegium vimineum*	A	G			GNR	SNA
White mulberry	*Morus alba*	A	T			GNR	SNA

NSA Bethesda Plant Species List (cont'd)

Common Name	Scientific Name	Origin[1]	Habit[2]	Federal Status[3]	State Status[4]	Global Rank[5]	State Rank[6]
True forget-me-not	*Myosotis scorpioides*	A	H			G5	SNA
Black gum	*Nyssa sylvatica*	N	T			G5	SNR
Sensitive fern	*Onoclea sensibilis*	N	H			G5	SNR
Sweet ciceley	*Osmorhiza claytonii*	N	H			G5	SNR
Switchgrass	*Panicum iergatum*	N	G			G5	SNR
Virginia creeper	*Parthenocissus quinquefolia*	N	V			G5	SNR
Paulownia/Princess tree	*Paulownia tomentosa*	A	T			GNR	SNA
Broad beech fern	*Phegopteris hexagonoptera*	N	H			G5	SNR
Wild blue phlox	*Phlox divaricata*	N	H			G5	SNR
Common Reed	*Phragmites australis*	A	G			G5	SNR
Pokeberry	*Phytolacca americana*	N	H			G5	SNR
Norway spruce	*Picea abies*	A	T			G5	SNA
Blue spruce	*Picea pungens*	A	T			G5	SNA
White pine	*Pinus strobus*	N	T			G5	SNR
Virginia pine	*Pinus virginiana*	N	T			G5	SNR
Sycamore	*Platanus occidentalis*	N	T			G5	SNR
Spring bluegrass	*Poa cuspidata*	N	G			G5	SNR
Mayapple	*Podophyllum peltatum*	N	H			G5	SNR
Solomon's-seal	*Polygonatum biflorum*	N	H			G5	SNR
Japanese knotweed	*Polygonum cuspidatum*	A	H			GNR	SNA
Pennsylvania smartweed	*Polygonum pensylvanicum*	N	H			G5	SNR
Mile-a-minute	*Polygonum perfoliatum*	A	H			GNR	SNA
Water smartweed	*Polygonum punctatum*	N	H			G5	SNR
Jumpseed	*Polygonum virginianum*	N	H			G5	SNR
Christmas fern	*Polystichum acrostichoides*	N	H			G5	SNR
Cottonwood	*Populus deltoides*	N	T			G5	SNR
Black cherry	*Prunus serotina*	N	T			G5	SNR
Ornamental cherry	*Prunus* sp.	A	T				SNA
Bradford pear	*Pyrus calleryana*	A	T			GNR	SNA
White oak	*Quercus alba*	N	T			G5	SNR
Bur oak	*Quercus macrocarpa*	N	T			G5	S1
Pin oak	*Quercus palustris*	N	T			G5	SNR
Red oak	*Quercus rubra*	N	T			G5	SNR
Aborted buttercup	*Ranunculus abortivus*	N	H			G5	SNR
Fig buttercup	*Ranunculus ficaria*	A	H			GNR	SNA
Pink azalea	*Rhododendron periclymenoides*	N	S			G5	SNR
Jetbead	*Rhodotypos scandens*	A	S			GNR	SNA
Smooth sumac	*Rhus glabra*	N	S			G5	SNR
Black locust	*Robinia pseudoacacia*	N	T			G5	SNA
Multiflora rose	*Rosa multiflora*	A	S			GNR	SNA
Blackberry	*Rubus argutus*	N	S			G5	SNR
Wineberry	*Rubus phoenicolasius*	A	S			G5	SNA

NSA Bethesda Plant Species List (cont'd)

Common Name	Scientific Name	Origin[1]	Habit[2]	Federal Status[3]	State Status[4]	Global Rank[5]	State Rank[6]
Cutleaf coneflower	*Rudbeckia laciniata*	N	H			G5	SNR
Curly dock	*Rumex crispus*	A	H			GNR	SNA
Weeping willow	*Salix babylonica*	A	T			GNR	SNA
Black willow	*Salix nigra*	N	T			G5	SNR
Bloodroot	*Sanguinaria canadensis*	N	H			G5	SNR
Black snakeroot	*Sanicula canadensis*	N	H			G5	SNR
Sassafras	*Sassafras albidum*	N	T			G5	SNR
Early saxifrage	*Saxifraga virginiensis*	N	H			G5	SNR
Horsenettle	*Solanum carolinense*	N	H			G5	SNR
Climbing nightshade	*Solanum dulcamara*	A	H			GNR	SNA
Tall goldenrod	*Solidago canadensis*	N	H			G5	SNR
Bluestem goldenrod	*Solidago caesia*	N	H			G5	SNR
Star chickweed	*Stellaria pubera*	N	H			G5	SNR
Lowrie's wood aster	*Symphyotrichum lowrieanum*	N	H			G4	SNR
Dandelion	*Taraxacum officinale*	A	H			G5	SNA
Bald cypress	*Taxodium distichum*	N	T			G5	SNR
Rue-anomone	*Thalictrum thalictroides*	N	H			G5	SNR
Basswood	*Tilia americana*	N	T			G5	SNR
Littleleaf linden	*Tilia cordata*	A	T			GNR	SNA
Poison ivy	*Toxicodendron radicans*	N	H/V			G5	SNR
Red clover	*Trifolium pratense*	A	H			GNR	SNA
Eastern hemlock	*Tsuga canadensis*	N	T			G4G5	SNR
Broad-leaved cattail	*Typha latifolia*	N	H			G5	SNR
Chinese elm	*Ulmus parvifolia*	A	T			GNR	SNA
Slippery elm	*Ulmus rubra*	N	T			G5	SNR
Sessile bellwort	*Uvularia sessilifolia*	N	H			G5	SNR
Lowbush blueberry	*Vaccinium pallidum*	N	S			G5	SNR
Maple-leaf viburnum	*Viburnum acerifolium*	N	S			G5	SNR
Arrowwood	*Viburnum dentatum*	N	S			G5	SNR
Black haw	*Viburnum prunifolium*	N	S			G5	SNR
Garden vetch	*Vicia sativa*	A	H			GNR	SNA
Periwinkle	*Vinca minor*	A	V/H			GNR	SNA
Common blue violet	*Viola sororia*	N	H			G5	SNR
Smooth yellow violet	*Viola pubescens*	N	H			G5	SNR
Fox grape	*Vitis labrusca*	N	V			G5	SNR
Chinese wisteria	*Wisteria sinensis*	A	V			GNR	SNA
Zelkova	*Zelkova serrata*	A	T			GNR	SNA

[1]Origin
A = Alien
N = Native

[2] Habit
T = Tree
S = Shrub
H = Herb
V = Vine

[3]Federal Status
LT = Threatened
C = Candidate

[4]State Status
E = Endangered
T = Threatened

[5]Global Rank
G1 = Critically Imperiled Globally
G2 = Imperiled Globally
G3 = Very Rare
G4 = Apparently Secure Globally
G5 = Demonstrably Secure Globally
GNR = Species Not Yet Ranked

[6]State Rank
S1 = Highly State Rare
S2 = State Rare
S3 = Watch List
S4 = Apparently Secure
S5 = Secure
SNA = Not Applicable
SNR = Unranked

APPENDIX 9

Planning Level Survey Results-Fauna

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NSA Bethesda Faunal Species List

Common Name	Scientific Name	Federal Status[3]	State Status[4]	Global Rank[5]	State Rank[6]
Mammals					
Northern short-tailed shrew	*Blarina brevicauda*	-	-	G5	S5
Domestic dog	*Canis lupusfamiliaris*	-	-	-	-
American Beaver	*Castor canadensis*	-	-	G5	S5
Virginia opossum	*Didelphis virginiana*	-	-	G5	S5
Big brown bat	*Eptesicus fuscus*	-	-	G5	S5B, S5N
Domestic cat	*Felis catus*	-	-	-	-
Meadow vole	*Microtus pennsylvanicus*	-	-	G5	S5
Pine vole	*Microtus pinetorum*	-	-	G5	S5
Little brown bat	*Myotis lucifugus*	-	-	G3	S5B, S5N
White-footed mouse	*Peromyscus leucopus*	-	-	G5	S5
Tricolored bat	*Pipistrellus subflavus*	-	-	G3	S5B, S5N
White-tailed deer	*Odocoileus virginianus*	-	-	G5	S5
Gray squirrel	*Sciurus carolinensis*	-	-	G5	S5
Eastern cottontail	*Sylvilagus floridanus*	-	-	G5	S5
Red fox	*Vulpes vulpes*	-	-	G5	S5
Amphibians					
Northern two-lined salamander	*Eurycea bislineata*	-	-	G5	S5
Red-backed salamander	*Plethodon cinereus*	-	-	G5	S5
Bullfrog	*Rana catesbeiana*	-	-	G5	S5
Green frog	*Rana clamitans*	-	-	G5	S5
Reptiles					
Black rat snake	*Elaphe obsoleta obsoleta*	-	-	G5	S5
Eastern banded water snake	*Nerodia sipedon*	-	-	G5	S5
Eastern box turtle	*Terrapene carolina*	-	-	G5	S5

Sources: U.S. Navy 2000, NatureServe 2013

[3]Federal Status
LT = Threatened
C = Candidate

[4]State Status
E = Endangered
T = Threatened

[5]Global Rank
G1 = Critically Imperiled Globally
G2 = Imperiled Globally
G3 = Very Rare
G4 = Apparently Secure Globally
G5 = Demonstrably Secure Globally
GNR = Species Not Yet Ranked

[6]State Rank
S1 = Highly State Rare
S2 = State Rare
S3 = Watch List
S4 = Apparently Secure
S5 = Secure
SNA = Not Applicable
SNR = Unranked

Benthic Taxa with Benthic IBI Scores and Narrative Ratings for Five Sites Sampled at NSA Bethesda

Benthic Taxa	Site				
	NNMC-1	NNMC-2	NNMC-3	NNMC-4	NNMC-5
Hirundinea					
Arhynchobdellida					
Erpobdellidae					
Eprobdella sp.	20	1			1
Rhynchobdellida					
Glossiphoniidae					
Batracobdella sp.	1	1			
Oligochaeta					
Haplotaxida					
Lumbricidae					
Lumbricus sp.	2	1	2		
Tubificidae		1			
Insecta					
Diptera					
Chironomidae					
Chironomus decorus		1			
Chironomus riparius		1			1
Simuliidae					
Simulium aureum			1		
Simulium vittatum				2	
Tipulidae					
Tipula sp.	1		2	1	
Ephemeroptera					
Baetidae					
Baetis flavistriga	1				
Hemiptera					
Notonectidae					
Nontonecta sp.	1				
Odonota					
Coenagrionidae					
Argia cf. aplicalis	1				
Ischnura posita	2				

Benthic Taxa with Benthic IBI Scores and Narrative Ratings for Five Sites Sampled at NSA Bethesda (cont'd)

Benthic Taxa	Site				
	NNMC-1	NNMC-2	NNMC-3	NNMC-4	NNMC-5
Trichoptera					
Hydropsychidae					
Ceratopsyche sp.	7	4	50	7	
Hydropsyche sp.	5	3	74	12	
Philopotamidae					
Chimarra sp.		2	8		
Malacostraca					
Decapoda					
Cambaridae			2		
Diplopoda					
Millipede sp.				1	
Gastropoda					
Basommatophora					
Physidae					
Physa sp.				1	1
Planorbidae					
Menetus dilatatus	1				
Stylommatophora					
Arionidae		1			
Turbellaria					
Tricladida					
Planariidae					
Dugesia sp.	3				
Total number of individuals in sample	**45**	**16**	**139**	**24**	**3**
Benthic IBI Score	**8**	**10**	**8**	**8**	**12**
Narrative rating	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**

Source: U.S. Navy 2009a

NSA Bethesda Bird Species List

Common Name	Scientific Name	Federal Status[1]	State Status[2]	Global Rank[3]	State Rank[4]	PIF Tier[5]	GCN[6]
Cooper's Hawk	*Accipiter cooperii*			G5		IV	
Sharp-shinned Hawk	*Accipiter striatus*			G5	S1S2B, S4N	IV	✓
Red-winged Blackbird	*Agelaius phoeniceus*			G5			
Wood Duck	*Aix sponsa*			G5			
Mallard	*Anas platyrhynchos*			G5	SNA		
Ruby-throated Hummingbird	*Archilochus colubris*			G5			
Great Blue Heron	*Ardea herodias*			G5	S4B,S3S4N	IV	✓
Tufted Titmouse	*Baeolophus bicolor*			G5			
Cedar Waxwing	*Bombycilla cedrorum*			G5			
Canada Goose	*Branta canadensis*			G5			
Red-tailed Hawk	*Buteo jamaicensis*			G5			
Red-shouldered Hawk	*Buteo lineatus*			G5	S4S5B,S4N	IV	✓
Green Heron	*Butorides virescens*			G5		II	
Northern Cardinal	*Cardinalis cardinalis*			G5			
Pine Siskin	*Carduelis pinus*			G5			
American Goldfinch	*Carduelis tristis*			G5			
House Finch	*Carpodacus mexicanus*			G5			
Turkey Vulture	*Cathartes aura*			G5			
Veery	*Catharus fuscescens*			G5	S4B	IV	✓
Hermit Thrush	*Catharus guttatus*			G5	S3S4B		✓
Brown Creeper	*Certhia americana*			G5	S4	IV	✓
Belted Kingfisher	*Ceryle alcyon*			G5			
Killdeer	*Charadrius vociferus*			G5			
Yellow-billed Cuckoo	*Coccyzus americanus*			G5			
Northern Flicker	*Colaptes auratus*			G5			
Rock Pigeon	*Columba livia*			G5			
Eastern Wood-Pewee	*Contopus virens*			G5			
Black Vulture	*Coragyps atratus*			G5			
American Crow	*Corvus brachyrhynchos*			G5			
Fish Crow	*Corvus ossifragus*			G5			
Blue Jay	*Cyanocitta cristata*			G5			
Yellow-rumped Warbler	*Dendroica coronata*			G5			
Magnolia Warbler	*Dendroica magnolia*			G5	S3S4B		✓
Chestnut-sided Warbler	*Dendroica pensylvanica*			G5	S3B		✓
Yellow Warbler	*Dendroica petechia*			G5			
Pileated Woodpecker	*Dryocopus pileatus*			G5			
Gray Catbird	*Dumetella carolinensis*			G5			
Acadian Flycatcher	*Empidonax virescens*			G5	S5B	II	✓
American Peregrine Falcon	*Falco peregrinus anatum*		I	G4T4	S2		✓
Barn Swallow	*Hirundo rustica*			G5			
Wood Thrush	*Hylocichla mustelina*			G5	S5B	I	✓
Baltimore Oriole	*Icterus galbula*			G5			

NSA Bethesda Bird Species List (cont'd)

Common Name	Scientific Name	Federal Status[1]	State Status[2]	Global Rank[3]	State Rank[4]	PIF Tier[5]	GCN[6]
Orchard Oriole	*Icterus spurius*			G5			
Dark-eyed Junco	*Junco hyemalis*			G5	S2B		✓
Ring-billed Gull	*Larus delawarensis*			G5			
Red-bellied Woodpecker	*Melanerpes carolinus*			G5			
Song Sparrow	*Melospiza melodia*			G5			
Northern Mockingbird	*Mimus polyglottos*			G5			
Black-and-white Warbler	*Mniotilta varia*			G5	S4B		✓
Brown-headed Cowbird	*Molothrus ater*			G5			
Great Crested Flycatcher	*Myiarchus crinitus*			G5			
Yellow-crowned Night Heron	*Nyctanassa violacea*			G5	S2B		✓
House Sparrow	*Passer domesticus*			G5			
Fox Sparrow	*Passerella iliaca*			G5			
Double-crested Cormorant	*Phalacrocorax auritus*			G5			
Downy Woodpecker	*Picoides pubescens*			G5			
Hairy Woodpecker	*Picoides villosus*			G5	S5		✓
Eastern Towhee	*Pipilo erythrophthalmus*			G5	S5B, S4N	II	✓
Scarlet Tanager	*Piranga olivacea*			G5	S5B	II	✓
Black-capped Chickadee	*Poecile atricapillus*			G5			
Carolina Chickadee	*Poecile carolinensis*			G5			
Blue-gray Gnatcatcher	*Polioptila caerulea*			G5			
Common Grackle	*Quiscalus quiscula*			G5			
Ruby-crowned Kinglet	*Regulus calendula*			G5			
Golden-crowned Kinglet	*Regulus satrapa*			G5	S2B		✓
Eastern Phoebe	*Sayornis phoebe*			G5			
Eastern Bluebird	*Sialia sialis*			G5			
White-breasted Nuthatch	*Sitta carolinensis*			G5			
Yellow-bellied Sapsucker	*Sphyrapicus varius*			G5	SHB,S3N		✓
Chipping Sparrow	*Spizella passerina*			G5			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*			G5			
European Starling	*Sturnus vulgaris*			G5			
Tree Swallow	*Tachycineta bicolor*			G5			
Carolina Wren	*Thryothorus ludovicianus*			G5			
House Wren	*Troglodytes aedon*			G5			
Winter Wren	*Troglodytes troglodytes*			G5	S2B,S3N		✓
American Robin	*Turdus migratorius*			G5			
Eastern Kingbird	*Tyrannus tyrannus*			G5			
Red-eyed Vireo	*Vireo olivaceus*			G5	S5B		✓
Mourning Dove	*Zenaida macroura*			G5			
White-throated Sparrow	*Zonotrichia albicollis*			G5			

[1]Federal Status
T = Threatened
C = Candidate

[2]State Status
E = Endangered
T = Threatened
I = In need of conservation

[3]Global Rank
G1 = Critically Imperiled Globally
G2 = Imperiled Globally
G3 = Very Rare (vulnerable to extirpation or extinction)
G4 = Apparently Secure Globally
G5 = Demonstrably Secure Globally

[4]State Rank
S1 = Highly State Rare
S2 = State Rare
S3 = Watch List
S4 = Apparently Secure
S5 = Secure
_B = Rank for breeding
_N = Rank for nonbreeding
H = Historic

[5]PIF Tier
I = High continental priority
II = High regional priority
III = Additional federally listed
IV = Additional state listed

[6]GNC = Greatest conservation need

Sources: MDNR 2005, MDNR 2010; Kearney 1999, U.S. Navy 2009a

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APPENDIX 10

Planning Level Survey Results– Wetlands

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APPENDIX 11

List of Special Status Species

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Current and Historical Rare, Threatened, and Endangered Species Of Montgomery County, Maryland*

April 2010

Maryland Department of Natural Resources
Wildlife and Heritage Service

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Animals					
Aeshna verticalis	Green-striped Darner	G5	S2		
Aimophila aestivalis	Bachman's Sparrow	G3	SHB	X	
Alasmidonta heterodon	Dwarf Wedge Mussel	G1G2	S1	E	LE
Alasmidonta undulata	Triangle Floater	G4	S1	E	
Alasmidonta varicosa	Brook Floater	G3	S1	E	
Ammodramus henslowii	Henslow's Sparrow	G4	S1S2B	T	
Ankylocythere tridentata	An Entocytherid Ostracod	GNR	SH		
Attheyella spinipes	A Harpacticoid Copepod	GNR	SU		
Autochton cellus	Golden-banded Skipper	G4	SH	X	
Bartramia longicauda	Upland Sandpiper	G5	S1B	E	
Botaurus lentiginosus	American Bittern	G4	S1S2B	I	
Caecidotea sp. 4	An Isopod	GNR	S1		
Circus cyaneus	Northern Harrier	G5	S2B		
Cistothorus platensis	Sedge Wren	G5	S1B	E	
Diacyclops palustris	A Cyclopoid Copepod	GNR	SU		
Dryobius sexnotatus	Six-banded Longhorn Beetle	GNR	S1	E	
Elliptio lanceolata	Yellow Lance	G2G3	SU		
Elliptio producta	Atlantic Spike	G3Q	S2	I	
Empidonax alnorum	Alder Flycatcher	G5	S2B	I	
Epitheca spinosa	Robust Baskettail	G4	S1S2		
Erpetogomphus designatus	Eastern Ringtail	G5	S2		
Farancia erytrogramma	Rainbow Snake	G4	S1	E	
Gallinula chloropus	Common Moorhen	G5	S2B	I	
Gomphus quadricolor	Rapids Clubtail	G3G4	S2	I	
Gomphus ventricosus	Skillet Clubtail	G3	SH	X	
Haliaeetus leucocephalus	Bald Eagle	G5	S3B		
Lampsilis cariosa	Yellow Lampmussel	G3G4	SU		
Lampsilis radiata	Eastern Lampmussel	G5	SU		
Lanius ludovicianus	Loggerhead Shrike	G4	S1B	E	
Lasmigona subviridis	Green Floater	G3	S1	E	
Leptodea ochracea	Tidewater Mucket	G3G4	S1S2		
Lophodytes cucullatus	Hooded Merganser	G5	S1B		
Mustela nivalis	Least Weasel	G5	S2S3	I	
Myotis leibii	Eastern Small-footed Bat	G3	S1	E	
Neotoma magister	Allegheny Woodrat	G3G4	S1	E	
Nyctanassa violacea	Yellow-crowned Night-heron	G5	S2B		
Ophiogomphus rupinsulensis	Rusty Snaketail	G5	S2		
Papilio cresphontes	Giant Swallowtail	G5	S2	I	
Percopsis omiscomaycus	Trout-perch	G5	SX	X	
Phyciodes batesii	Tawny Crescent	G4	SH	X	
Podilymbus podiceps	Pied-billed Grebe	G5	S2B		
Sorex hoyi winnemana	Southern Pygmy Shrew	G5T4	S2		
Speyeria idalia	Regal Fritillary	G3	SH	X	
Sphodros rufipes	Red-legged Purse-web Spider	G4	S1S2		

Spiza americana	Dickcissel	G5	S2B	
Strophitus undulatus	Creeper	G5	S2	I
Stygobromus pizzinii	Pizzini's Cave Amphipod	G3G4	S1	
Stygobromus sp. 14	Roundtop Amphipod	GNR	S1	

