INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FINAL

NAVY INFORMATION OPERATIONS COMMAND

SUGAR GROVE

SUGAR GROVE, WEST VIRGINIA




Prepared by

TETRA TECH

May 2010

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Prepared by

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May 2010

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Integrated Natural Resources Management Plan for
Navy Information Operations Command Sugar Grove

Plan Years
2010–2020

Approving Officials:

Installation Commanding Officer	Date
NAVFAC Midlant Naval Facilities Engineering Command Natural/Cultural Resources Section	Date
Installation Natural Resources Manager	Date

Annual Review	**Date**
_____	_____
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5th Year Review	
_____	_____
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INRMP Review and Revision Process

This Integrated Natural Resources Management Plan (INRMP) covers a 10-year period from 2010–2020. INRMPs should contain the most up-to-date natural resources information, and updates and revisions may be necessary in order to maintain a proactive management plan. In accordance with U.S. Department of Navy (Navy) INRMP Guidance (Navy 2006) this INRMP will be informally reviewed on an annual basis and formally reviewed every five years to evaluate its effectiveness. U.S. Fish and Wildlife Service (USFWS) and state partners are invited to participate in each review of this INRMP. The web-based Metrics Builder tool on the Natural Resources Data Call station website (https://clients.emainc.com/dcs/NR/userlogon.asp) is used to evaluate this INRMP during the review process. Seven areas of performance are evaluated with the Metrics Builder. These are as follows:

1. INRMP Implementation
2. Partnership/Cooperation and Effectiveness
3. Team Adequacy
4. INRMP Impact on the Installation Mission
5. Status of Federally Listed Species and Critical Habitat
6. Ecosystem Integrity
7. Fish and Wildlife Management and Public Use

Annual reviews with USFWS and state partners shall verify that:

1. All Environmental Readiness Level (ERL) 4 projects and activities have been budgeted for and implementation is on schedule.
2. All required trained natural resources positions are filled or are in the process of being filled.
3. 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).
4. All required coordination has occurred.

5. All significant changes to the installation's mission requirements or its natural resources have been identified.

Certain developments may necessitate an INRMP revision. These developments include but are not limited to:

1. A change in mission requirements or intensity of land use.
2. Significant change in natural resource baseline condition. For example, a substantial change in the population of a listed species or a new invasive species.
3. Old INRMP has proven inadequate, was unable to be implemented, or monitoring has shown projects to be ineffective in meeting natural resource management goals.
4. Natural resource management goals have changed or planning horizon of previous INRMP has expired.
5. Base Realignment and Closure (BRAC) actions.

If any of the above developments have taken place or are predicted to take place in the near future, USFWS and state partners should be notified during the review process. In many cases the modifications would not trigger a new National Environmental Policy Act (NEPA) action and the existing Environmental Assessment (EA) will cover the modifications. If a change is determined to be a "significant" difference from the original INRMP, then additional NEPA analysis, such as a new EA or potentially an Environmental Impact Statement (EIS), would be required.

DATE	SECTION/PAGE	COMMENT	REVIEWER

DATE	SECTION/PAGE	COMMENT	REVIEWER

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EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) for Navy Information Operations Command Sugar Grove (NIOC Sugar Grove) emphasizes ecosystem management as the fundamental process for planning actions that affect natural resources. It ensures compliance with:

- Department of Defense (DoD) Instruction (DoDI) 4715.3, Environmental Conservation Program (3 May 1996);
- Operational Navy Instruction (OPNAVINST) 5090. 1C (30 October 2007), Environmental Readiness Program Manual Chapter 24: Natural Resources Management;
- Naval Facility NAVFAC P-73, Natural Resources Management Procedural Manual (Chapter 2: Integrated Natural Resources Management Plans dated 7 December 2005); and
- Sikes Act Improvement Act of 1997 (16 United States Code 670a et seq.).

IMPLEMENTATION

This INRMP will be reviewed annually for necessary updates to ensure that it remains a functional document throughout the 10-year plan period, 2010–2020. Changes and recommendations will be recorded in the INRMP Review and Revision Process section of this document. A major review and update of this INRMP was conducted in 2010, and a formal review will be conducted in 2015 as described in the Plan Updates section of this document.