Plants

Agalinis auriculata	Auricled Gerardia	G3	S1	E
Agalinis obtusifolia	Blunt-leaved Gerardia	G4G5Q	S1	E
Agalinis setacea	Thread-leaved Gerardia	G5?	S1	E
Amelanchier nantucketensis	Nantucket Shadbush	G3Q	S1	T
Amelanchier stolonifera	Running Juneberry	G5	S2	
Ammannia coccinea	Scarlet Ammannia	G5	SU	
Antennaria solitaria	Single-headed Pussytoes	G5	S2	T
Arabis hirsuta	Hairy Rockcress	G5	SU	
Arabis missouriensis	Missouri Rockcress	G5?Q	S1	E
Aristida lanosa	Woolly Three-awn	G5	S1	E
Armoracia lacustris	Lake Cress	G4?	S1	E
Arnica acaulis	Leopard's-bane	G4	S1	E
Asclepias rubra	Red Milkweed	G4G5	S1	E
Asplenium pinnatifidum	Lobed Spleenwort	G4	S1	E
Astragalus canadensis	Canada Milkvetch	G5	S1	E
Astragalus distortus	Bent Milkvetch	G5	S2	T
Baptisia australis	Wild False Indigo	G5	S2	T
Botrychium simplex	Small Grape-fern	G5	SH	X
Bouteloua curtipendula	Side-oats Grama	G5	S2	
Bromus latiglumis	Broad-glumed Brome	G5	S1	E
Bromus nottowayanus	Nottoway's Brome	G3G5	S1S2	
Buchnera americana	Blue-hearts	G5?	SH	X
Cacalia muehlenbergii	Great Indian-plantain	G4	SH	X
Calystegia spithamaea	Low Bindweed	G4G5	S2	
Cardamine pratensis	Cuckooflower	G5	S1	
Carex buxbaumii	Buxbaum's Sedge	G5	S2	T
Carex careyana	Carey's Sedge	G4G5	S1	E
Carex davisii	Davis' Sedge	G4	S1	E
Carex decomposita	Cypress-knee Sedge	G3	S1	E
Carex hitchcockiana	Hitchcock's Sedge	G5	S1	E
Carex lupuliformis	Hop-like Sedge	G4	S2	
Carex meadii	Mead's Sedge	G4G5	S1	E
Carex pellita	Woolly Sedge	G5	S2?	
Carex planispicata	A Sedge	G4Q	S1S2	
Carex projecta	Necklace Sedge	G5	S2	
Carex shortiana	Short's Sedge	G5	S2	E
Carex sparganioides	Burr-reed Sedge	G5	S1S2	
Carex tenera	Slender Sedge	G5	SH	X
Carex tetanica	Rigid Sedge	G4G5	SH	X
Carya laciniosa	Big Shellbark Hickory	G5	S1	E
Castanea dentata	American Chestnut	G4	S2S3	
Celtis laevigata	Sugarberry	G5	SU	
Ceratophyllum echinatum	Prickly Hornwort	G4?	S1	E
Chamaesyce vermiculata	Hairy Spurge	G5	SH	
Corallorhiza wisteriana	Wister's Coralroot	G5	S1	E
Coreopsis tripteris	Tall Tickseed	G5	S1	E
Cuscuta coryli	Hazel Dodder	G5?	SH	X
Cuscuta polygonorum	Smartweed Dodder	G5	S1	E
Cyperus refractus	Reflexed Cyperus	G5	S2?	
Cyperus retrofractus	Rough Cyperus	G5	S2	

Desmodium humifusum	Trailing Tick-trefoil	G1G2Q	SH	X	
Desmodium rigidum	Rigid Tick-trefoil	GNRQ	S1	E	
Dichanthelium aciculare	Bristling Panicgrass	G5	S2?		
Dichanthelium laxiflorum	Lax-flowered Witchgrass	G5	S1?		
Dichanthelium oligosanthes	Few-flowered Panicgrass	G5	S2S3		
Dichanthelium scabriusculum	Tall Swamp Panicgrass	G4	S1	E	
Diplazium pycnocarpon	Glade Fern	G5	S2	T	
Dirca palustris	Leatherwood	G4	S2	T	
Echinodorus cordifolius	Upright Burhead	G5	S1	E	
Erythronium albidum	White Trout Lily	G5	S2	T	
Eupatorium maculatum	Spotted Joe-pye-weed	G5	SU	X	
Euphorbia obtusata	Blunt-leaved Spurge	G5	S1	E	
Eurybia radula	Rough-leaved Aster	G5	S1	E	
Gentiana andrewsii	Fringe-tip Closed Gentian	G5?	S2	T	
Gentiana villosa	Striped Gentian	G4	S1	E	
Geum aleppicum	Yellow Avens	G5	S1	E	
Goodyera tesselata	Tesselated Rattlesnake-plantain	G5	SH	X	
Hasteola suaveolens	Sweet-scented Indian-plantain	G4	S1	E	
Helianthus occidentalis	Mcdowell's Sunflower	G5	S1	T	
Houstonia tenuifolia	Slender-leaved Bluets	G4G5	S1		
Ilex decidua	Deciduous Holly	G5	S2		
Iresine rhizomatosa	Bloodleaf	G5	S1	E	
Iris cristata	Crested Iris	G5	S1	E	
Isotria medeoloides	Small Whorled Pogonia	G2	SH	X	LT
Juglans cinerea	Butternut	G4	S2S3		
Juncus longii	Long's Rush	G3Q	S1	E	
Krigia dandelion	Potato Dandelion	G5	S1	E	
Lactuca hirsuta	Hairy Lettuce	G5?	SH	X	
Lathyrus palustris	Vetchling	G5	S1	E	
Linum floridanum	Florida Yellow Flax	G5?	SH	X	
Lipocarpha micrantha	Small-flowered Hemicarpha	G5	S1	E	
Lithospermum latifolium	American Gromwell	G4	S1	E	
Lycopodiella caroliniana	Carolina Clubmoss	G5	S1	E	
Lygodium palmatum	Climbing Fern	G4	S2	T	
Lysimachia hybrida	Lowland Loosestrife	G5	S2	T	
Lythrum alatum	Winged Loosestrife	G5	S1	E	
Matelea obliqua	Climbing Milkweed	G4?	S1	E	
Matteuccia struthiopteris	Ostrich Fern	G5	S2		
Mecardonia acuminata	Erect Water-hyssop	G5	S1	E	
Melanthium latifolium	Broad-leaved Bunchflower	G5	S1	E	
Melica mutica	Narrow Melicgrass	G5	S1	T	
Muhlenbergia capillaris	Long-awned Hairgrass	G5	S1	E	
Najas gracillima	Thread-like Naiad	G5?	SU	X	
Nelumbo lutea	American Lotus	G4	S2		
Oligoneuron rigidum	Hard-leaved Goldenrod	G5	SH	X	
Onosmodium virginianum	Virginia False-gromwell	G4	S1	E	
Orthilia secunda	One-sided Pyrola	G5	SH	X	
Panicum flexile	Wiry Witch-grass	G5	S1	E	
Paronychia virginica var. virginica	Yellow Nailwort	G4T1Q	S1	E	
Paspalum fluitans	Floating Paspalum	G5	S1	E	
Pellaea glabella	Smooth Cliffbrake	G5	S1	E	
Phacelia covillei	Coville's Phacelia	G3	S2	E	
Phlox glaberrima	Smooth Phlox	G5	S1	E	
Phlox pilosa	Downy Phlox	G5	S1	E	
Platanthera flava	Pale Green Orchid	G4	S2		
Platanthera peramoena	Purple Fringeless Orchid	G5	S1	T	
Platanthera psycodes	Small Purple Fringed Orchid	G5	SH	X	

Polygala polygama	Racemed Milkwort	G5	S1	T
Polygala senega	Seneca Snakeroot	G4G5	S2	T
Potamogeton foliosus	Leafy Pondweed	G5	S1	E
Potamogeton spirillus	Spiral Pondweed	G5	S1	
Potamogeton zosteriformis	Flatstem Pondweed	G5	S1	E
Potentilla arguta	Tall Cinquefoil	G5	SU	
Prunus pumila	Eastern Dwarf Cherry	G5	SU	
Pycnanthemum clinopodioides	Basil Mountain-mint	G2	SH	
Pycnanthemum torrei	Torrey's Mountain-mint	G2	S1	E
Pycnanthemum verticillatum	Whorled Mountain-mint	G5	S1	E
Pycnanthemum virginianum	Virginia Mountain-mint	G5	S2	
Pyrola virens	Greenish-flowered Pyrola	G5	SH	X
Quercus macrocarpa	Mossy-cup Oak	G5	S1	
Quercus shumardii	Shumard's Oak	G5	S2	T
Ranunculus ambigens	Water-plantain Spearwort	G4	SH	X
Ranunculus flabellaris	Yellow Water-crowfoot	G5	S1	E
Ruellia humilis	Hairy Wild-petunia	G5	S1	E
Ruellia purshiana	Pursh's Ruellia	G3	S1	E
Ruellia strepens	Rustling Wild-petunia	G4G5	S1	E
Rumex altissimus	Tall Dock	G5	S1	E
Sagittaria australis	Long-beaked Arrowhead	GNRQ	SU	
Sagittaria engelmanniana	Engelmann's Arrowhead	G5?	S2	T
Sagittaria rigida	Sessile-fruited Arrowhead	G5	S1	E
Salix exigua	Sandbar Willow	G5	S1	E
Salix humilis var. tristis	Dwarf Prairie Willow	G4G5	S1	
Sanguisorba canadensis	Canada Burnet	G5	S2	T
Schoenoplectus smithii	Smith's Clubrush	G5?	SU	X
Scleria reticularis	Reticulated Nutrush	G4	S2S3	
Scutellaria galericulata	Common Skullcap	G5	S1	
Scutellaria leonardii	Leonard's Skullcap	G4T4	S2	T
Scutellaria nervosa	Veined Skullcap	G5	S1	E
Scutellaria saxatilis	Rock Skullcap	G3	S1	E
Sida hermaphrodita	Virginia Mallow	G3	S1	E
Silene nivea	Snowy Campion	G4?	S1	E
Smilacina stellata	Star-flowered False Solomon's-seal	G5	S1	E
Smilax pseudochina	Halberd-leaved Greenbrier	G4G5	S2	T
Solidago rupestris	Rock Goldenrod	G4?	SH	X
Solidago simplex var. racemosa	Riverbank Goldenrod	G5T3?	S1	T
Solidago speciosa	Showy Goldenrod	G5	S2	T
Spermacoce glabra	Buttonweed	G4G5	S1	E
Sphenopholis pensylvanica	Swamp-oats	G4	S2	T
Spiranthes lucida	Wide-leaved Ladys' Tresses	G5	S1	E
Spiranthes ochroleuca	Yellow Nodding Ladys' Tresses	G4	S1	E
Sporobolus asper	Long-leaved Rushgrass	G5	S1	
Sporobolus clandestinus	Rough Rushgrass	G5	S2	T
Stachys aspera	Rough Hedge-nettle	G4?	S1	E
Stachys nuttallii	Nuttall's Hedge-nettle	G5?	S1	
Stenanthium gramineum	Featherbells	G4G5	S1	T
Symphyotrichum depauperatum	Serpentine Aster	G2	S1	E
Symphyotrichum drummondii	Drummond Aster	G5	S1	
Talinum teretifolium	Fameflower	G4	S1	T
Thelypteris simulata	Bog Fern	G4G5	S2	T
Trachelospermum difforme	Climbing Dogbane	G4G5	S1	E
Trichophorum planifolium	Bashful Bulrush	G4G5	S2S3	
Trichostema setaceum	Narrow-leaved Bluecurls	G5	S1	
Trifolium reflexum	Buffalo Clover	G3G4	SH	X

Triosteum angustifolium	Narrow-leaved Horse-gentian	G5	S1	E
Triphora trianthophora	Nodding Pogonia	G3G4	S1	E
Valeriana pauciflora	Valerian	G4	S1	E
Valerianella chenopodiifolia	Goose-foot Cornsalad	G5	S1	E
Valerianella umbilicata	Tall Cornsalad	G3G5	SH	X
Veronica scutellata	Marsh Speedwell	G5	S1	E
Vitis rupestris	Sand Grape	G3	S1	
Zanthoxylum americanum	Northern Prickly-ash	G5	S1	E

* This report represents a compilation of information in the Wildlife and Heritage Service's Biological and Conservation Data system as of the date on the report. It does not include species considered to be "watchlist" or more common species.

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APPENDIX 12

Summary Narrative - INRMP Benefits for Migratory Birds

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Migratory birds are a large, diverse group of birds that utilize breeding grounds in the United States and Canada and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. The MBTA, 16 USC §703-711 is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds their eggs, parts, and nests unless permitted by regulation. As of March 2010, 1007 species were included on the list of migratory birds (75 FR 9282). Nonnative species such as house sparrow, European starling, rock pigeon, and mute swan are not protected by the MBTA.

Migratory Bird Management Actions at NSA Bethesda include monitoring migratory bird populations through periodic seasonal bird surveys, habitat enhancement, and the installation and maintenance of nest box structures (See Sections 4.8.1, 4.8.2.1, and 4.8.2.2 of the INRMP).

Habitat Enhancement

Because of the level of development at NSA Bethesda, the conservation and enhancement of the installation's remaining natural habitat is important to protecting migratory bird populations. Supplemental plantings of native trees and shrubs in maintained open areas and around buildings and recreational areas, where consistent with current and planned land uses, and leaving snags standing in the forests, when not a safety issue, are recommended to help enhance habitat diversity and meet wildlife management objectives.

Artificial Nest Boxes

Artificial nest boxes may be used for enhancing habitat conditions for a number of bird and wildlife species in areas where there are few natural cavity trees or where competition from aggressive nonnative species such as house sparrows and European starlings is great. More than a dozen bird species that occur at NSA Bethesda are cavity nesters and could benefit from the installation and maintenance of artificial nest boxes. Building and installing nest boxes is a recommended project in Appendix 18.

Migratory Bird Surveys

Comprehensive bird surveys were conducted in 2007 and 2008. A 10-year update conducted in 2017-2018 would provide additional data on birds frequenting the installation and the potential impacts of land use changes under BRAC. Seasonal bird survey updates are recommended to determine use by migrating, breeding, and wintering birds in each habitat type present for FY18.

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APPENDIX 13

Summary Narrative - INRMP Benefits for Endangered Species

Not applicable

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APPENDIX 14

Summary Narrative - INRMP Benefits for Critical Habitat

Not applicable

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APPENDIX 15

Detailed Natural Resources Management Prescriptions

All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 U.S.C. 1341 *et seq*.).

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FOREST MANAGEMENT **PRIORITY: HIGH**

Project Title

Forest Health Monitoring

Goal

Ensure the health and safety of the installation forest and the patients, staff, and visitors who use and enjoy them.

Objective

Conduct annual forest health and hazardous tree monitoring throughout the base's forested areas.

Background/Justification

The forested areas at NSA Bethesda contain numerous mature trees that exhibit signs of damage from storms and invasive vine infestation. In addition, several pests that attack hardwoods have been documented in Montgomery County that could cause serious damage to the forested areas and street trees at NSA Bethesda. Regular monitoring to identify and responding to potentially dangerous situations are necessary to keep the forests healthy and prevent injury from hazard trees to the wounded warriors, their guest, and base employees that use the forest trails and picnic areas.

Impact to Mission

Failure to implement this project may result in an increased incidence of hazard trees that may become a safety issue.

Project Description

Conduct annual monitoring for hazard trees and forest diseases and pests. Common diseases include anthracnose on sycamore and dogwoods, and pests include emerald ash borer and Gypsy moth. Hazard trees or other trees that require removal should be reported to grounds maintenance. If grounds maintenance is unable to respond in a timely manner, natural resources contractors may be used to remove trees. Ensure all personnel involved in tree felling are certified arborists. If a tree pest outbreak is diagnosed, coordinate with the NAVFAC HQ Forester to implement an appropriate action.

Regulatory Drivers

32 CFR 190 - Natural Resources Management Program; DoDI 4715.03 - Environmental Conservation Program; OPNAVINST 5090.1D - Environmental Readiness Program

Implementation Schedule:	**Annual**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**no cost for monitoring (in house)** **$3,000 for tree removal annually (2-3 trees on average)**

FOREST MANAGEMENT **PRIORITY: HIGH**

Project Title

Deer Exclosures

Goal

Conserve and enhance existing forested areas to maximize ecosystem services.

Objective

Test the enhancement of understory diversity and overstory tree establishment on experimental plots.

Background/Justification

The natural forested areas on the NSA Bethesda campus are heavily browsed by the installation's excessive deer population. Installing several deer exclosures would provide relief from this stress and allow for natural regeneration of native forest species.

Impact to Mission

Failure to implement this project would allow for the continued degradation of the installation's forested area, and would contribute to the further decline of the installation's natural healing environment and enjoyment by the wounded warriors, their guest, and base employees.

Project Description

Prior to investing a high level of effort into deer exclosures, it is recommended that the base construct one to two experimental exclosures. Exclosures should be constructed from 8 foot tall galvanized steel wire or polypropylene mesh stretched between steel T-posts set at 15-foot intervals. Two 4-foot sections of steel mesh can be combined to create an 8-foot tall fence. A 40 sq ft exclosure would be relatively inexpensive to construct and would provide a viable study plot to evaluate the effectiveness of the device. A gate should be installed to provide access for vegetation assessment. The exclosures should be inspected monthly and after all extreme weather events for necessary repairs and maintenance.

A vegetation inventory including species presence and percent cover should be conducted prior to installing the exclosure and at one-year intervals post-installment to assess its effectiveness in promoting the restoration of native vegetation. Invasive species should be monitored and removed as they occur.

Regulatory Drivers 32 CFR 190 - Natural Resources Management Program; DoDI 4715.03 - Environmental Conservation Program; OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY15**
Priority:	**ERL 3, Navy Level 5**
Funding Sources:	**O&MN**
Cost Estimate:	**$6,000 (per exclosure)**

Deer Exclosure Material Costs

Item	Number	Cost	Total Cost
T-post (10-ft)	18	$12.00	$216.00
T-post driver	1	$50.00	$50.00
T-post corner brace set	4	$15.00	$15.00
Access gate	1	$175	$175.00
Polypropylene mesh (8’ x160’)	1	$170.00	$170.00
Nylon ziplock ties (100)	1	$10.00	$10.00
Ziplock tie pull cutter	1	$30.00	$30.00
Total[1]			**$666.00**

[1] Total per 40x40 foot exclosure

VEGETATION MANAGEMENT **PRIORITY: MEDIUM**

Project Title

Replacement of Landscape Trees and Vegetation

Goal

Maintain a diverse urban forest and landscape to benefit native wildlife, including small mammals, birds, and pollinators, and provide a pleasant, healing environment for the wounded warriors, their guest, and base employees.

Objective

Maintain a consistent level of landscape maintenance year to year to ensure compliance with the Presidential Memorandum on Beneficial Landscaping, Navy policy, and the NSA Bethesda IAP.

Background/Justification

Numerous trees have been removed from the landscaped environment due to decadence or disease. Replacing these trees would help maintain the natural beauty of the NSA Bethesda campus as well as enhance habitat for the installations wildlife.

Impact to Mission

Failure to implement this project would further contribute to the decline of the installation's natural healing environment and enjoyment by the wounded warriors, their guest, and base employees.

Project Description

Replace street trees and landscaped materials with native species in areas where they have died or are removed for safety purposes or through invasive plant control efforts. When hazard trees are removed from landscaped areas, replace with native species. Replacement plantings should include a mix of trees and shrubs that flower and fruit throughout the season to provide benefits for birds and native pollinators (see Appendix 21). Treegators or an alternative method of watering should be provided for one year following planting.

Regulatory Drivers 32 CFR 190 - Natural Resources Management Program; DoDI 4715.03 - Environmental Conservation Program; OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**Annual**
Priority:	**ERL 2, Navy Level 5**
Funding Sources:	**O&MN**
Cost Estimate:	**$5,000 annually (2-3 trees/shrubs on average)**

WETLANDS MANAGEMENT **PRIORITY: HIGH**

Project Title

Base-wide Wetlands Jurisdictional Delineation

Goal

Ensure compliance with existing state and federal wetland regulations.

Objective

Assess the base-wide occurrence of wetlands and provide a wetlands map for planning purposes.

Background/Justification

The existing NWI wetlands assessment was conducted with little or no ground-truthing and does not accurately assess the occurrence of wetlands at NSA Bethesda. Additional wetland delineations have addressed small, isolated areas on the base only. A base-wide jurisdictional delineation would provide valuable wetland information to site planners.

Impact to Mission

The lack of up-to-date wetlands delineation and GIS data layer can impede planning activities and may result in wetlands violations.

Project Description

Conduct base-wide wetland delineation at NSA Bethesda using sub-meter GPS technology and develop a wetlands GIS layer. Wetlands will be described according to the Cowardin classification system. Have the wetlands professionally surveyed by a licensed surveyor.

Regulatory Drivers

CWA, EO 11990 - Protection of Wetlands, EO 13508 - Chesapeake Bay Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY15**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$36,000**

WETLANDS MANAGEMENT **PRIORITY: LOW**

Project Title

Shallow Water Habitat Maintenance and Enhancement

Goal

Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Objective

Enhance the functionality of the existing shallow water emergent habitat adjacent to the Stoney Creek in-stream pond.

Background/Justification

The shallow water habitat near the Stoney Creek in-stream pond is the largest and most diverse area of palustrine emergent wetland at NSA Bethesda. At times it becomes clogged with vegetative debris, invasive species, and woody vegetation. Conducting limited annual maintenance would maintain and enhance this valuable habitat for wildlife such as wading birds, ducks, and herpetofauna.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities.

Project Description

Monitor as necessary, remove invasive species and woody species from the herbaceous, emergent vegetated portions of the shallow water wetland adjacent to Stoney Creek. Use aquatic-approved herbicides to treat the target species. Remove excessive vegetative material and litter as they impede flow between the two cells of the wetland.

Regulatory Drivers

CWA, Sikes Act, EO 11990 – Protection of Wetlands, EO 13508 - Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**Annual**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$1,200**

SOIL AND WATER MANAGEMENT **PRIORITY: MEDIUM**

Project Title

University Pond Shoreline Enhancement

Goal

Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Objective

Enhance the functionality of the existing shallow water emergent habitat adjacent to the University Pond.

Background/Justification

The shoreline around University Pond has recently been improved by removal of a wooden bulkhead and adding a walkway around the base of the pond connecting the two trail systems to the east and west of the pond. Mowed lawn currently extends to the water's edge. Additional enhancements, including creating a fringe of native wetland vegetation is needed to stabilize the shoreline, reduce runoff, and enhance wildlife habitat.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities.

Project Description

Replace areas of mowed lawn that abut the University Pond with a two to three foot area of native vegetation that requires little or no additional maintenance. Using live plugs, plant dense, matt forming native rushes and sedges interspersed with showy flowering plants to form a fringe at the water's edge and emergent species in shallow portions of the pond. Flowering shrubs may be interspersed around the pond as accents. Besides enhancing the beauty of the area, the flowering plants will provide a food source for native pollinators.

Newly planted vegetation is a favored food source for geese, crows, and other wildlife, therefore exclusion fencing must be installed to protect the shoreline enhancement sites. Exclusion fencing may include goose barrier fencing and/or a system of roping strung over the planted area. It is recommended the fencing stay in place during the first two years of the project. Mylar tape may be hung at various intervals along the fencing to further deter geese.

Monitoring and maintenance, including invasive species control, should continue for two to three years after planting.

Regulatory Drivers

Sikes Act, CWA, EO 11990 – Protection of Wetlands, EO 13508- Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental

Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule: **FY18**

Priority: **ERL 3, Navy Level 2**

Funding Sources: **O&MN**

Cost Estimate: **$15,500**

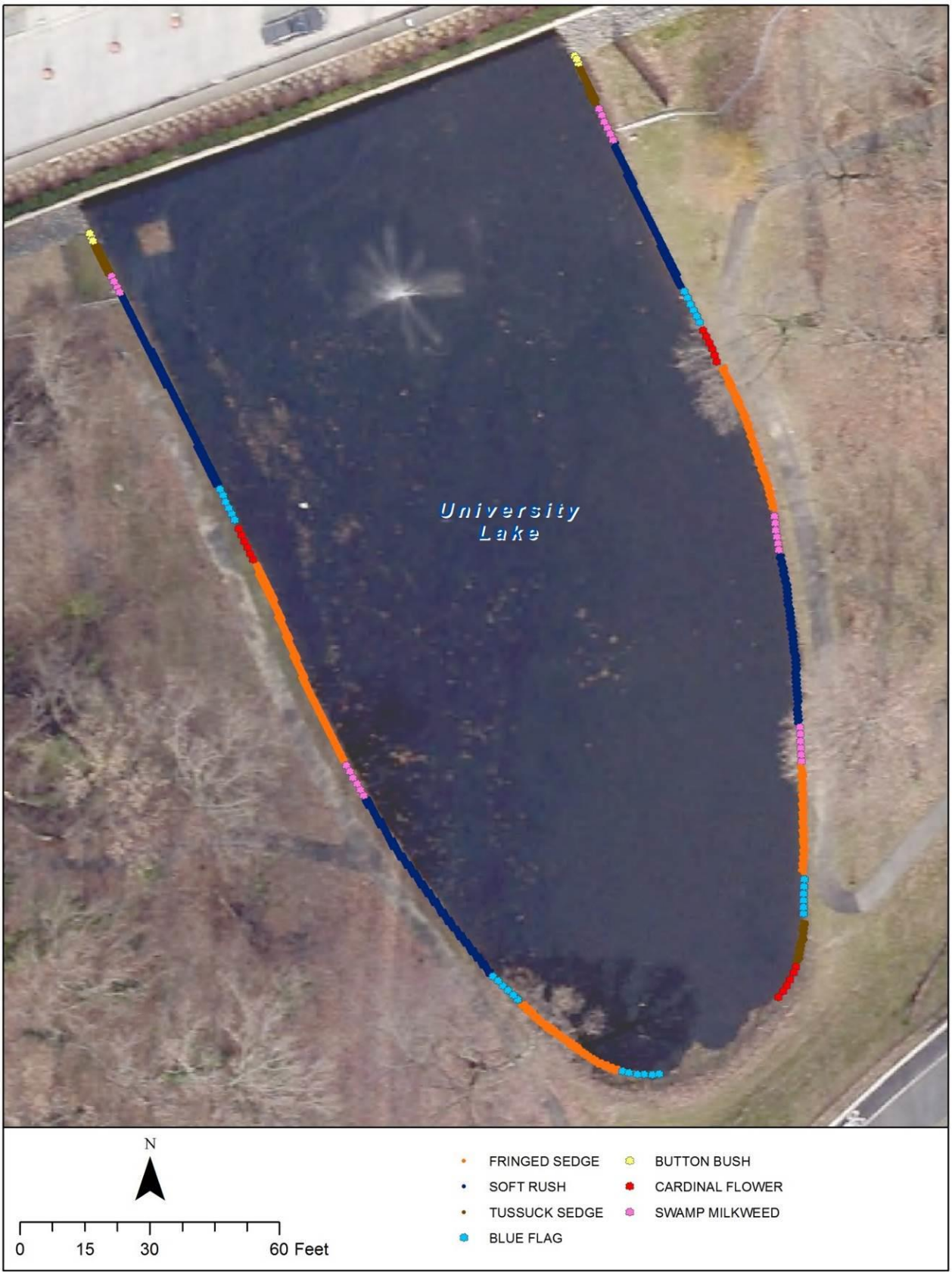
University Pond Planting Recommendations

Common Name	Scientific Name	Size	Count	Cost[1]	Total Cost
Swamp milkweed	*Asclepias incarnata*	plug	50	$0.85	$42.50
Fringed sedge	*Carex crinita*	plug	960	$0.80	$768.00
Tussock sedge	*Carex stricta*	plug	60	$0.85	$51.00
Blue flag	*Iris versicolor*	plug	60	$0.85	$51.00
Soft rush	*Juncus effusus*	plug	1,200	$0.80	$960.00
Cardinal flower	*Lobelia cardinalis*	plug	50	$0.85	$42.50
Big-leaved arrowhead	*Sagittaria latifolia*	plug	50	$0.85	$42.50
Buttonbush	*Cephalanthus occidentalis*	2-3' bare root	6	$2.30	$13.80
Shipping estimate			2,436		$320.00
Total[2]					**$2,291.30**

[1]Mid Atlantic Native Plants (https://midatlanticnatives.com/)
[2]Costs are based on 2014 estimate. Future prices may increase.

University Pond Material Costs

Item	Number	Cost	Total Cost
Stakes for exclusion fence (4')	105	$2.00	$210.00
Twine (2,250')	2	$14.00	$28.00
Mylar tape (216')	1	$15.00	$15.00
Total[1]			**$253.00**



University Pond Planting Plan

SOIL AND WATER MANAGEMENT **PRIORITY: HIGH**

Project Title

Stoney Creek Stream Bank Enhancement

Goal

Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Objective

Enhance the functionality of the shoreline habitat adjacent to the in-stream pond of Stoney Creek.

Background/Justification

The Stoney Creek in-stream pond and areas throughout the Stoney Creek Corridor are highly disturbed, prone to erosion, and support few aquatic and wetland plant species. Protection and enhancement the function and value of the wetland community could be accomplished through planting a fringe of native wetland vegetation.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities.

Project Description

Assess and restore areas along Stoney Creek with living and constructed shoreline enhancements. A variety of techniques including bio-logs, erosion control netting, rock gabion, and native vegetation plantings may be used. At a minimum, a two to three foot area of native herbaceous vegetation and shrubs should be planted in disturbed areas.

Newly planted vegetation is a favored food source for geese, crows, and other wildlife, therefore exclusion fencing must be installed to protect the shoreline enhancement sites. Exclusion fencing may include goose barrier fencing and/or a system of roping strung over the planted area. It is recommended the fencing stay in place during the first two years of the project. Mylar tape may be hung at various intervals along the fencing to further deter geese. Monitoring and maintenance, including invasive species control, should continue for two to three years after planting.

Regulatory Drivers

Sikes Act, CWA, EO 11990 – Protection of Wetlands, EO 13508- Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule: FY19

Priority: ERL 3, Navy Level 2

Funding Sources: O&MN

Cost Estimate: $4,000,000

SOIL AND WATER MANAGEMENT **PRIORITY: MEDIUM**

Project Title

Lake Eleanor Shoreline Enhancement

Goal

Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Objective

Improve water quality and aesthetics at Lake Eleanor.

Background/Justification

Lake Eleanor currently provides open water habitat for Canada geese, which are a nuisance on the installation because of their excessive excrement. The pond is also fed by runoff from the maintained lawn areas, and, therefore, is susceptible to pollution from any toxic substances used for the maintenance of turf areas. Creating a fringe of native wetland vegetation would discourage geese from using the pond as well stabilize the shoreline and reduce runoff from the surrounding lawn.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities. Failure to implement this project would also contribute to the decline of the installation's natural healing environment and enjoyment by the wounded warriors, their guest, and base employees.

Project Description

Replace areas of mowed lawn that abut Lake Eleanor with a two to three foot area of native vegetation that requires little or no additional maintenance. Using live plugs, plant dense, matt forming native rushes and sedges interspersed with showy flowering plants to form a fringe at the water's edge and emergent species in shallow portions of the pond. Besides enhancing the beauty of the area, the flowering plants will provide a food source for native pollinators.

Newly planted vegetation is a favored food source for geese, crows, and other wildlife, therefore exclusion fencing must be installed to protect the shoreline enhancement sites. Exclusion fencing may include goose barrier fencing and/or a system of roping strung over the planted area. It is recommended the fencing stay in place during the first two years of the project. Mylar tape may be hung at various intervals along the fencing to further deter geese.

Monitoring and maintenance, including invasive species control, should continue for two to three years after planting.

Regulatory Drivers

CWA, Sikes Act, EO 11990 – Protection of Wetlands, EO 13508 - Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental

Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule: **FY17**

Priority: **ERL 3, Navy Level 2**

Funding Sources: **O&MN**

Cost Estimate: **$12,700**

Lake Eleanor Planting Recommendations

Common Name	Scientific Name	Size	Count	Cost[1]	Total Cost
Swamp milkweed	*Asclepias incarnata*	plug	50	$0.85	$42.50
Fringed sedge	*Carex crinita*	plug	420	$0.80	$336.00
Fox sedge	*Carex vulpinoidea*	plug	300	$0.85	$255.00
Blue flag	*Iris versicolor*	plug	60	$0.85	$51.00
Soft rush	*Juncus effusus*	plug	660	$0.80	$528.00
Cardinal flower	*Lobelia cardinalis*	plug	50	$0.85	$42.50
Big-leaved arrowhead	*Sagittaria latifolia*	plug	50	$0.85	$42.50
Shipping estimate			1,590		$280.00
Total[2]					**$1,577.50**

[1]Mid Atlantic Native Plants (https://midatlanticnatives.com/)
[2]Costs are based on 2014 estimate. Future prices may increase.

Lake Eleanor Material Costs

Item	Number	Cost	Total Cost
Stakes for exclusion fence (4')	70	$2.00	$140.00
Twine (2,250')	1	$14.00	$14.00
Mylar tape (216')	1	$15.00	$15.00
Total[1]			**$169.00**

Lake Eleanor Planting Plan

SOIL AND WATER MANAGEMENT **PRIORITY: HIGH**

Project Title

Lake Eleanor Aeration System

Goal

Protect and enhance the functions and values of wetland communities, to the greatest extent practicable.

Objective

Improve water quality and appearance of Lake Eleanor.

Background/Justification

There is little water movement or freshwater input to Lake Eleanor, and consequently eutrophication is a major problem in the pond. Aeration can be achieved through the infusion of air into the bottom of the pond or by surface agitation to allow for oxygen exchange at the surface and the release of noxious gasses such as carbon dioxide, methane or hydrogen sulfide. Because Lake Eleanor is an integral part of the installation's historic landscape, any modifications to the pond would require approval from the SHPO at the Maryland Historic Trust. A subsurface bubbler system would cause little disturbance to the surface water and would likely be approved.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities. Failure to implement this project would also contribute to the decline of the installation's natural healing environment and enjoyment by the wounded warriors, their guest, and base employees.

Project Description

Select and install a small pond aeration system at Lake Eleanor. A fine bubble aeration is recommended as an efficient way to transfer oxygen to the pond. This system includes an on-shore compressor that pumps air through a hose connected to an underwater aeration unit. Attached to the unit are a number of diffusers. Diffusers may be discs, plates, tubes or hoses constructed from glass-bonded silica, porous ceramic plastic, PVC or perforated rubber membranes. Annual maintenance may be required to clean tubing and diffuser parts.

Regulatory Drivers

CWA, Sikes Act, EO 11990 – Protection of Wetlands, EO 13508 - Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY17**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$6,000**

SOIL AND WATER MANAGEMENT **PRIORITY: HIGH**

Project Title

Installation Assessment for Soil Erosion Restoration Sites

Goal

Reduce the contribution to pollution through erosion and sedimentation.

Objective

Identify and assess areas of erosion base-wide that contribute to stream sedimentation.

Background/Justification

Steep slopes, construction activity, invasive plant removal, and general foot traffic have lead to the degradation of vegetative cover at various locations around NSA Bethesda. Conducting a pedestrian survey to identify areas that would benefit from seeding, planting, installing erosion control devices or other type erosion control effort is necessary to quantify and develop site-specific restoration plans.

Impact to Mission

Implementation of this project helps maximize water quality requirements related to the CWA and EO 13508, while meeting Navy stewardship responsibilities. Failure to implement this project would also contribute to the decline of the installation's natural healing environment and enjoyment by the wounded warriors, their guest, and base employees.

Project Description

Conduct a base-wide pedestrian survey to identify and assess erosion areas and develop site-specific restoration plans. The plan should prioritize treatment areas based on erosion severity and include cost estimate for implementation of 3 to 5 sites during the first year of implementation.

Regulatory Drivers

CWA, Sikes Act, EO 11990 – Protection of Wetlands, EO 13508 - Chesapeake Bay Protection and Restoration, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY18 – FY19**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$15,600**

INVASIVE SPECIES MANAGEMENT and HABITAT RESTORATION

Project Title

Invasive Species Control and Habitat Restoration

Goal

Control, reduce, or eliminate invasive plant populations by at least 95% at each project site over a three to five year period per project.

Objective

Restore natural habitats and prevent the further spread of invasive species by implementing annual treatments on priority areas at NSA Bethesda. Once all areas have been treated, annual maintenance should be able to be conducted in-house or by contractors with minimal expense.

Background/Justification

In accordance with EO 13112, the Federal Noxious Weed Act, the Chesapeake Bay Preservation Act and Navy policy on environmental stewardship, efforts to identify and control invasive species at NSA Bethesda have been implemented since about 2005. Invasive plants have been identified and mapped in 15 zones across the installation. Annual treatments have been conducted in high priority areas including those heavily infested with invasive vine species such as porcelainberry, English ivy, mile-a-minute, oriental bittersweet, winter creeper, and periwinkle as well as select herbaceous species.

Preserving the remaining area of forest habitat that occurs on NSA Bethesda is a natural resources priority. Continuing to control invasive species through annual treatments would help maintain the integrity of the forested areas while improving their wildlife and aesthetic value.

Invasive plant control efforts have been conducted on over 50 acres of forest and other natural areas at NSA Bethesda since 2005. Because of the extent and density of infestations, the reestablishment or enhancement of native vegetation is required some areas at to help prevent reinfestation of invasive species, enhance native species diversity, and reduce the risk of soil erosion.

Impact to Mission

Invasive/nuisance species compete with native species and, in many cases, take over the habitat and change or alter the ecosystem. As invasive species continue to spread across the natural areas they threaten to impact the installation’s mission to provide a safe, attractive healing environment for injured service members and their guests. Absence of an active control program results in further degradation of habitat that supports the mission and disregards Navy stewardship responsibilities.

Regulatory Drivers

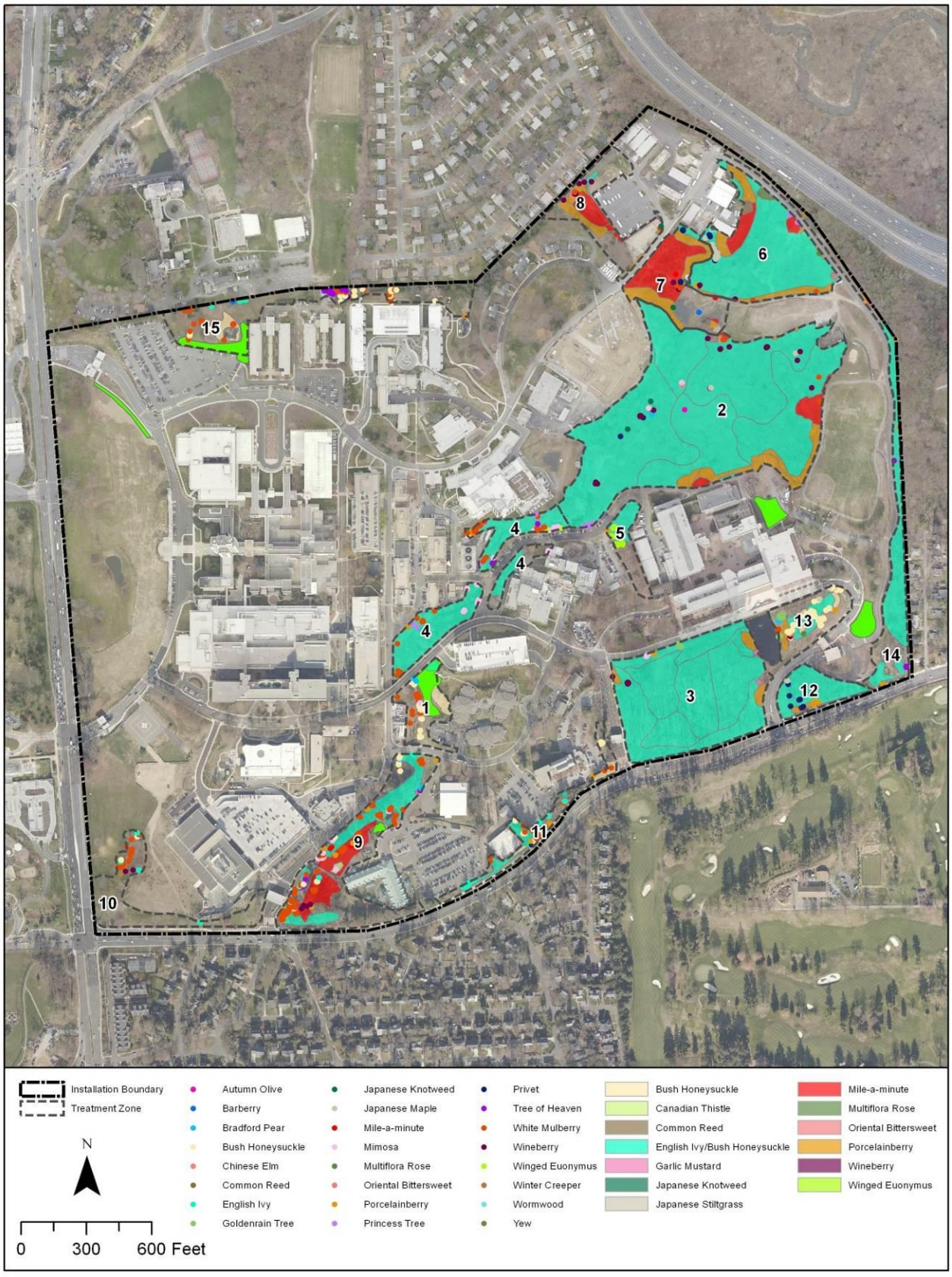
Sikes Act, EO 13112 - Invasive Species, EO 13508 - Chesapeake Bay Protection and Restoration, Federal Noxious Weed Act, Chesapeake Bay Preservation Act, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Project Description

Management recommendations provided in the *Biological Surveys and Management Plan National Naval Medical Center Bethesda, Maryland* (U.S. Navy 2009) should continue to be implemented in order of priority to the greatest extent practicable. It is particularly important to conduct follow up treatments and monitoring to assess treatment effectiveness for a minimum of three years in each management zone previously treated.

Specific recommendations for controlling invasive plants within each treatment zone and restoring native vegetation as necessary follow:

Implementation Schedule:	**Annual**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN, Chesapeake Bay Program**
Cost Estimate:	**$30,000 - $75,000 annually**



Base-wide Invasive Plant Treatment Areas

Zone 1 **PRIORITY: LOW**

A large portion of the invasive plants in Zone 1 has been impacted by development of the new three Fisher Houses (Buildings 65-67) and a multi -purpose garage (Building 32) and by the semi-permanent placement of contractor's trailers along East Palmer Rd. Areas of invasive species infestation, however, still remain along the Stoney Creek corridor on the zone's western edge, within the grassy meadow, and in the remaining wooded area of Zone 1. Invasive species control efforts and restoration of native vegetation along the of Stoney Creek stream corridor would improve the function of the riparian buffer and help meet Navy requirements of the Chesapeake Bay Preservation Act and EO 13508.

Zone 1 is a highly visible site that occurs on sloping terrain and has a stream corridor. Therefore, care must be taken to ensure planted materials are adequately maintained before removing existing vegetation. Establishing a bank of low-growing native shrubs such as winterberry holly (*Viburnum verticillata*), meadowsweet (*Spiraea latifolia*), and spicebush (*Lindera benzoin*) with intermittent taller shrubs such as blackhaw viburnum (*Viburnum prunifolium*) is recommended along the stream bank. Using a combination of flowering shrubs such as these, which have a range of flowering and fruiting times, also supports native birds and pollinators.

Planting should occur in the late fall. In areas with poor soil, organic matter and plant started with microbes and mycorrhizal fungi should be added to the planting whole. One to two-gallon container-grown stock should be used. During large rain events, high energy overbank flow can occur, so care must be taken to plant any vegetation high enough not to be damaged by fast-moving flood waters. Water weakly or install low profile treegators to ensure adequate soil moisture during dry periods during the first three growing season. Monitor and conduct spot treatments for two additional years.

Zone 1. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Bradford Pear	4-5	-	-	Cut-stump treatment, chip in place
Bush Honeysuckle	-	0.3	4	Cut-stump treatment, chip in place
English ivy	-	0.01	4	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Japanese knotweed		0.01	5	Foliar application
Mimosa	1-2	-	-	Cut-stump treatment, chip in place
Mugwort	-	0.02	2	Foliar application
Porcelainberry	-	0.02	2	Foliar application
Privet	-	0.02	1	Cut-stump treatment, chip in place
White mulberry	10-15	-	-	Cut-stump treatment, chip in place
Wineberry	-	0.02	1	Foliar application
Winged Euonymus	-	0.01	5	Cut-stump treatment, chip in place
Total	**40-55**	**1.5**		

Zone 1. Planting Recommendations

Common Name	Scientific Name	Count	Size	Unit Cost	Total Cost
Spicebush	*Lindera benzoin*	10	1 gal	$8.00	$80.00
Winterberry holly*	*Ilex verticillata*	10	1 gal	$8.50	$85.00
Blackhaw viburnum	*Viburnum prunifolium*	10	1 gal	$12.50	$125.00
Sycamore	*Platanus occidentalis*	4	1" cal	$30.00	$120.00
Soil amendments		1	25 lb	$20.00	$20.00
Mulch		1	sq yd	$20.00	$20.00
Treegators		34		$20.00	$680.00
Total					**$1,130.00**

* needs 1 male/10 females for fertilization

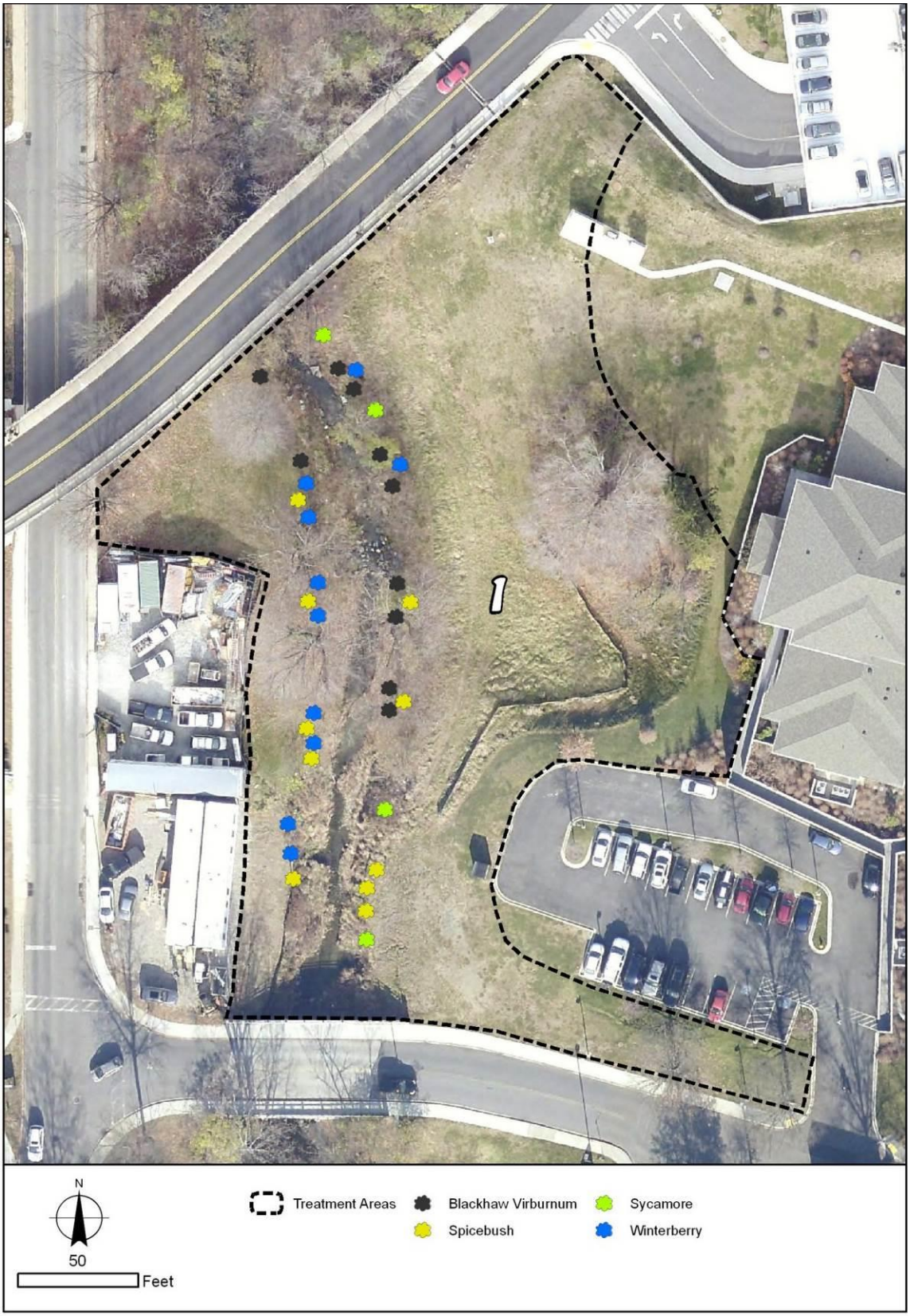
Implementation Schedule: FY19 – FY20

Cost Estimate: $17,000 yr 1 or $10,000 excluding tree removal

$4,000 yr 2

$3,000 yr 3

Zone 1. Treatment Area



Zone 1. Planting Diagram

Zone 2 **PRIORITY: HIGH**

Dense infestations of porcelainberry, mile-a-minute, oriental bittersweet, and other species were treated in portions of Zone 2 from 2010 – 2012 and English ivy, winter creeper, and periwinkle were treated from 2012 – 2014. Because of the persistence of these species, and the continued disturbance from construction around the site's perimeter, annual monitoring and spot treatments are recommended for two to three additional years. Bush honeysuckle has also been partially treated in this zone, but remains a major problem in some areas. However, removing this species from the steep slopes on the northern edge of Zone 2 would likely cause soil destabilization and massive erosion and should be avoided. Other species including Japanese stiltgrass and mugwort are increasing in Zone 2 and should be controlled in future treatments as well.

Zone 2 supports a network of walking trails, many of which are being upgraded to be fully accessible. Once trail modifications are complete, the zone should be reassessed for trail side and forest plantings. It is expected that plantings will be needed along over a mile of trails. Plantings should include a variety of shade tolerant ferns, wildflowers, and shrubs. Trail planners should consult the NAVFAC Washington and installation natural resources media managers for appropriate species to be planted.

Zone 2. Invasive Species Treatments

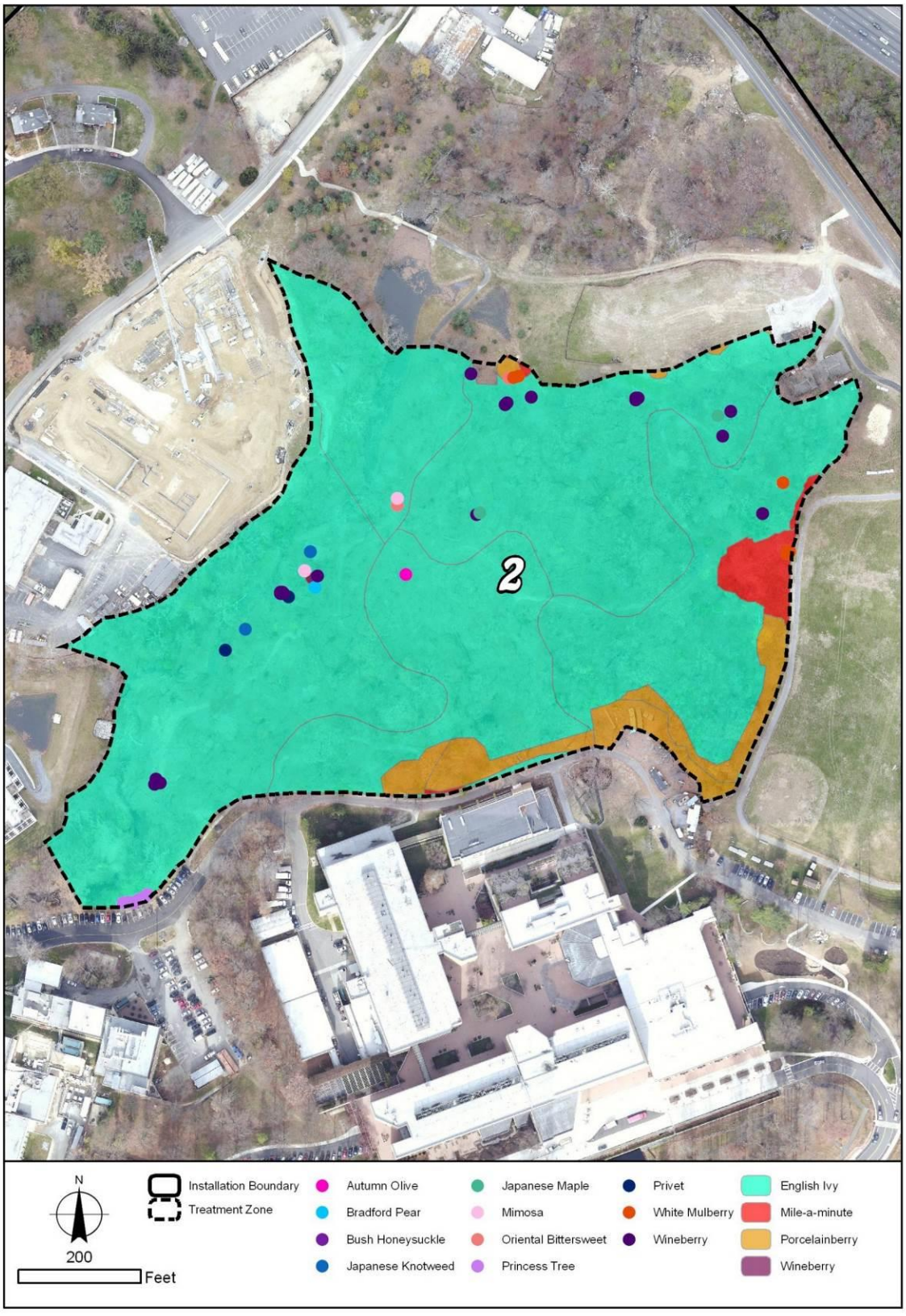
Common Name	Count	Acres	Cover Class	Recommended Treatment
Autumn Olive	1-2	-	-	Foliar application
Bradford Pear	1-2	-	-	Basal bark treatment
Bush Honeysuckle		14	2	Foliar application
English Ivy, Periwinkle, Winter Creeper	-	16	1	Monitor, spot treat with foliar application
Garlic mustard		0.02	1	Foliar application
Japanese Knotweed		0.01	-	Foliar application
Japanese Stiltggrass		0.05	5	Foliar application
Japanese Maple	2-4	-	-	Basal bark treatment
Mile-a-minute	-	0.5	1	Foliar application
Mimosa	2-4	-	-	Basal bark treatment
Oriental Bittersweet	-		1	Monitor, spot treat with foliar application
Porcelainberry	-		1	Monitor, spot treat with foliar application
Princess Tree	6-8	-	-	Basal bark treatment
Privet	3-5	-	-	Foliar application
White Mulberry	4-6	-	-	Basal bark treatment
Wineberry	15-20	-	-	Foliar application
Total	**34 - 52**	**16**		

Implementation Schedule: FY15 - FY17

Cost Estimate: $16,000 yr 1

$8,000 yr 2

$5,000 yr 3



Zone 2. Treatment Area

Zone 3 **PRIORITY: HIGH**

Porcelainberry was cut and treated in 2010 – 2012 and appeared to be well controlled at the end of treatments. English ivy was cut from trees and ground treated in 2012 – 2014 and also appeared to be well controlled. Bush honeysuckle is the most pervasive invasive species remaining in Zone 3 and should be targeted for control in the future. Wineberry is also increasing in this zone and should be targeted before it becomes a major problem. Japanese stiltgrass, Chinese wisteria, various non-native tree species, and garlic mustard, which have also been observed on the site, should also be considered for future treatment.

Recommendations for future treatments include monitoring and spot treating the English ivy and porcelainberry and treating bush honeysuckle and the remaining invasive species for three years. In addition, because of the extent of the area infested with bush honeysuckle that will be removed, replanting with native herbaceous species, particularly ferns, and shrubs such as spicebush (*Lindera benzoin*), maple-leaf viburnum (*Viburnum acerifolium*), American beautyberry (*Callicarpa americana*), winterberry holly or others is recommended in locations left denuded by invasive plant control.

Zone 3. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
English Ivy	-	7.0	1	Monitor, spot treat with foliar application
Bush Honeysuckle		7.0	2	Foliar application
Garlic Mustard	-	0.02	3	Foliar application
Goldenrain Tree	3-4	-	-	Basal bark treatment
Mimosa	2-3	-	-	Basal bark treatment
Porcelainberry	-	0.1	1	Monitor, spot treat with foliar application
White Mulberry	1-2	-	-	Basal bark treatment
Wineberry	10-15	-	-	Foliar application
Total	**16-24**	**7.7**		

Zone 3. Planting Recommendations

Common Name	Scientific Name	Count	Size	Unit Cost	Total Cost
Southern lady fern	*Athyrium asplenioides*	100	4"	$3.00	$300.00
Christmas fern	*Polystichum acrostichoides*	100	4"	$3.00	$300.00
Hay-scented fern	*Dennstaedtia punctilobula*	100	4"	$3.00	$300.00
Spicebush	*Lindera benzoin*	50	1 gal	$8.00	$400.00
Maple-leaf viburnum	*Viburnum acerifolium*	50	1 gal	$8.00	$400.00
American beautyberry	*Callicarpa americana*	50	1 gal	$4.50	$400.00
Winterberry holly*	*Ilex veticillata*	50	1 gal	$8.50	$425.00
Soil amendments		10	25 lb	$20.00	$200.00
Total					**$2725.00**

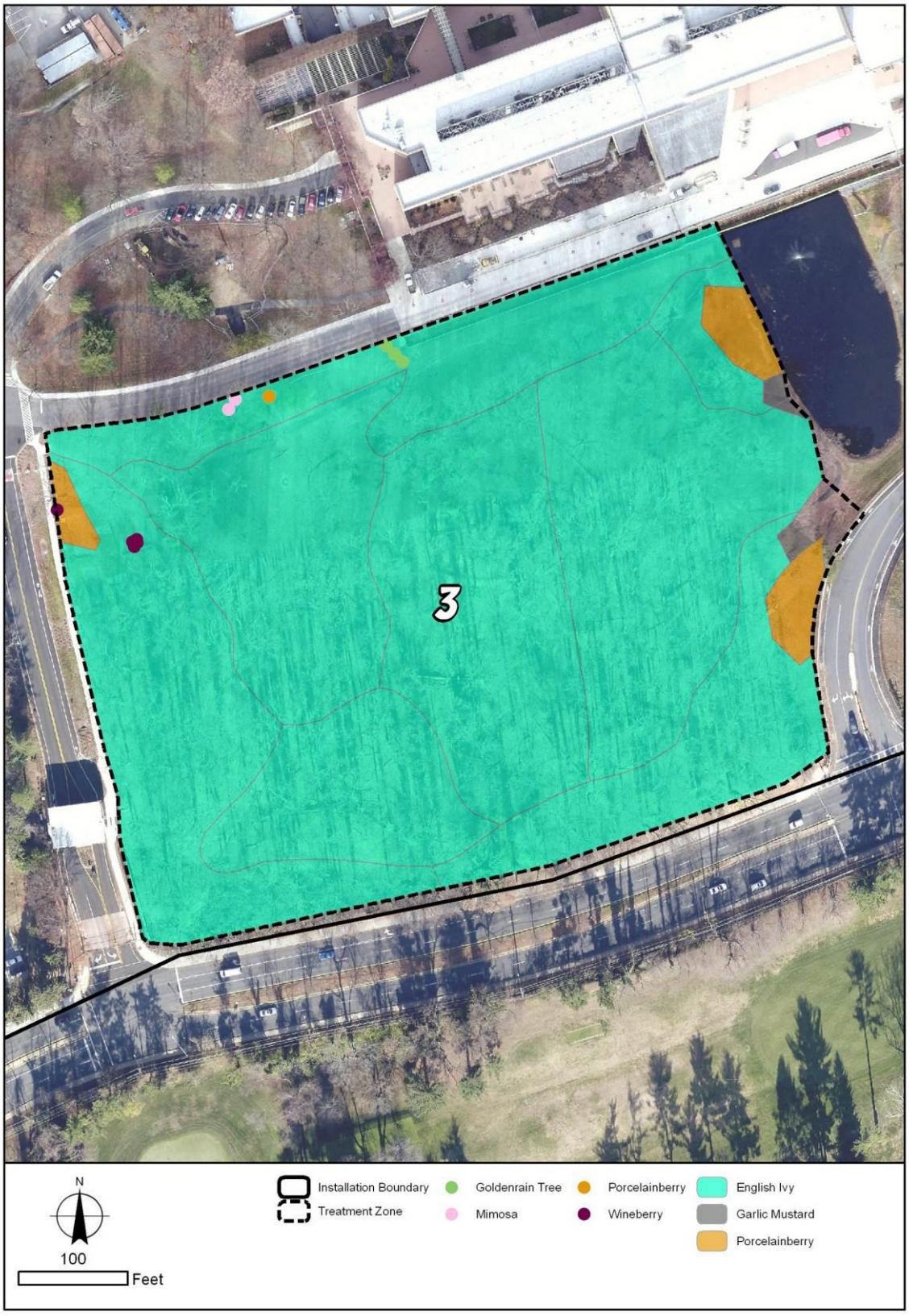
* needs 1 male/10 females for fertilization

Implementation Schedule: FY15 – FY17

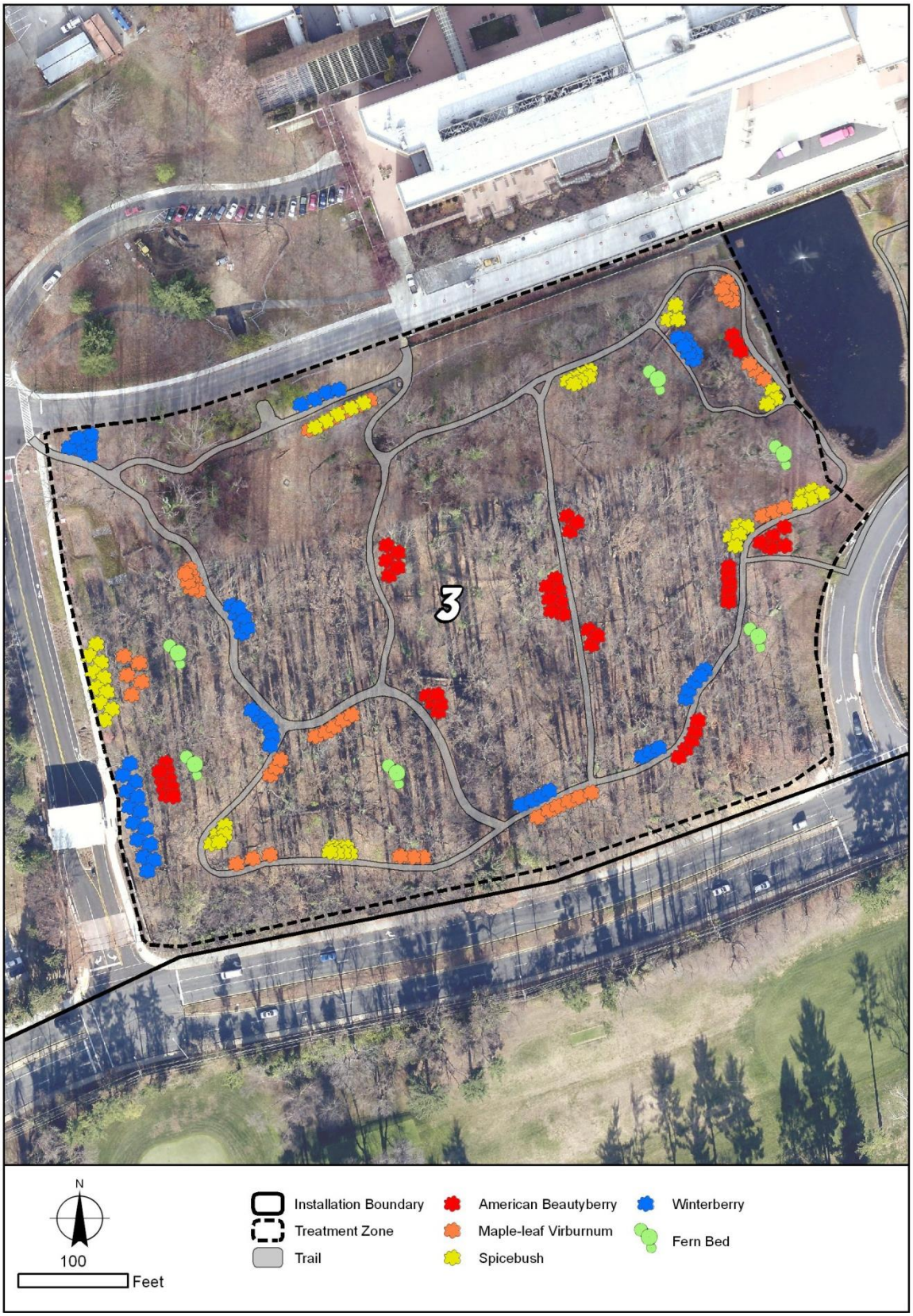
Cost Estimate: $16,000 yr 1

$4,000 yr 2

$3,500 yr 3



Zone 3. Treatment Area



Zone 3. Planting Diagram

Zone 4 **PRIORITY: MEDIUM**

The porcelainberry and mile-a-minute were treated in 2011 – 2012 and appeared to be well controlled in all of Zone 4 after the final treatment. Much of zone 4 remains infested with English ivy and bush honeysuckle as well as a number of other non-native species including tree-of-heaven, princess tree, white mulberry, mimosa, and winged euonymus.

Continued monitoring and spot treatments of the porcelainberry and mile-a-minute are recommended as the first priority in Zone 4 to prevent their reestablishment. Control of the tree-of-heaven, princess tree, and other aggressive invasive trees as well as restoration of the riparian zone are recommended as lower priority actions in this zone. Monitoring and mop up should be conducted for three years.

Planting native trees and shrubs should be coordinated with the Stoney Creek trail development plans. Trail planners should consult the NAVFAC Washington and installation natural resources media managers for appropriate species to be planted.

Zone 4. Invasive Plant Treatments

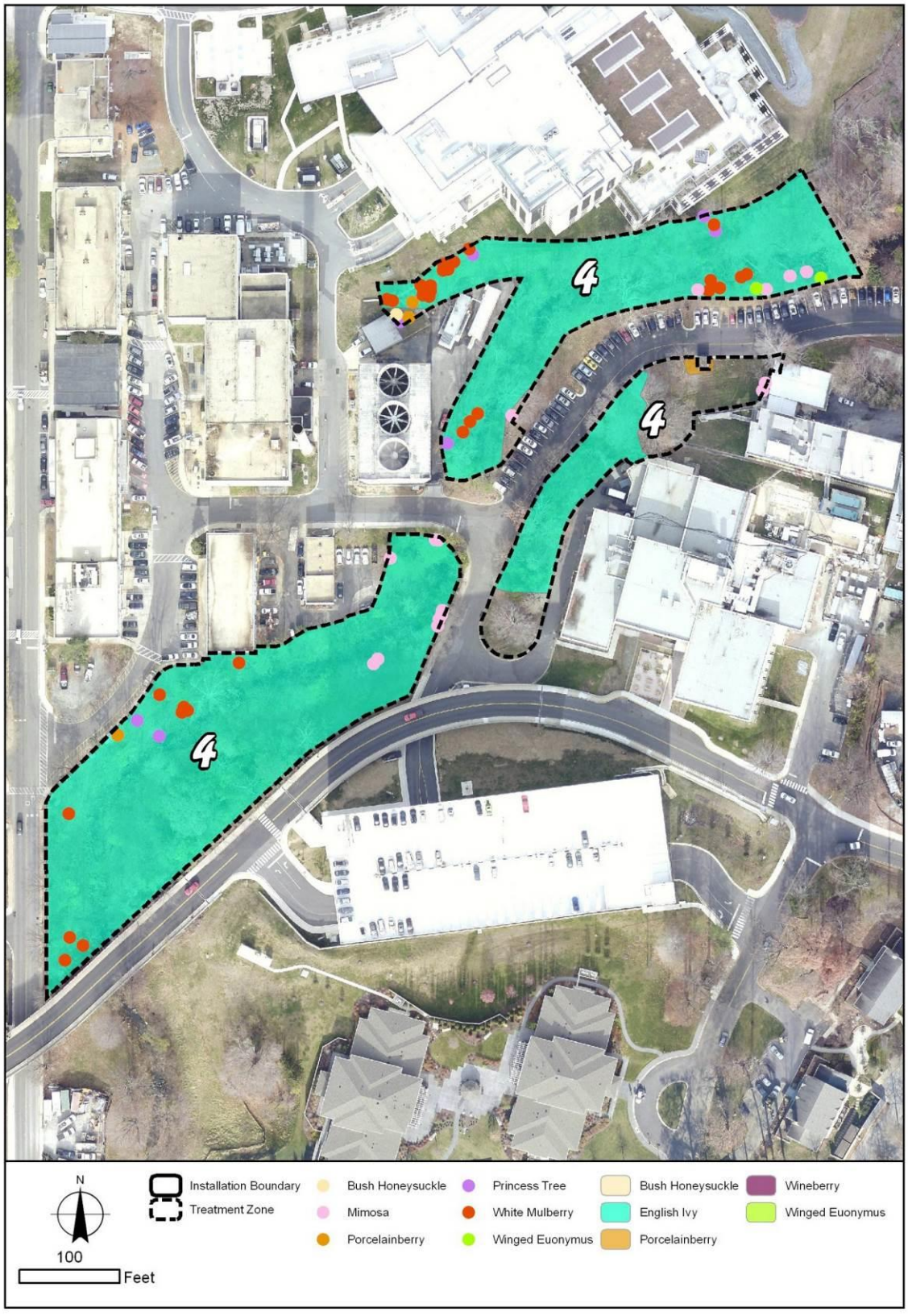
Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle		3	4	Foliar application
English Ivy		3	4	Monitor, spot treat with foliar application
Mimosa	5-10	-		Cut-stump treatment, chip in place
Porcelainberry		0.02	1	Monitor, spot treat with foliar application
Princess Tree	10-15	-	-	Cut-stump treatment, leave wood in woods
Tree of Heaven	3-5	-	-	Cut-stump treatment, leave wood in woods
White Mulberry	30-35	-	-	Basal bark treatment
Winged Euonymus	5-10	-	-	Cut-stump treatment, chip in place
Total	**53-75**	**3**		

Implementation Schedule: FY17 – FY19

Cost Estimate: $21,000 yr 1 or $4,000 excluding trees

$4,000 yr 2

$3,000 yr 3



Zone 4. Treatment Area

Zone 5 **PRIORITY: LOW**

Eradication of the porcelainberry, reducing the cover of bush honeysuckle and English ivy, and controlling the spread of winged euonymus (which is relatively limited at NSA Bethesda) are recommended goals for invasive species treatment in Zone 5.

Because of the steep terrain and aesthetic value provided by winged euonymus, selective shrub removal and replacement is recommended. Care must be taken to ensure native species, such as blackhaw viburnum, New Jersey tea, mapleleaf viburnum, and mountain laurel, are well established before too much of the existing shrub layer is removed.

Planting should occur in the late fall. In areas with poor soil, organic matter and plant started with microbes and mycorrhizal fungi should be added to the planting whole. One to two-gallon container-grown stock should be used. Water weakly or install low profile treegators to ensure adequate soil moisture during dry periods during the first three growing season. Monitoring and spot treatments should be conducted for two additional years.

Zone 5. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle	-	0.4	-	Cut-stump treatment, chip in place
English Ivy	-	0.4	-	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Porcelainberry	-	0.02	-	Foliar application
Winged Euonymus	-	0.02	-	Cut-stump treatment, chip in place
Total	**17**	**1.0**		

Zone 5. Planting Recommendations

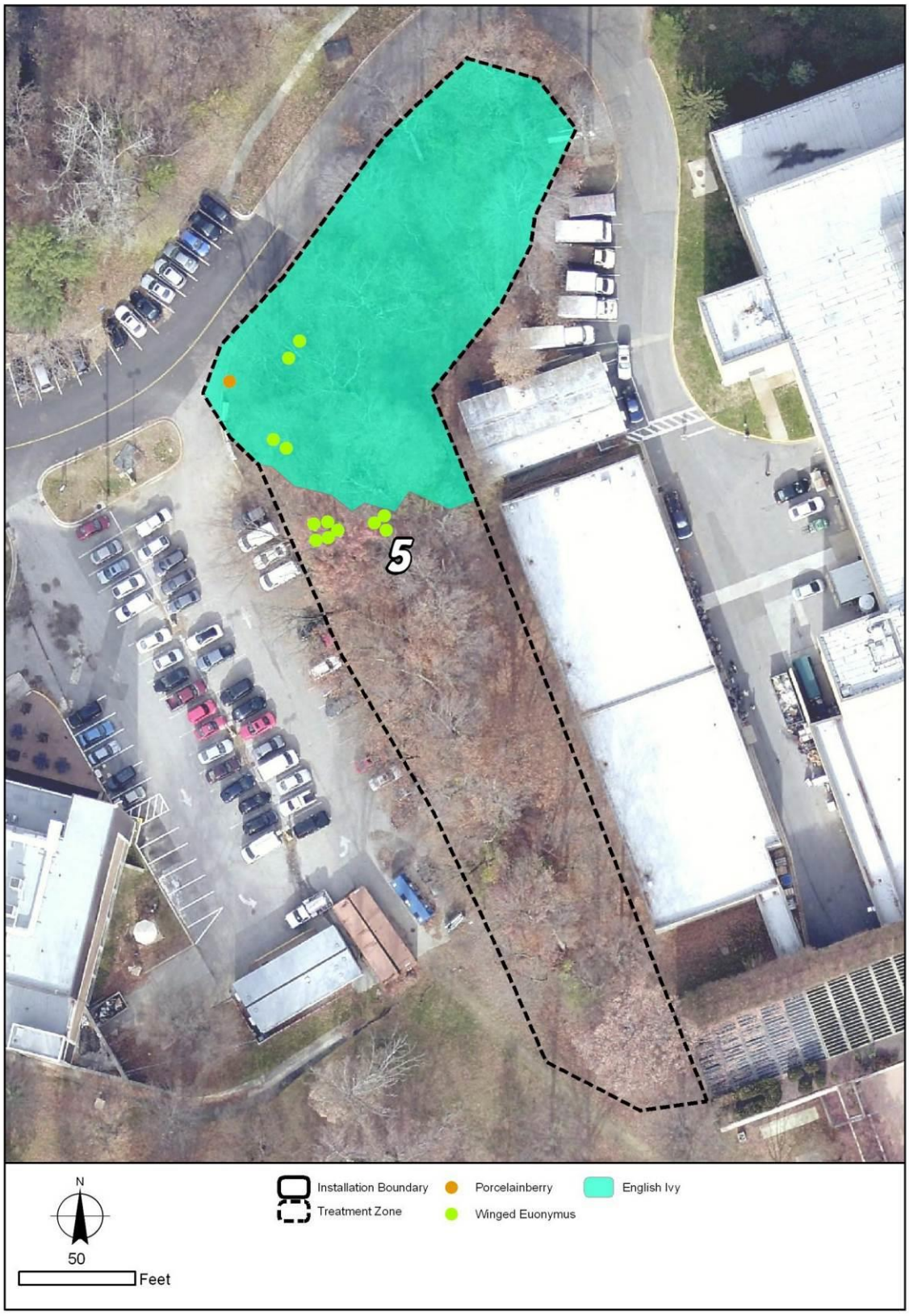
Common Name	Scientific Name	Count	Size	Cost	Total Cost
Mapleleaf viburnum	*Viburnum acerifolium*	10	1 gal	$8.50	$85.00
Blackhaw viburnum	*Viburnum prunifolium*	10	1 gal	$12.50	$125.00
New Jersey tea	*Ceanothus americanus*	10	1 gal	$8.50	$85.00
Mountain laurel	*Kalmia latifolia*	5	1 gal	$7.00	$35.00
Soil amendments		1	25 lb	$20.00	$20.00
Mulch		1	sq yd	$20.00	$20.00
Treegators (low profile)		30		$20.00	$600.00
Total					**$970.00**

Implementation Schedule: FY19 – FY21

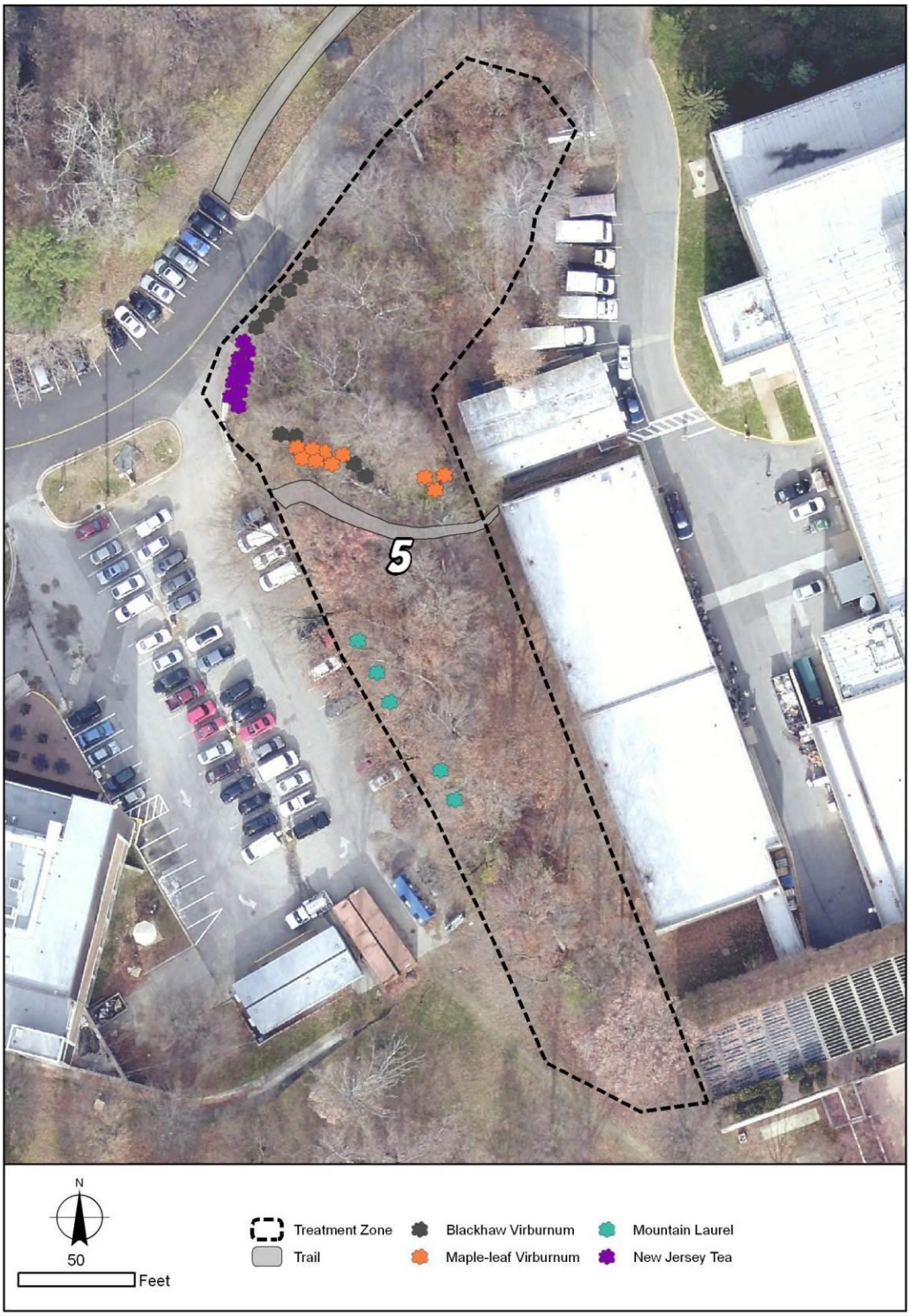
Cost Estimate: $9,000 yr 1

$3,000 yr 2

$2,500 yr 3



Zone 5. Treatment Area



Zone 5. Planting Diagram

Zone 6 **PRIORITY: HIGH**

Porcelainberry common reed, bittersweet, and mugwort were treated 2010 – 2012 and appeared to be well controlled at the end of treatments. Additional treatments were conducted to control common reed, Japanese knotweed, and bamboo in 2013 – 2014. However, continued construction and disturbance around the area's perimeter can be expected to introduce more invasive species in the future. An area in the center of Zone 6 is managed by the Environmental Restoration program and appears to have been a storage site for soil, gravel, and vegetative debris. This area will continue to be a source of invasive species unless a native plant community can be established at this site.

Invasive species control recommendations for Zone 6 are to continue monitoring and spot treatments of princess tree, porcelainberry, bittersweet, mile-a-minute, knotweed, common reed and bamboo, as well as begin treatments of English ivy, privet, bush honeysuckle, and any other invasive species that may occur. Two additional years of monitoring and spot treatments are recommended.

Treating the remaining invasive species in the central portion of Zone 6 and establishing a temporary ground cover with a non-invasive grass such as annual rye and continuing annual treatments until a native vegetative community is established is also recommended.

Zone 6. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle		4.5	3	Foliar application
Common Reed	5	0.2	1	Monitor, spot treat with foliar application
English Ivy, Winter Creeper, Periwinkle,	-	4.5	3	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Japanese Maple	8-10	-	-	Basal bark treatment
Japanese knotweed	-	0.1	4	Foliar application
Mile-a-minute	-	0.1	2	Monitor, spot treat with foliar application
Multiflora Rose	2-4	-	-	Foliar application
Oriental Bittersweet	-	0.02	2	Monitor, spot treat with foliar application
Porcelainberry	-	1.0	2	Monitor, spot treat with foliar application
Princess Tree	3-5	-	-	Basal bark treatment
Privet	6-10	-	-	Foliar application
White Mulberry	2-3	-	-	Basal bark treatment
Wineberry	-	0.01	2	Foliar application
Wormwood	-	0.02	2	Foliar application
Yew	1-2	-	-	Foliar application
Total	**22-34**	**5.3**		

Implementation Schedule: FY16 – FY18

Cost Estimate: $8,800 yr 1

$4,500 yr 2

$3,000 yr 3

Zone 6. Treatment Area

Zone 7 **PRIORITY: HIGH**

Porcelainberry wormwood, Canada thistle, and mile-a-minute were treated in 2011 – 2012, though mile-a minute was observed again in 2013. Another extremely aggressive invasive grass, Japanese stiltgrass, which appears to have been introduced during construction activities, should also be treated at this site as soon as possible. Beefsteak plant (*Perilla frutescens*) is an additional invasive that was observed near the modified wetland area in Zone 7 in 2012. Spot treatments of any returning mile-a-invasive species are recommended to continue for the next three years in Zone 7.

Some native grasses and forbs, including milkweed (*Asclepias syriaca*), have become established in the treated area at Zone 7, however, greater coverage on the remaining extensive areas of bare soil should be established to prevent the recolonization of invasive species. A variety of native warm season grasses and/or turf grasses are tolerant to the herbicide Plateau® and can be seeded before or following treatment. Using Plateau® as a pre-emergent herbicide in early spring and seeding with a tolerant lawn or a native warm season grass mix is recommended for all areas denuded by invasive plant control. If a significant seedbank of invasive species has developed in the soil, repeated treatments may be required. Check the Plateau® label for a list of tolerant species.

Continued mowing is also recommended is areas planted with trees until complete canopy closure is achieved.

Zone 7. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Barberry	1-2	-	-	Foliar application
Beefsteak Plant	-	0.01	1	Foliar application
Canadian Thistle	-	0.5	2	Monitor, spot treat with foliar application
English Ivy		0.3		Foliar application
Japanese Knotweed	-	0.05	2	Monitor, spot treat with foliar application
Japanese Stiltgrass	-	0.05	5	Foliar application
Mile-a-minute	-	2.0	2	Monitor, spot treat with foliar application
Mimosa	1-2	-	-	Foliar application
Mugwort	-	0.5	2	Monitor, spot treat with foliar application
Porcelainberry	-	0.5	2	Monitor, spot treat with foliar application
Privet	2-4	-	-	Foliar application
White Mulberry	2-4	-	-	Basal bark treatment
Wineberry	5-10	-	-	Foliar application
Total	**11-22**	**3.91**		

Zone 7. Planting Recommendations

Common Name	Scientific Name	Count	Size	Cost	Total Cost
Winterberry holly*	*Ilex verticillata*	10	1 gal	$7.00	$70.00
Spicebush	*Lindera benzoin*	10	1 gal	$8.50	$85.00
Bayberry	*Morelly pensylvanica*	10	1 gal	$7.00	$70.00
Blackhaw viburnum	*Viburnum prunifolium*	2	1 gal	$12.50	$25.00
Soil amendments		1	25 lb	$20.00	$20.00
Treegators		32		$20.00	$640.00
Total					**$910.00**
* needs 1 male/10 females for fertilization					

Zone 7. Seeding Recommendations

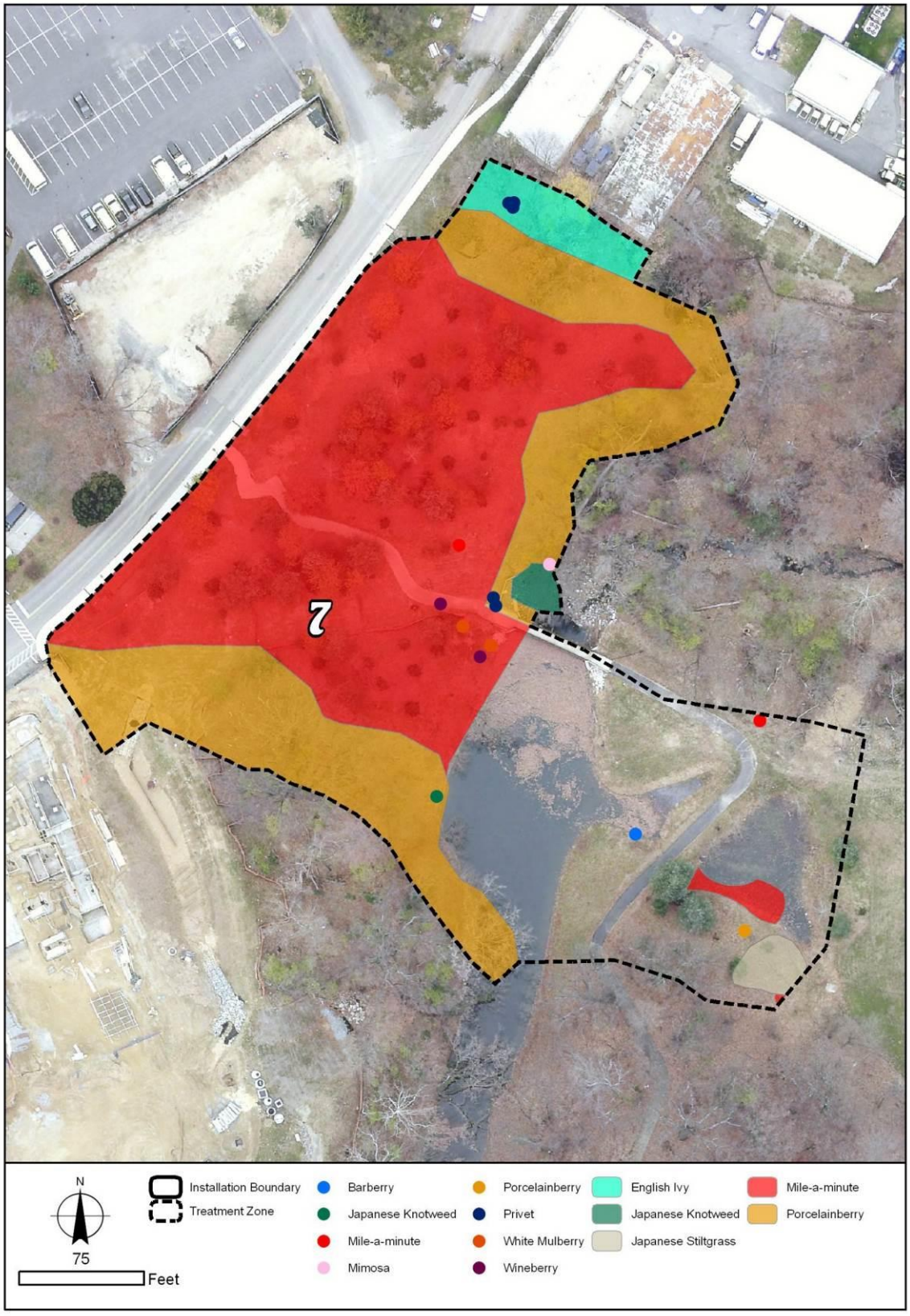
Common Name	Scientific Name	Rate	Acres	Cost	Total Cost
Conservation Mix*		100 lb/ac	1	$1.82	$182.00
Available from http://www.ernstseed.com/seed-mixes/					

Implementation Schedule: FY14 – FY16

Cost Estimate: $10,500 yr 1

$4,500 yr 2

$3,500 yr 3



Zone 7. Treatment Area

Zone 7. Planting Diagram

Zone 8 **PRIORITY: HIGH**

Porcelainberry and mile-a-minute were treated in 2011 – 2012 and appeared to be well controlled after the final treatment. Wineberry, grape, Japanese knotweed, and English ivy are other incidental species that were treated at Zone 8 as well.

Monitoring and spot treatments, however, will likely be required for two to three additional years or until a dense vegetative cover can be established on disturbed areas. Mugwort and English ivy will also require continued treatments if they are to be controlled. An appropriate lawn grass mix such as Kentucky bluegrass, creeping red fescue, and annual rye is recommended to prevent erosion and reduce the risk of reinvasion. A glyphosate herbicide such as Rodeo® or Accord® Concentrate that has low residual soil activity should be used to remove any remaining undesirable vegetation prior to seeding.

Zone 8. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
English Ivy	-	0.04	4	Monitor, spot treat with foliar application
Japanese Knotweed	-	0.02	3	Foliar application
Mile-a-minute	-	1.0	2	Monitor, spot treat with foliar application
Porcelainberry	-	0.02	1	Monitor, spot treat with foliar application
Wormwood	-	0.04	2	Foliar application
White Mulberry	2-3	-	-	Basal bark treatment
Wineberry	-	0.02	2	Foliar application
Total	**2-3**	**2.4**		

Zone 8. Seeding Recommendations

Common Name	Scientific Name	Rate	Acres	Cost	Total Cost
Ernst Conservation Mix		100 lb/ac	0.5	$1.56	$78.00

Implementation Schedule: FY16 – FY18

Cost Estimate: $3,500 yr 1

$2,500 yr 2

$2,300 yr 3

Zone 8. Treatment Area

Zone 9 **PRIORITY: MEDIUM**

Much of the area in Zone 9 has been undergoing treatment since 2005, when limited invasive control efforts were begun and a number of native trees were planted. Regular mowing was discontinued in the area planted and the area became over run with invasive species. Mile-a-minute, porcelainberry, Canada thistle, and wineberry were treated in 2010- 2012 with > 95 percent success. Invasive species will likely continue to dominate the area until a native plant cover or grasses can be reestablished. Seeding with a mix of shade-tolerant turf grasses are recommended for portions of this site. Foliar spraying any remaining undesirable vegetation with a glyphosate herbicide such as Rodeo® or Accord® Concentrate that has low residual soil activity should be used to remove any remaining undesirable vegetation prior to seeding. Portions of this site are fairly steep, so erosion control matting may be required. Planting native shrubs is also recommended to enhance the riparian buffer and improve the reforestation effort begun in 2005 at this site.

Resuming mowing via the installation grounds maintenance contract is recommended for the hillside to the west of the Child Development Center until a full-canopied forest stand that will deter re-infestation by invasive species is established. Mowers must avoid damaging the planted trees.

Zone 9. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Barberry	1-2	-	-	Foliar application
Bradford Pear	3-5	-	-	Cut-stump treatment, chip in place
Bush Honeysuckle	-	3.5	2	Cut-stump treatment, chip in place
Canadian Thistle	-	1.0	1	Monitor, spot treat with foliar application
English Ivy	-	2.0	3	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Mile-a-minute	-	1.0	1	Monitor, spot treat with foliar application
Mimosa	9-10	-	-	Cut-stump treatment, chip in place
Porcelainberry		4.5	1	Monitor, spot treat with foliar application
Tree of Heaven	4-5	-	-	Basal bark treatment
White Mulberry	78-80	-	-	Basal bark treatment
Wineberry	-	4.5	1	Foliar application
Total	**100-112**	**5.0**		

Zone 9. Planting Recommendations

Common Name	Scientific Name	Count	Size	Unit Cost	Total Cost
Flowering dogwood	*Cornus florida*	5	1" cal	$27.50	$137.50
Eastern redbud	*Cercis canadensis*	5	1" cal	$27.50	$137.50
Spicebush	*Linder benoin*	20	1 gal	$8.00	$160.00
Winterberry holly*	*Ilex verticillata*	10	1 gal	$7.00	$70.00
White Fringe Tree	*Chionanthus virginicus*	5	1 gal	$9.00	$45.00
Shadbush	*Amelanchier canadensis*	5	1" cal	$27.50	$137.50
Soil amendments		1	25 lb	$20.00	$20.00
Mulch		1	sq yd	$20.00	$20.00
Treegators		40		$20.00	$800.00
Total					**$1,527.50**

* needs 1 male/10 females for fertilization

Zone 9. Seeding Recommendations

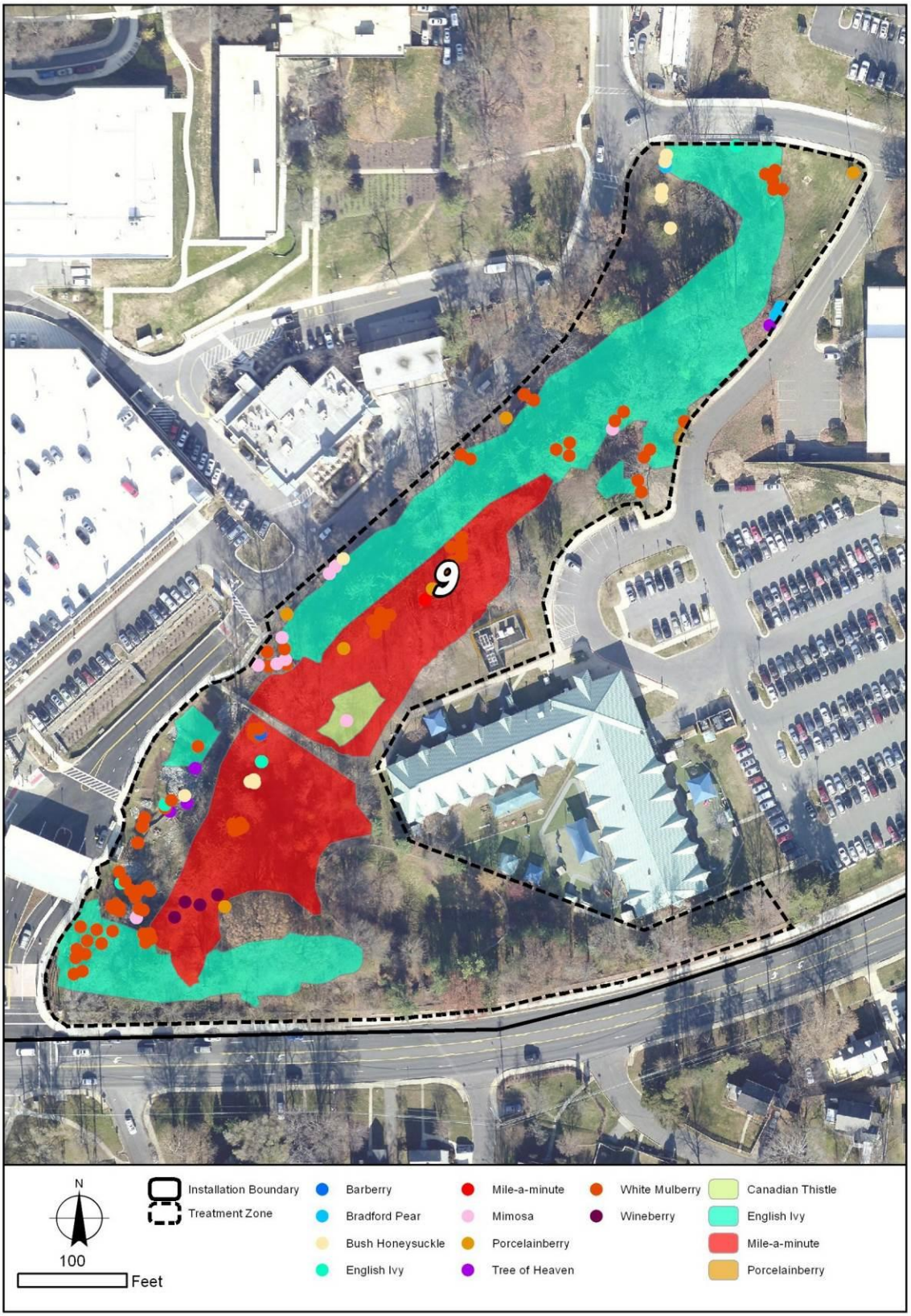
Common Name	Scientific Name	Rate	Acres	Cost	Total Cost
Ernst Conservation Mix		100 lb/ac	0.5	$1.56	$78.00

Implementation Schedule: FY17 – FY19

Cost Estimate: $19,000 yr 1 or $14,000 excluding tree removal

$4,500 yr 2

$3,000 yr 3



Zone 9. Treatment Area

Zone 9. Planting Diagram

Zone 10 **PRIORITY: LOW**

Zone 10 currently falls under the grounds maintenance contract and is mowed frequently, though little tree care seems to be conducted. The best management option for this zone would be to include the control of invasive species that occur in and around ornamental plantings in the grounds maintenance contract.

Alternatively, an invasive species control specialist should be contracted to cut and spray the vine species such as English ivy, winter creeper, and porcelainberry currently affecting the ornamental specimen trees as the highest priority and replace nonnative trees and shrubs with native species when practicable.

Zone 10. Invasive Plant Treatments

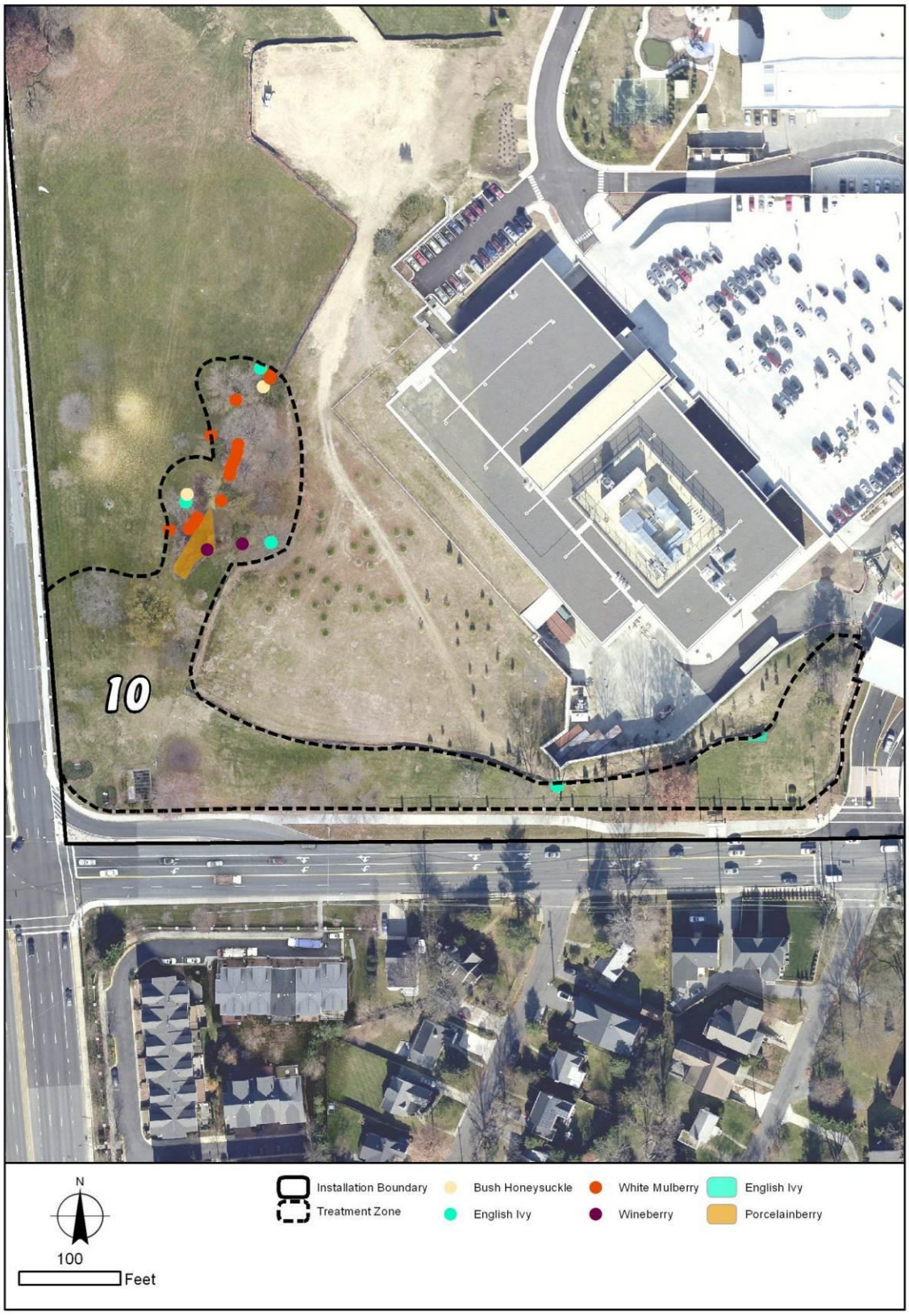
Common Name	Count	Acres	Cover Class	Recommended Treatment
Barberry	2-3	-	-	Foliar application
Bush Honeysuckle	10-15	-	-	Cut-stump treatment, chip in place
English Ivy/Winter creeper		0.1	5	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Goldenrain Tree	3-4	-	-	Cut-stump treatment, chip in place
Porcelainberry		0.5	4	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Princess Tree	1-2	-	-	Cut-stump treatment, chip in place
Privet	2-3	-	-	Cut-stump treatment, chip in place
White Mulberry	42	-	-	Cut-stump treatment, chip in place
Wineberry	5-10	-	-	Foliar application
Winged Euonymus	2-3	-	-	Cut-stump treatment, chip in place
Total		**2.2**		

Implementation Schedule: FY19 - FY21

Cost Estimate: $12,000 yr 1 or $4,000 excluding mulberry removal

$3,000 yr 2

$2,500 yr 3



Zone 10. Treatment Area

Zone 11 **PRIORITY: LOW**

New construction and roads have impacted much of the invasive vegetation in Zone 11 and additional planned development will likely alter conditions throughout the area. English ivy is currently the primary remaining issue as it climbs in and damages native and specimen trees throughout the area. Controlling ivy that occurs in and around ornamental plantings under the grounds maintenance contract would be the preferred management option. Alternatively, an invasive species control specialist should be contracted to cut and spray the English ivy and any other invasive vine species that affect ornamental and specimen trees. Replacing nonnative trees and shrubs with native species when practicable is a lower priority treatment recommended for Zone 11.

Zone 11. Invasive Plant Treatments

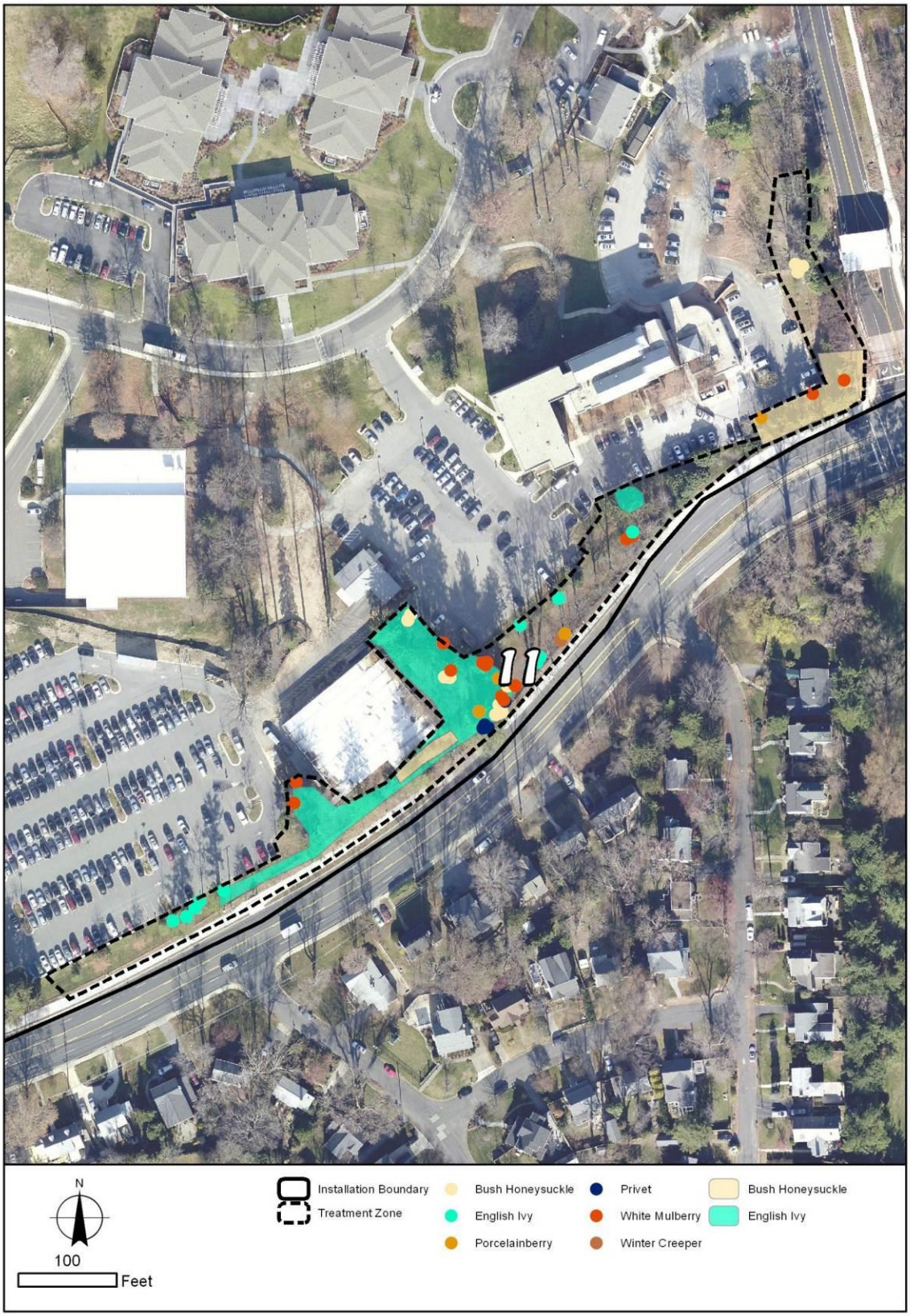
Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle	-	3.0	3	Cut-stump treatment, chip in place
English Ivy/Winter Creeper	-	1.0	3	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Porcelainberry	-	0.02	2	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Privet	4	-	-	Cut-stump treatment, chip in place
White Mulberry	40-50	-	-	Cut-stump treatment, chip in place
Wineberry	5-10	-	-	Foliar application
Total	**X**	**1.3**		

Implementation Schedule: FY18 – FY20

Cost Estimate: $17,500 yr 1 or $4,000 excluding mulberry removal

$2,500 yr 2

$2,000 yr 3



Zone 11. Treatment Area

Zone 12 **PRIORITY: LOW**

Porcelainberry vines in Zone 12 were cut and treated from 2010 – 2012. Some Chinese privet and wineberry were also incidentally treated though they were not target species at this site. Bush honeysuckle and English ivy were not treated. Future monitoring and spot treatments of porcelainberry, privet, and wineberry are the highest priority actions at this site. Reducing the cover of bush honeysuckle and English ivy are recommended as lower priorities. The grounds maintenance contract could potentially take over control of porcelainberry as it occurs along the fence line.

Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle		1.3	3	Foliar application
English Ivy	-	1.3	3	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Japanese Maple	1-2	-	-	Basal bark treatment
Porcelainberry	-	0.5	1	Monitor, spot treat with foliar application
Privet	7-10	-	-	Foliar application
Wineberry	-	0.02	1	Foliar application
Total	**10-17**	**1.3**		

Implementation Schedule: FY19 - FY21

Cost Estimate: $4,000 yr 1

$2,500 yr 2

$2,000 yr 3

Zone 12. Treatment Area

Zone 13 **PRIORITY: LOW**

In 2008, a portion of the invasive species that occurred on Zone 13 was treated by hand pulling and cutting by grounds maintenance personnel. Monitoring porcelainberry and additional efforts are recommended to control the remaining invasive species on this site.

Replacing nonnative shrubs and trees with attractive native species is a secondary priority. Care must be taken to ensure planted materials will be adequately maintained before removing existing vegetation. Shrubs such as American beautyberry, mapleleaf viburnum, winterberry, and mountain laurel may be planted in group arrangements under the existing trees. Additional specimen trees such as flowering dogwood are also recommended. The ground throughout most of this area is in poor condition and is generally bare with no litter layer or organic matter. Mulch should be used to promote moisture retention and prevent erosion in planted areas.

In lawn areas where Japanese stiltgrass occurs, an appropriate lawn grass mix such as Kentucky bluegrass, creeping red fescue, and annual rye is recommended to be seeded following the final herbicide application.

Zone 13. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Bradford Pear	2	-		Cut-stump treatment, chip in place
Bush Honeysuckle	-	2.0	2	Cut-stump treatment, chip in place
English Ivy	-	2.0	2	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Goldenrain Tree	6-7	-	-	Cut-stump treatment, chip in place
Japanese Maple	6-7	-	-	Cut-stump treatment, chip in place
Japanese Stiltgrass	-	0.04	4	Foliar application
Multiflora Rose	1-2	-	-	Foliar application
Porcelainberry		0.2	1	Monitor, spot treat with foliar application
White Mulberry	2-3	-	-	Cut-stump treatment, chip in place
Wineberry	2-5	-	-	Foliar application
Total	**76**	**2.0**		

Zone 13. Planting Recommendations

Common Name	Scientific Name	Count	Size	Unit Cost	Total Cost
Mapleleaf viburnum	*Viburnum acerifolium*	10	1 gal	$8.50	$85.00
Flowering dogwood	*Cornus florida*	5	1" cal	$27.50	$137.50
Mountain laurel	*Kalmia latifolia*	5	1 gal	$7.00	$35.00
American beautyberry	*Callicarpa americana*	5	1 gal	$12.50	$62.50
Winterberry holly*	*Ilex verticillata*	10	1 gal	$7.00	$70.00
Soil amendments		1	25 lb	$20.00	$20.00
Mulch		1	sq yd	$20.00	$20.00
Treegators		35		$20.00	$700.00
Total					**$1,130.00**

* needs 1 male/10 females for fertilization

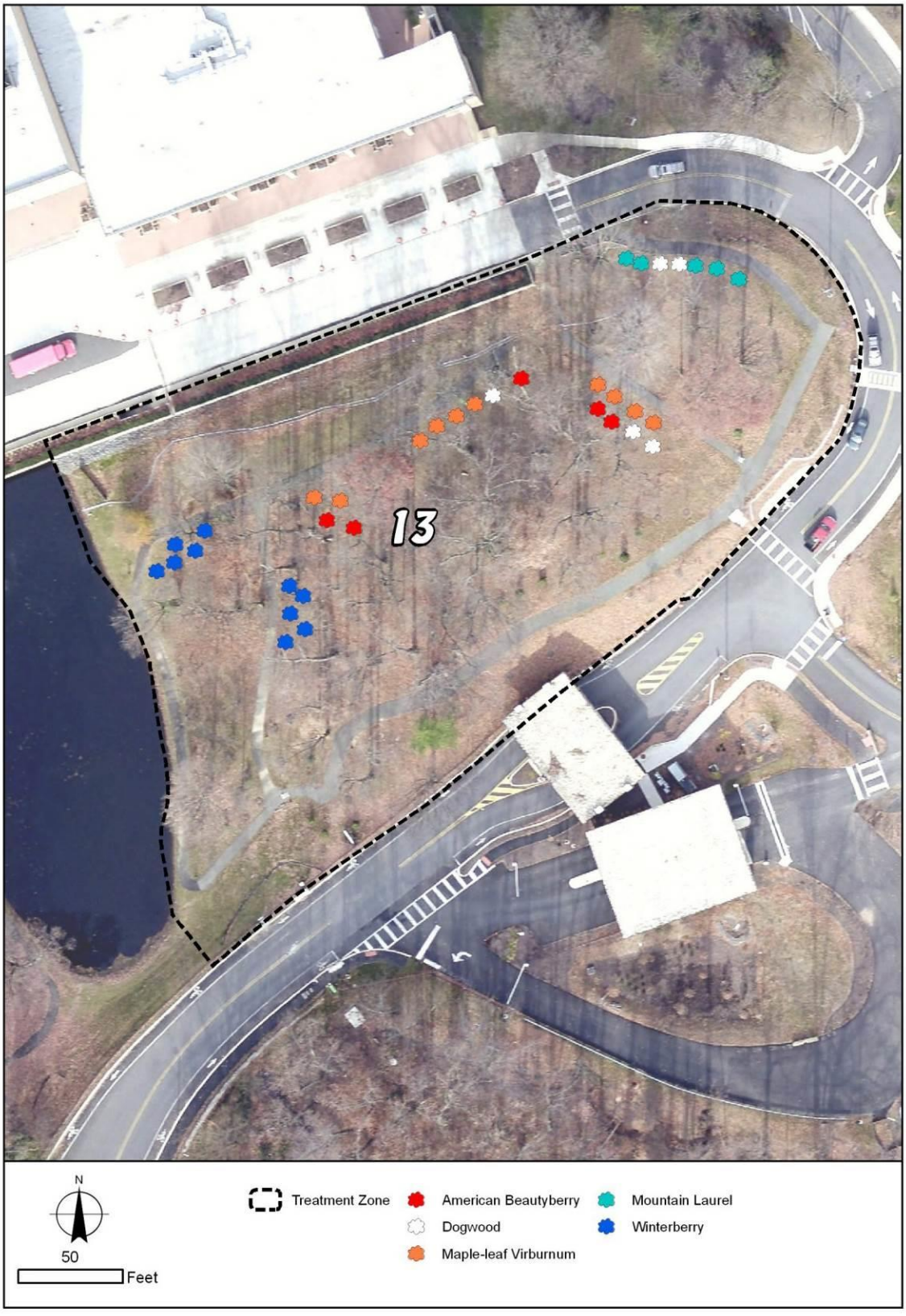
Implementation Schedule: FY19 - FY21

Cost Estimate: $11,000 to 17,000 yr 1

$2,500 yr 2

$2,000 yr 3

Zone 13. Treatment Area



Zone 13. Planting Diagram

Zone 14 **PRIORITY: LOW**

Porcelainberry and bittersweet vines were cut and treated in 2010 -2012 and appeared to be greater than 95 percent controlled during a site assessment. Some tree planting and landscaping have been conducted in this area as part of the BRAC action.

Future monitoring and spot treatments for porcelainberry and Oriental bittersweet is the highest priority at this site. However, the adjacent county park property where these species are not controlled, will act as a constant seed source for these materials. Treating wineberry, privet, princess tree, and tree of heaven, white mulberry English ivy, bush honeysuckle, and winter creeper is a secondary recommended action for Zone 14. Ivy species, which generally occur as ground cover at the base of trees and shrubs should be treated as part of the grounds maintenance contract.

Zone 14. Invasive Plant Treatments

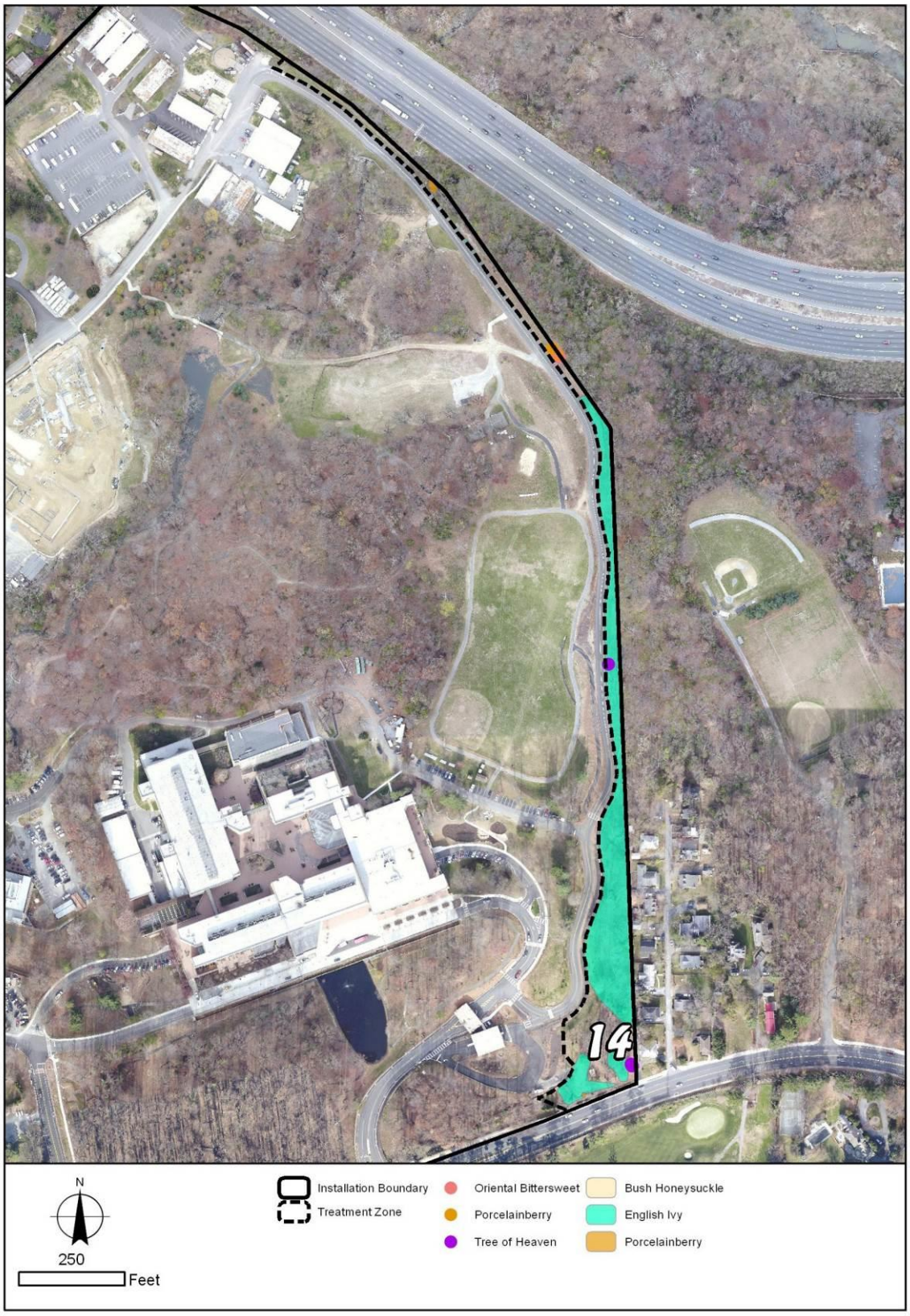
Common Name	Count	Acres	Cover Class	Recommended Treatment
Bush Honeysuckle	-	2.0	2	Foliar application
English Ivy, Periwinkle, Winter Creeper	-	2.5	2	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Japanese Maple	4-5	-	-	Basal bark treatment
Oriental Bittersweet	-	0.02	2	Monitor, spot treat with foliar application
Porcelainberry	-	0.02	2	Monitor, spot treat with foliar application
Princess Tree	1-2	-	-	Monitor, spot treat with foliar application
Tree of Heaven	6-7	-	-	Monitor, spot treat with foliar application
White Mulberry	2-3	-	-	Monitor, spot treat with foliar application
Wineberry	3-5	-	-	Foliar application
Total	**21-32**	**3.0**		

Implementation Schedule: FY18 – FY20

Cost Estimate: $5,500 yr 1

$3,000 yr 2

$2,500 yr 3



Zone 14. Treatment Area

Zone 15 **PRIORITY: LOW**

Major changes have occurred in Zone 15 that have removed much of the lawn and natural area where invasive species occurred. Eradication of the remaining areas of porcelainberry, tree of heaven, barberry, and wineberry is the highest priority recommendation for Zone 15. Reducing the cover of the English ivy, bush honeysuckle, and white mulberry by 90 percent or more is a lower priority recommendation. Because of the large number of honeysuckle shrubs recommended for removal in this area, at least a portion should be replaced with native species. Care must be taken to ensure planted materials will be adequately maintained before removing existing vegetation.

Shrubs such as American beautyberry, mapleleaf viburnum, winterberry, and blackhaw viburnum may be planted in group arrangements under the existing trees. Additional specimen trees such as flowering dogwood, American holly (*Ilex opaca*), and sassafras (*Sassafras albidum*) are also recommended. As with other maintained portion of the installation, it is recommended that the treatment and control of the invasive species that occur in this area be required under the installation grounds maintenance contract to protect ornamental vegetation.

Zone 15. Invasive Plant Treatments

Common Name	Count	Acres	Cover Class	Recommended Treatment
Barberry	1-2	-	-	Foliar application
Bush Honeysuckle	-	0.3	3	Cut-stump treatment, chip in place
English Ivy	-	0.03	2	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Porcelainberry	-	0.05	4	Cut vines from trees and shrubs; apply herbicide solution to cut vines and remaining foliage
Tree of Heaven	9-10	-	-	Basal bark treatment
White Mulberry	40	-	-	Cut-stump treatment, chip in place
Wineberry	-	0.03	2	Foliar application
Total	**101**	**4.0**		

Zone 15. Planting Recommendations

Common Name	Scientific Name	Count	Size	Unit Cost	Total Cost
Mapleleaf viburnum	*Viburnum acerifolium*	5	1 gal	$8.50	$42.50
Blackhaw viburnum	*Viburnum prunifolium*	5	1 gal	$12.50	$62.50
Flowering dogwood	*Cornus florida*	2	1” cal	$27.50	$55.00
Winterberry holly*	*Ilex verticillata*	5	1 gal	$7.00	$35.00
American beautyberry	*Callicarpa americana*	5	1 gal	$12.50	$62.50
American holly	*Ilex opaca*	2	1” cal	$30.00	$60.00
Sassafras	*Sassafras albidum*	2	1” cal	$30.00	$60.00
Soil amendments		1	25 lb	$20.00	$20.00
Mulch		1	sq yd	$20.00	$20.00
Treegators		26		$20.00	$520.00
Total					**$937.50**

* needs 1 male/10 females for fertilization

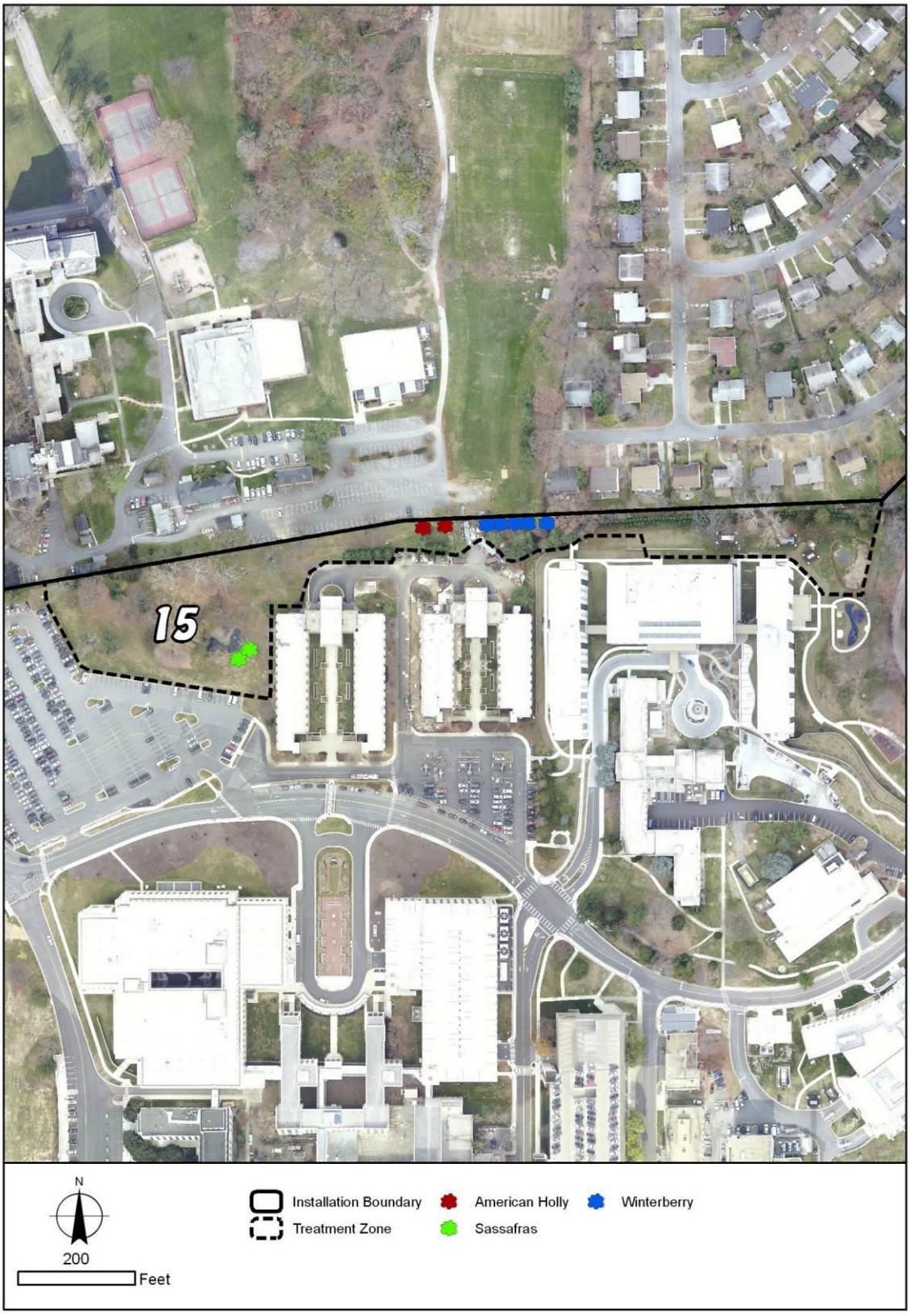
Implementation Schedule: FY18 – FY20

Cost Estimate: $12,000 yr 1

$3,500 yr 2

$3,000 yr 3

Zone 15. Treatment Area



Zone 15. Planting Diagram

INVASIVE SPECIES EDUCATION **PRIORITY: MEDIUM**

Project Title

Invasive Species Outreach, Volunteer Coordination

Goal

Increase public awareness of invasive species issues and the benefits of native plants.

Objective

Oversee or participate in one or more public awareness events annually.

Background/Justification

NSA Bethesda is unique in the level of involvement friends and families of injured service members and other concerned parties have in base events and development. Memorial plantings and other types of donations benefit the overall beauty and landscape value off the installation. Therefore, it is important to increase awareness among staff, residents, and visitors on invasive species issues and the benefits of native plants through various venues.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act, EO 13112 - Invasive Species, EO 13508 - Chesapeake Bay Protection and Restoration, Federal Noxious Weed Act, and Navy policy on invasive species management.

Project Description

Coordinate and oversee volunteer activities during annual Earth Day, National Public Lands Day, and National Pollinator Week events. Promote event activities through various on-base media outlets such as the *Administrative Musings*, *The Journal,* and the *Plan of the Day*. Promotional material can be obtained from the Navy Energy, Environment, and Climate Change website (http://greenfleet.dodlive.mil/ENVIRONMENT/EARTH-DAY/) and National Environmental Education Foundation website (http://www.publiclandsday.org/about).

Necessary materials must be provided to facilitate volunteer participation in invasive plant removal and native species planting in accordance with site restoration plans.

Materials needed include:

- Clear plastic garbage bags
- Gloves
- Clippers
- Shovels
- Trowels
- Tee-shirts
- Snacks
- Drinks

Pre-registration is useful in calculating the amount of materials and staff will be required to oversee each project. The natural resources media manager must also ensure target species are marked by flagging or painting prior to each event and removal of bagged weeds and garbage following the event. Providing snacks and drinks and participation tee-shirts would be well regarded by volunteers. Tee-shirts could include the event name and installation, but should not specify the year to allow for future use of leftovers. Recycling containers should be made available for drink cans and bottles.

Regulatory Drivers

Sikes Act, EO 13112 - Invasive Species, EO 13508 - Chesapeake Bay Protection and Restoration, Federal Noxious Weed Act, Chesapeake Bay Preservation Act, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**Biannual**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$2,500 - $3,500 per event**

INVASIVE SPECIES EDUCATION **PRIORITY: MEDIUM**

Project Title

Invasive Species Education, Invasive Plant Brochure

Goal

Control, reduce, or eliminate invasive plant populations to the greatest extent practicable.

Objective

Increase public awareness of invasive species issues and the benefits of native plants.

Background/Justification

NSA Bethesda is unique in the level of involvement friends and families of injured service members and other concerned parties have in base events and development. Memorial plantings and other types of donations benefit the overall beauty and landscape value off the installation. Therefore, it is important to increase awareness among staff, residents, and visitors on invasive species issues and the benefits of native plants through various venues.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act, EO 13112 - Invasive Species, EO 13508 - Chesapeake Bay Protection and Restoration, Federal Noxious Weed Act, and Navy policy on invasive species management.

Project Description

Develop and distribute informational brochures that relay information regarding invasive plant species at NSA Bethesda and what steps the installation is taking to control them. Several hundred brochures should be printed and distributed at public events such as earth Day and National Public Lands Day.

Regulatory Drivers

Sikes Act, EO 13112 - Invasive Species, EO 13508 - Chesapeake Bay Protection and Restoration, Federal Noxious Weed Act, Chesapeake Bay Preservation Act, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY16**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$9,500**

FISH AND WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Baseline Invertebrate Survey

Goal

Conserve and promote the conservation of fish and wildlife and their habitats.

Objective

Obtain baseline data and current population data for invertebrate wildlife occurring at the installation.

Background/Justification

The Sikes Act, 32 CFR190 - DoD Natural Resources Management Program, and Navy policy require current inventories on Navy-managed lands. No odonate, lepidopteron, or other invertebrate surveys have been conducted at NSA Bethesda to-date. This is particularly important to add to obtain baseline data for native pollinators present at NSA Bethesda.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management including management of federally listed species of concern.

Project Description

Conduct baseline surveys for odonates, lepidoptera, spiders, and other terrestrial invertebrates with potential to occur at NSA Bethesda in order to assess the occurrence of wildlife species utilizing the installation.

It is critical to develop written protocols, GPS-locate survey points, and create a digital database for each survey so that future monitoring will accurately reflect baseline survey efforts. County rare species list should be reviewed prior to conducting the survey and survey efforts should focus on any potentially suitable rare species habitat.

Regulatory Drivers

Sikes Act, ESA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY15**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$33,200**

FISH AND WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Small Mammal Survey Updates

Goal

Conserve and promote the conservation of fish and wildlife and their habitats.

Objective

Assess the occurrence of small mammal wildlife populations utilizing the installation to better manage for all wildlife species.

Background/Justification

The Sikes Act, 32 CFR190 - DoD Natural Resources Management Program, and Navy policy require current inventories on Navy-managed lands. Small mammals were conducted in 1999, nearly 15 years ago, at NSA Bethesda. A comprehensive survey update is needed to determine if additional species have migrated onto the base or if species may be extirpated from the base. Movement of small mammal species to NSA Bethesda is a probable due to development of habitat in the surrounding area and availability of habitat at the installation.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management including management of federally listed species of concern and may result in a negative annual review by the MDNR and USFWS and annual metrics report to Congress.

Project Description

Conduct survey updates for small mammals with potential to occur at NSA Bethesda in order to assess the occurrence of wildlife species utilizing the installation. The proposed small mammal survey is an update to the faunal survey conducted in 1999 at to document wildlife species that inhabit NSA Bethesda. The 1999 survey was conducted over a 13-day period and consisted of trapping and observations during the winter, spring, and summer. Live traps and pitfalls were set and monitored for one to two nights to sample small mammals. In addition, on every visit direct observation of large mammal species, their tracks and feces were recorded. No record of the number or location of traps is available.

It is critical to develop written protocols, GPS-locate survey points, and create a digital database for each survey so that future monitoring will accurately reflect baseline survey efforts. County rare species list should be reviewed prior to conducting the survey and survey efforts should focus on any potentially suitable rare species habitat.

Regulatory Drivers

Sikes Act, ESA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY16**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$28,500**

FISH AND WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Herpetofaunal Survey Updates

Goal

Conserve and promote the conservation of fish and wildlife and their habitats.

Objective

Assess the occurrence and current population data for herpetofaunal species occurring at the installation.

Background/Justification

The Sikes Act, 32 CFR190 - DoD Natural Resources Management Program, and Navy policy require current inventories on Navy-managed lands. Herpetofaunal surveys were conducted in 1999, nearly 15 years ago, at NSA Bethesda. A comprehensive survey update is needed to determine if additional species have migrated onto the base or if species may be extirpated from the base. Movement of herpetofaunal species to NSA Bethesda is a probable due to development of habitat in the surrounding area and availability of habitat at the installation.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management including management of federally listed species of concern.

Project Description

Conduct survey updates for herpetofauna with potential to occur at NSA Bethesda in order to assess the occurrence of wildlife species utilizing the installation. The 1999 survey involved 13 days of trapping and observations during the winter, spring and summer. Amphibians and reptiles were sampled by turning over rocks and logs during the day and frogs were identified at night by their calls. Still and slow moving bodies of water were searched for breeding amphibians in March with no success.

It is critical to develop written protocols; GPS-locate survey points, and create a digital database for each survey so that future monitoring will accurately reflect baseline survey efforts. County rare species list should be reviewed prior to conducting the survey and survey efforts should focus on any potentially suitable rare species habitat.

Regulatory Drivers

Sikes Act, ESA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY16**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$28,300**

FISH AND WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Bat Survey Updates

Goal

Conserve and promote the conservation of fish and wildlife and their habitats.

Objective

Obtain baseline data and current population data for bat species occurring at the installation.

Background/Justification

The Sikes Act, 32 CFR190 - DoD Natural Resources Management Program, and Navy policy require current inventories on Navy-managed lands. Bat surveys were conducted in 1999, nearly 15 years ago, at NSA Bethesda. Bat populations have been decimated in recent years by white-nose syndrome and the USFWS is evaluating the need to list additional species under the ESA. One rare bat species known to occur in Montgomery County, Eastern Small-footed Bat *(Myotis leibii*) is one species currently under review by the USFWS that has potential to occur at NSA Bethesda.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management including management of federally listed species of concern.

Project Description

Conduct survey updates for bats with potential to occur at NSA Bethesda in order to assess the occurrence of wildlife species utilizing the installation. The 1999 survey involved 13 days of trapping and observations during the winter, spring and summer. Mist nets were operated for two to three hours after dusk on two summer nights to sample bats. No record of the number or location of the mist nets is available.

It is critical to develop written protocols; GPS-locate survey points, and create a digital database for each survey so that future monitoring will accurately reflect baseline survey efforts. Survey methods should include Anabat recording analysis and mist netting if the Anabat analysis warranted further biological data collection.

Regulatory Drivers

Sikes Act, ESA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY16**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$41,000**

FISH AND WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Deer Population Survey

Goal

Balance wildlife population levels with biological and cultural carrying capacity.

Objective

Obtain an accurate count of the deer population that resides at NSA Bethesda.

Background/Justification

High deer densities lead to poor deer herd health, destruction of forest habitat as well as damage or destruction of landscape plantings. NSA Bethesda has approximately 80 acres, or about 0.125 square mile of suitable habitat for deer. Incidental field observations of deer conducted in 2007 and 2008 indicate as many as 9 to 10 deer reside at NSA Bethesda equaling up to 80 deer per square mile. Carrying capacity varies for habitat type and quality and though no habitat studies have been conducted at NSA Bethesda, the adjacent Rock Creek Park has identified a desired deer density goal of 15 – 20 deer per square mile in order to allow for natural forest regeneration and reduce impacts to cultural resources. The entire perimeter of NSA Bethesda is fenced, however, it is unclear at this time if the installation's deer population is static and a multi-year study is required to determine the total population size.

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 could cause a health and safety issue for installation employees.

Project Description

Conduct white-tailed deer population survey to determine population numbers, areas used, and impacts to the natural resources at NSA Bethesda. Camera surveys are recommended for estimating deer abundance. It is critical to develop written protocols, GPS-locate survey points, and create a digital database for each survey so that future monitoring will accurately reflect baseline survey efforts.

Regulatory Drivers

Sikes Act, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D -- Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY15**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$40,000**

NUISANCE WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Deer Population Management

Goal

Balance wildlife population levels with biological and cultural carrying capacity.

Objective

Maintain deer populations with biological and cultural carrying capacity at NSA Bethesda.

Background/Justification

High deer densities lead to poor deer herd health, destruction of forest habitat as well as damage or destruction of landscape plants. NSA Bethesda has approximately 80 acres, or about 0.125 square mile of suitable habitat for deer. Incidental field observations of deer conducted in 2007 and 2008 indicate 10 or more deer reside at NSA Bethesda equaling at least 80 deer per sq mile. Carrying capacity varies for habitat type and quality and though no habitat studies have been conducted at NSA Bethesda, the adjacent Rock Creek Park has identified a desired deer density goal of 15 – 20 deer per sq mile in order to allow for natural forest regeneration and reduce impacts to vegetation. Once accurate population estimates have been established, NSA Bethesda may need to implement population control measures.

Impact to Mission

Failure to implement this project would result in the continued overpopulation of deer and degradation of forest habitat as well as damage of landscape plantings and potential increase of deer-vehicle collisions. Additionally, deer disease could cause a health and safety issue for installation employees.

Project Description

A two-step approach involving lethal and non-lethal methods is recommended. Target reduction levels should be set depending on the results of the deer population study. To reach the targeted herd size, NSA Bethesda should consider participating in the Interagency Agreement between the USDA APHIS-WS and other regional Navy bases that have implemented sharpshooting programs. An initial desired deer density goal of 4 – 6 deer (30 – 50 deer per square mile) within two years is recommended as this will allow for habitat recovery as well as maintaining a viable population of deer at NSA Bethesda. A deer contraception program could then be implemented to maintain the desired number of deer.

Regulatory Drivers

Sikes Act, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY16**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$TBD**

NUISANCE WILDLIFE MANAGEMENT **PRIORITY: HIGH**

Project Title

Resident Canada Goose Control

Goal

Balance wildlife population levels with biological and cultural carrying capacity.

Objective

Maintain resident goose populations within cultural carrying capacity.

Background/Justification

Impact to Mission

Goose populations must be controlled to reduce the potential to spread disease through droppings, reduce competition for food/nesting habitat with native waterfowl and control browsing of native vegetation. The NSA Bethesda INRMP provides guidelines for controlling resident goose populations. Currently goose populations at specific areas of the base are high enough to cause significant fouling of sidewalks, grassy areas, run off into the waterways surrounding the installation, and are a potential vector for disease as feces are carried into the hospital on people's shoes.

Project Description

Continue to coordinate with APHIS-WS to remove resident Canada geese when populations exceed cultural carrying capacity and are deemed a nuisance by the installation natural resources manager.

Regulatory Drivers

Sikes Act; MBTA

Implementation Schedule:	**Annual**
Priority:	**ERL 4, Navy Level 1**
Funding Sources:	**O&MN**
Cost Estimate:	**$12,000 annually**

MIGRATORY BIRD MANAGEMENT **PRIORITY: MEDIUM**

Project Title

Migratory Bird Survey

Goal

Conserve and promote the conservation of fish and wildlife and their habitats.

Objective

Maintain current data on migratory bird presence and usage at NSA Bethesda to better understand impacts of habitat enhancement and other management efforts.

Background/Justification

Comprehensive bird surveys were conducted in 2007 and 2008. A 10-year update conducted in 2017-2018 would provide additional data on birds frequenting the installation and the potential impacts of land use changes under BRAC.

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 NSA Bethesda in noncompliance with the MBTA and Sikes Act.

Project Description

Conduct seasonal bird surveys to determine use by migrating, breeding, and wintering birds in each habitat type present at NSA Bethesda. Migratory bird surveys should be conducted in mid to late April; breeding bird surveys in late June, and winter surveys in December or January. The survey route and protocol outlined in the *Biological Surveys and Management Plan, National Naval Medical Center* (U.S. Navy 2009a) should be used.

Regulatory Drivers

Sikes Act, MBTA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**FY18**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$25,800**

MIGRATORY BIRD MANAGEMENT **PRIORITY: LOW**

Project Title

Habitat Enhancement for Cavity Nesters

Goal

Maintain and enhance habitat for resident and migratory bird species.

Objective

Enhance nesting habitat for migratory birds in a limited area at NSA Bethesda.

Background/Justification

Appropriate habitat for nesting and brooding has declined for many bird species world-wide. Nesting habitat can be created or enhanced for a number of cavity nesting species; including eastern bluebirds, house wrens, Carolina wrens, chickadees, tufted titmouse, purple martins, and others by the use of artificial nest boxes/hotels. Suitable foraging habitat for many species is abundant at NSA Bethesda, however, because little nesting habitat is available, implementing a nest box program could benefit several of these species.

Project Description

Building and installing nest boxes is a popular activity for community members and conservation organizations and volunteer support may be available from the NSA Bethesda community. Mapping nest box locations using global position systems (GPS) technology is important to relocating bird boxes for future monitoring and maintenance. All nest boxes must be placed in areas away from the helipad to avoid increasing BASH potential. Install bluebird nest boxes in appropriate habitat in accordance with guidelines as provided by the North American Bluebird Society (http://www.nabluebirdsociety.org/Main/tbt.htm); the Purple Martin Conservation Association (PMCA) (http://www.purplemartin.org/), or the Cornel Lab of Ornithology (http://www.birds.cornell.edu/nestinginfo/nestboxref/placement).

Regulatory Drivers

Sikes Act, MBTA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule: **2017**

Priority: **ERL 3, Navy Level 2**

Funding Sources: **O&MN**

Cost Estimate: **$4,500 for material and set up during first year**

WILDLIFE EDUCATION AND OUTREACH **PRIORITY: MEDIUM**

Project Title

Produce and distribute wildlife education materials

Goal

Balance wildlife population levels with biological and cultural carrying capacities.

Objective

Increase public awareness of various wildlife management issues on an as needed basis.

Background/Justification

Promoting and distributing educational outreach materials on issues such as the impacts such as the impact free-roaming cats have on native small mammal and bird species, refraining from feeding geese, cats, and other nuisance species, and the benefits of bird nest boxes would support wildlife management goals at the base. If feeding geese and other waterfowl becomes an issue at NSA Bethesda, signs such as"Keep the Wild in Wildlife – Don't Feed the Geese" could be posted at the ponds and picnic areas.

Project Description

Produce and distribute educational materials on feral pets, Canada geese, and bird nest boxes.

Regulatory Drivers

Sikes Act, MBTA, 32 CFR 190 - Natural Resources Management Program, DoDI 4715.03 - Environmental Conservation Program, OPNAVINST 5090.1D - Environmental Readiness Program; OPNAV M-5090.1 - Environmental Readiness Program Manual

Implementation Schedule:	**annual or as needed**
Priority:	**ERL 3, Navy Level 2**
Funding Sources:	**O&MN**
Cost Estimate:	**$2,000 for materials annually**

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APPENDIX 16

Project List and Implementation Schedule

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Project List and Implementation Schedule

EPR #	Project Title	Implementation Schedule (FY)	Prime Legal Driver / Initiative	ERL / Navy Level	Cost Estimate ($)	Fund Sources	Priority	FY15 Cost Estimate ($)	FY16 Cost Estimate ($)	FY17 Cost Estimate ($)	FY18 Cost Estimate ($)	FY19 Cost Estimate ($)	FY20 Cost Estimate ($)
	Forest Management												
	Forest Health Monitoring	Annual	32 CFR 190 OPNAVIST 5090.1D	ERL3 / Navy Level 3	3,000 annually	O&MN	H	3,000	3,000	3,000	3,000	3,000	3,000
	Deer Exclosures	FY15	32 CFR 190 OPNAVIST 5090.1D	ERL2 / Navy Level 5	6,000	O&MN	M	12,000					
	Vegetation Management												
	Replacement of Landscaped Trees and Vegetation	Annual	32 CFR 190 OPNAVIST 5090.1D	ERL2 / Navy Level 5	5,000 annually	O&MN	M	5,000	5,000	5,000	5,000	5,000	5,000
	Wetlands Management												
	Base-wide Wetland Delineation & Jurisdictional Determination	FY15	CWA, EO 11990, EO 13508	ERL4 / Navy Level 1	36,000	O&MN	H	36,000					
	Shallow Water Habitat Maintenance and Enhancement	Annual	CWA, EO 11990, EO 13509	ERL3 / Navy Level 2	1,200 annually	O&MN	L	1,200	1,200	1,200	1,200	1,200	1,200
	Soil and Water Management												
	University Pond Shoreline Enhancement	FY18	CWA, EO 11990, EO 13510	ERL3 / Navy Level 3	15,500	O&MN	L				15,500		
	Stoney Creek Stream Bank Enhancement	FY19	CWA, EO 11990, EO 13510	ERL3 / Navy Level 3	4 million	O&MN	L					4,000,000	
	Lake Eleanor Shoreline Enhancement	FY17	CWA, EO 11990, EO 13510	ERL3 / Navy Level 3	12,700	O&MN	L			12,700			
	Lake Eleanor Aeration System	FY17	CWA, EO 11990, EO 13510	ERL3 / Navy Level 2	6,000	O&MN	L			6,000			
	Installation Assessment for Soil Erosion Restoration Sites	FY18-FY19	CWA, EO 11990, EO 13510	ERL3 / Navy Level 2	15,600	O&MN	H				15,600		
	Invasive Species Management												
	Invasive Plant Species Control & Restoration Zone 1	FY19 - FY21	EO 13112; Sikes Act	ERL4 / Navy Level 1	17,000 (Yr-1) 4,000 (Yr-2) 3,000 (Yr-3)	O&MN; Ches. Bay Program	L					17,000	4,000
	Invasive Plant Species Control & Restoration Zone 2	FY15 - FY17	EO 13112; Sikes Act	ERL4 / Navy Level 1	16,000 (Yr-1) 8,000 (Yr-2) 5,000 (Yr-3)	O&MN; Ches. Bay Program	H	16,000	8,000	5,000			

Project List and Implementation Schedule (Cont'd)

EPR #	Project Title	Implementation Schedule (FY)	Prime Legal Driver / Initiative	ERL / Navy Level	Cost Estimate ($)	Fund Sources	Priority	FY15 Cost Estimate ($)	FY16 Cost Estimate ($)	FY17 Cost Estimate ($)	FY18 Cost Estimate ($)	FY19 Cost Estimate ($)	FY20 Cost Estimate ($)
	Invasive Plant Species Control & Restoration Zone 4	FY17 - FY19	EO 13112; Sikes Act	ERL4 / Navy Level 1	16,000 (Yr-1) 4,000 (Yr-2) 3,500 (Yr-3)	O&MN; Ches. Bay Program	M			21,000	4,000	3,000	
	Invasive Plant Species Control & Restoration Zone 5	FY19 - FY21	EO 13112; Sikes Act	ERL4 / Navy Level 1	21,000 (Yr-1) 4,000 (Yr-2) 3,000 (Yr-3)	O&MN; Ches. Bay Program	L					9,000	3,000
	Invasive Plant Species Control & Restoration Zone 6	FY16 - FY18	EO 13112; Sikes Act	ERL4 / Navy Level 1	9,000 (Yr-1) 3,000 (Yr-2) 2,500 (Yr-3)	O&MN; Ches. Bay Program	H		8,800	4,500	3,000		
	Invasive Plant Species Control & Restoration Zone 7	FY15 - FY17	EO 13112; Sikes Act	ERL4 / Navy Level 1	8,800 (Yr-1) 4,500 (Yr-2) 3,000 (Yr-3)	O&MN; Ches. Bay Program	H	9,500	4,500	3,500			
	Invasive Plant Species Control & Restoration Zone 8	FY16 - FY18	EO 13112; Sikes Act	ERL4 / Navy Level 1	4,500 (Yr-1) 3,500 (Yr-2) 2,500 (Yr-3)	O&MN; Ches. Bay Program	H		3,500	2,500	2,300		
	Invasive Plant Species Control & Restoration Zone 9	FY17 - FY19	EO 13112; Sikes Act	ERL4 / Navy Level 1	3,500 (Yr-1) 2,500 (Yr-2) 2,300 (Yr-3)	O&MN; Ches. Bay Program	M			19,000	4,500	3,000	
	Invasive Plant Species Control & Restoration Zone 10	FY19 - FY21	EO 13112; Sikes Act	ERL4 / Navy Level 1	19,000 (Yr-1) 4,500 (Yr-2) 3,000 (Yr-3)	O&MN; Ches. Bay Program	M					12,000	3,000
	Invasive Plant Species Control & Restoration Zone 11	FY18 - FY20	EO 13112; Sikes Act	ERL4 / Navy Level 1	12,000 (Yr-1) 3,000 (Yr-2) 2,500 (Yr-3)	O&MN; Ches. Bay Program	L				17,500	2,500	2,000
	Invasive Plant Species Control & Restoration Zone 12	FY19 - FY21	EO 13112; Sikes Act	ERL4 / Navy Level 1	17,500 (Yr-1) 2,500 (Yr-2) 2,000 (Yr-3)	O&MN; Ches. Bay Program	L					4,000	2,500
	Invasive Plant Species Control & Restoration Zone 13	FY19 - FY21	EO 13112; Sikes Act	ERL4 / Navy Level 1	4,000 (Yr-1) 2,500 (Yr-2) 2,000 (Yr-3)	O&MN; Ches. Bay Program	L					17,000	2,500
	Invasive Plant Species Control & Restoration Zone 14	FY18 - FY20	EO 13112; Sikes Act	ERL4 / Navy Level 1	5,500 (Yr-1) 3,000 (Yr-2) 2,500 (Yr-3)	O&MN; Ches. Bay Program	L				5,500	3,000	2,500
	Invasive Plant Species Control & Restoration Zone 15	FY18 - FY20	EO 13112; Sikes Act	ERL4 / Navy Level 1	12,000 (Yr-1) 3,500 (Yr-2) 3,000 (Yr-3)	O&MN; Ches. Bay Program	L				12,000	3,500	3,000
	Invasive Species Outreach												
	Invasive Species Outreach, Volunteer Coordination	Biannual	EO 13112; Sikes Act	ERL3 / Navy Level 2	4,000 - 6,000 annually	O&MN	M	5,000	5,000	5,000	5,000	5,000	5,000
	Invasive Plant Brochure	FY16	EO 13112; Sikes Act	ERL3 / Navy Level 2	9,500	O&MN	M		9,500				

Project List and Implementation Schedule (Cont'd)

EPR #	Project Title	Implementation Schedule (FY)	Prime Legal Driver / Initiative	ERL / Navy Level	Cost Estimate ($)	Fund Sources	Priority	FY15 Cost Estimate ($)	FY16 Cost Estimate ($)	FY17 Cost Estimate ($)	FY18 Cost Estimate ($)	FY19 Cost Estimate ($)	FY20 Cost Estimate ($)
	Fish and Wildlife Management												
	Baseline Invertebrate Survey	FY15	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	33,200	O&MN	H	33,200					
	Small Mammal Survey Update	FY16	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	28,500	O&MN	H		28,500				
	Herpetofaunal Survey Updates	FY15	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	28,300	O&MN	H		28,300				
	Bat Survey Updates	FY15	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	41,000	O&MN	H		41,000				
	Deer Population Study	FY15	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	40,000	O&MN	H	40,000					
	Migratory Bird Management												
	Habitat Enhancement For Cavity Nesters	FY17	MBTA; Sikes Act	ERL3 / Navy Level 2	4,000	O&MN	L			4,500			
	Bird Survey Update	FY18	MBTA; Sikes Act	ERL3 / Navy Level 3	25,800	O&MN	M				25,800		
	Nuisance Wildlife Management												
	Deer Population Management	FY16 - FY17	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	TBD	O&MN	H	TBD					
	Resident Canada Goose Control	Annual	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	12,000 annually	O&MN	H	12,000	12,000	12,000	12,000	12,000	12,000
	Wildlife Outreach												
	Outreach materials	Annual	Sikes Act, 32 CFR 190, OPNAVIST 5090.1D	ERL4 / Navy Level 1	2,000 annually	O&MN	M	2,000	2,000	2,000	2,000	2,000	2,00
	Annual Cost Summary							**$190,900**	**164,300**	**$110,400**	**$133,900**	**$4,112,900**	**$50,700**

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APPENDIX 17

Research Requirements List

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APPENDIX 18

List of Native Plants for Landscaping and Site Restoration

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Deer Resistant Plants for Landscaping

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Native Plants for Landscaping and Site Reclamation

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Forbs/Herbs									
Swamp milkweed	*Asclepias incarnata*	1'-2'			√		√	√	riparian buffer, pollinator
Common milkweed	*Asclepias syriaca*	1'-2'		√	√		√	√	reclamation, pollinator
Butterfly weed	*Asclepias tuberosa*	1'-3'	√					√	reclamation, pollinator
Threadleaf coreopsis	*Coreopsis verticillata*	1'-2'	√				√	√	reclamation, pollinator
Boneset	*Eupatorium* spp.	1'-4'	√	√	√		√	√	reclamation, pollinator
Sunflower	*Helianthus* spp.	1'-2'	√	√			√	√	reclamation, pollinator
Blue flag	*Iris versicolor*	2'-3'			√		√	√	riparian buffer, pollinator
Round-head bushclover	*Lespedeza capitata*	2'-4'	√					√	reclamation, pollinator
Wand-like bushclover	*Lespedeza intermedia*	1'-3'	√	√			√	√	reclamation, pollinator
Cardinal flower	*Lobelia cardinalis*	1'-2'		√	√		√	√	riparian buffer, pollinator
Wild bergamot	*Monarda fistulosa*	1'-3'	√					√	reclamation, pollinator
Arrowhead, big-leaved	*Sagittaria latifolia*	1'-4'			√		√	√	riparian buffer, pollinator
Goldenrod	*Solidago* spp.	2'-6'	√	√	√		√	√	reclamation, pollinator
New York aster	*Symphyotrichum novi-belgii*	1'-4'		√	√		√	√	reclamation, pollinator
Late purple aster	*Symphyotrichum patens*	1'-4'	√	√			√	√	reclamation, pollinator
Goat's rue	*Tephrosia virginiana*	1'-2'	√	√				√	reclamation, pollinator
Grasses/Grass like									
Bushy broomsedge	*Andropogon glomeratus*	1'-5'		√	√		√	√	native warm-season grassland
Broomsedge	*Andropogon virginicus*	1'-3'	√	√			√	√	native warm-season grassland
Side-oats grama	*Bouteloua curtipendula*	3'-5'		√			√		native warm-season grassland
Fringed sedge	*Carex crinita*	1'-3'		√	√		√	√	riparian buffer
Shallow sedge	*Carex lurida*	1'-3'			√	√	√		riparian buffer
Tussock sedge	*Carex stricta*	1'-3'		√	√	√	√		riparian buffer
Soft rush	*Juncus effusus*	1'-2'		√	√		√	√	riparian buffer
Switchgrass	*Panicum virgatum*	3'-5'	√	√	√		√	√	native warm-season grassland

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Little bluestem	*Schizachyrium scoparium*	2'-3'	√	√			√	√	native warm-season grassland
Indian grass	*Sorghastrum nutans*	5'-6'	√	√			√	√	native warm-season grassland
Eastern gamma grass	*Tripsacum dactyloides*	3'-5'	√	√			√	√	native warm-season grassland
Shrubs									
Hazel alder	*Alnus serrulata*	6'-15'		√	√	√	√		riparian buffer
Serviceberry	*Amelanchier canadensis*	5'-15'		√					landscape, wildlife
Chokeberry, red	*Aronia arbutifolia*	3'-10'	√	√	√		√	√	riparian buffer, reclamation
Buttonbush	*Cephalanthus occidentalis*	3'-7'			√	√	√		riparian buffer, pollinator
Sweet pepperbush	*Clethra alnifolia*	3'-8'		√	√	√	√	√	riparian buffer, landscape, pollinator
Dogwood, silky	*Cornus amomum*	6'-10'		√	√		√		riparian buffer
Dogwood, graystem	*Cornus racemosa*	10'-15'	√	√	√	√	√	√	riparian buffer, reclamation
Hazelnut	*Corylus americana*	6'-10'		√	√		√	√	reclamation, wildlife
Inkberry	*Ilex glabrs*	2'-10'		√	√	√	√		riparian buffer, landscape
Winterberry	*Ilex verticillata*	4'-12'		√	√		√	√	riparian buffer, landscape, pollinator
Virginia sweetspire	*Itea virginica*	3'-5'		√	√	√	√	√	riparian buffer, landscape, pollinator
Mountain laurel	*Kalmia latifolia*	3'-10'	√	√		√	√		landscape, pollinator
Spicebush	*Lindera benzoin*	3'-10'		√	√	√	√		landscape, pollinator
Wax myrtle	*Morella (Myrica) cerifera*	2'-6'		√	√		√	√	riparian buffer, landscape, pollinator
Swamp azalea	*Rhododendron viscosum*	3'-8'		√	√	√	√		riparian buffer, pollinator
Meadowsweet	*Spiraea latifolia*	2’-5’		√	√	√	√		riparian buffer, landscape
Blueberry, highbush	*Vaccinium corymbosum*	2'-12'		√	√	√	√		riparian buffer, pollinator
Blueberry, lowbush	*Vaccinium pallidum*	1'-2'	√	√		√	√		reclamation, wildlife
Viburnum, arrowwood	*Viburnum dentatum*	4'-8'		√	√		√	√	riparian buffer, landscape, pollinator

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Viburnum, blackhaw	*Viburnum prunifolium*	8'-15'	√	√	√	√	√		landscape, reclamation, pollinator
Small Trees									
Serviceberry	*Amelanchier arboria*	15'-25'		√			√	√	landscape, wildlife, pollinator
Dogwood	*Cornus florida*	20'-30'		√			√	√	landscape, pollinator
Hawthorn	*Crataegus* spp.	10'-20'		√			√	√	landscape, pollinator
Sweetbay magnolia	*Magnolia virginiana*	15'-30'		√	√	√	√		riparian buffer, landscape, pollinator
Sassafras	*Sassafras albidum*	20'-40'		√			√	√	landscape, pollinator
Medium to Large Trees									
Red maple	*Acer rubrum*	50'-80'	√	√	√		√	√	riparian buffer, landscape
River birch	*Betula nigra*	40'-70'		√	√	√	√		riparian buffer, landscape
Hackberry	*Celtis occidentalis*	40'-60'		√	√		√	√	riparian buffer, landscape
Persimmon	*Diospyros virginiana*	30'-40'	√	√			√	√	reclamation, wildlife
Ash, green	*Fraxinus americana*	50'-80'		√	√			√	riparian buffer, landscape
Ash, White	*Fraxinus pennsylvanica*	50'-60'		√	√			√	riparian buffer, landscape
America holly	*Ilex opaca*	40'-50'		√	√		√	√	landscape, wildlife, pollinator
Eastern red cedar	*Juniperus virginiana*	45'-65'	√	√	√		√	√	visual screen
Yellow poplar	*Leriodendron tulipifera*	100'-150'		√			√	√	landscape, pollinator
Red mulberry	*Morus rubra*	30'-40'		√			√	√	wildlife
Blackgum	*Nyssa sylvatica*	50'-70'		√	√		√	√	landscape, pollinator
Pine, shortleaf	*Pinus echinata*	80'-100'	√	√			√	√	reforestation
Pine, loblolly	*Pinus taeda*	80'-100'	√	√	√		√	√	landscape, reforestation
Pine, Virginia	*Pinus virginiana*	30'-50'	√	√			√	√	reclamation
Sycamore	*Platanus occidentalis*	75'-120'		√	√		√	√	riparian buffer, landscape
Oak, white	*Quercus alba*	70'-80'		√			√	√	landscape, reforestation
Oak, southern red	*Quercus falcata*	70'-80'	√	√			√	√	landscape, reforestation
Oak, cherrybark	*Quercus pagodaefolia*	70'-80'		√	√		√	√	landscape, reforestation,

Common Name	***Scientific Name***	**Height**	**Low Moisture**	**Moderate Moisture**	**High Moisture**	**Full Shade**	**Partial Sun**	**Full Sun**	**Suggested Uses**
Oak, pin	*Quercus palustris*	60'-70'		√	√		√	√	riparian buffer, landscape
Oak, willow	*Quercus phellos*	40'-60'	√	√	√		√	√	landscape, riparian buffer,
Oak, chestnut	*Quercus prinus*	65'-80'	√				√	√	reforestation, reclamation
Oak, black	*Quercus velutina*	65'-80'	√	√	√		√	√	landscape, reforestation
Black locust	*Robinia pseudoacacia*	30'-50'	√	√			√	√	reclamation, pollinator
Black willow	*Salix nigra*	30'-50'		√	√	√	√		riparian buffer

Deer-Resistant Plants for Landscaping

Scientific Name	Common Name
Plants Rarely Damaged	
Asimina triloba	Paw paw
Arisaema triphylum	Jack in the pulpit
Betula papyrifera	Paper birch
Betula nigra	River birch
Clethra alnifolia	Sweetpepper bush
Coreopsis verticillata	Threadleaf coreopsis
Dennstaedtia punctilobula	Hayscented fern
Dryopteris marginalis	Wood fern
Ilex opaca	American holly
Iris concolor	Blue flag
Juncus effusus	Soft rush
Lyonia mariana	Piedmont staggerbush
Morella pensylvanica	Bayberry
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Polystichum arcostichoides	Christmas fern
Thelypteris noveboracensis	New York fern
Viburnum dentatum	Arrowwood viburnum
Plants Seldom Severely Damaged	
Amorpha fruticosa	False indigo bush
Asclepias tuberosa	Butterflyweed
Asclepias incarnata	Swamp milkweed
Callicarpa americana	American beautyberry
Calycanthus floridus	Sweetshrub
Cornus florida	Flowering dogwood
Cornus sericea	Red osier dogwood
Crataegus spp	Hawthorn species
Gleditsia triacanthos	Honey locust
llex glabra	Inkberry
Ilex verticillata	Winterberry
Itea virginica	Virginia sweetspire
Kalmia latifolia	Mountain laurel
Leucothoe axillaris	Coastal doghobble
Lindera benzoin	Spicebush
Salix spp	Willow spp.
Sassafras albidum	Sassafras
Viburnum prunifolium	Blackhaw viburnum
Plants Occasionally Severely Damaged	
Acer rubrum	Red maple
Amelanchier ssp	Serviceberry

Scientific Name	**Common Name**
Campsis radicans	Trumpet creeper
Cornus racemosa	Graystem dogwood
Hamamelis virginiana	Common witchhazel
Hydrangea arborescens	Smooth hydrangea
Juniperus virginiana	Eastern red cedar
Pinus strobus	Eastern white pine
Quercus alba	White oak
Quercus prinus	Chestnut oak
Quercus rubra	Northern red oak
Rhododendron spp.	Deciduous azaleas
Viburnum spp	Viburnum spp
Plants Frequently Severely Damaged	
Cercis canadensis	Eastern redbud
Chamaecyparis thyoides	Atlantic white cedar
Chionanthus virginicus	Fringe tree

APPENDIX 19

NEPA Documentation for INRMP

To be inserted as Completed

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