The following principles and guidelines for ecosystem management shall be the standards for implementation of natural resources management at NIOC Sugar Grove:

- Maintain and improve the sustainability of native biological diversity;
- Use adaptive management to keep management practices current;
- Use ecological units and time frames, not political boundaries and fiscal years;
- Support sustainable human activities as integral parts of ecosystem management;
- Use best scientific information available to make decisions;
- Coordinate activities with all interested agencies and organizations; and,
- Use benchmarks to monitor and evaluate management practices.

Natural resources management is a dynamic field, with diverse issues that require careful and thorough ecosystem management. Training, personal development, and interaction with other

natural resources professionals will ultimately lead to successful program implementation. Mutual agreement on management issues and concerns between NIOC Sugar Grove, West Virginia Division of Natural Resources (WVDNR), U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and other interested parties will help to ensure implementation of sound management practices. In accordance with the Sikes Act, the WVDNR and USFWS have concurred on the fish and wildlife management components of the INRMP (Appendix A). In accordance with the National Environmental Policy Act (NEPA), an environmental assessment has been prepared to evaluate the potential environmental consequences of implementing this INRMP (Appendix D).

MANAGEMENT ISSUES

Nine management issues are identified in this INRMP to help manage natural resources effectively for support of the military mission and to ensure compliance with relevant environmental regulations. Although there are other day-to-day activities that involve the natural resources program, the following are the primary management issues are:

- Stormwater
- Soil erosion and sediment control
- Landscaping and land management
- Invasive Species
- Forestry
- Fish and wildlife
- Protected species
- Outdoor recreation
- Wetlands
- Pest management

MANAGEMENT GOALS AND OBJECTIVES

Overall program goals and project-specific management goals are presented for NIOC Sugar Grove Main Base and the Operations Area. The goal of the INRMP is to implement an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission, integrates and coordinates management activities, provides for sustainable multipurpose use of natural resources, and provides public access for use of natural resources subject to safety and military security considerations. The management objectives are to integrate management of forests, fish and wildlife, land, and

outdoor recreation as practicable and consistent with the military mission and established land uses.

The 10 project-specific management goals identified for the Main Base are the following:

- Implement engineering design solutions for the nine storm water and erosion control problem areas.
- Ensure that proper erosion and sediment control, and storm water management practices are implemented for all development projects.
- Manage urban forest resources for aesthetic and ecological benefits.
- Maintain and enhance forested riparian buffers.
- Protect wetlands and comply with state and federal regulations.
- Monitor and control invasive and exotic plant species.
- Promote wildlife conservation for environmental awareness and appreciation.
- Reconnect hiking trail and display interpretive signs.
- Implement integrated pest management practices.
- Implement feral cat control measures.

The 14 project-specific management goals identified for the Operations Area are the following:

- Develop moist soil management areas for storm water detention ponds.
- Annually monitor effect of seasonal drawdowns, reflooding depths, and dewatering on vegetation response. Continue land application of treated biosolids generated from the Main Base.
- Develop wildlife habitat in the Natural Resources Development Area.
- Update the threatened and endangered species data.
- Continue SBRC preservation, and conduct LFSB survey and monitoring.
- Conduct a forest resources inventory.
- Inspect forested areas for insect and disease control requirements.
- Initiate formal deer harvest reporting.
- Conduct deer browse survey.
- Develop outdoor recreation facilities.
- Implement integrated pest management practices.
- Promote wildlife conservation for environmental awareness and appreciation.

- Protect wetlands and comply with state and federal regulations.
- Monitor and control invasive and exotic plant species.

MANAGEMENT RECOMMENDATIONS SUMMARY

To assist with programming and budgeting priorities, natural resources management recommendations are categorized by funding level classifications (Classes) and environmental readiness levels (ERLs) as described in Section 6.0 of this document.

The total funding requirement to implement project-specific management actions provided for the 10-year INRMP period (2010–2020) is $80,900, and does not include salary or other in-house expenses. Changes in prioritization of projects and changes in funding allocations may affect the schedule outlined in this INRMP.

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ACRONYMS AND ABBREVIATIONS

3-D	3-dimensional
°F	degrees Fahrenheit
ANSI	American National Standards Institute
ATV	all terrain vehicle
BMP	best management practices
BRAC	Base Realignment and Closure
BSA	Boy Scouts of America
CECOS	Civil Engineers Corps Officers School
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNO	Chief of Naval Operations
CNRMA	Commander Navy Region Mid-Atlantic
CWA	Clean Water Act
DENIX	Defense Environmental Network and Information Exchange
DEP	Division of Environmental Protection
DoD	Department of Defense
DoDI	DoD Instruction
DoE	Department of Energy
DWR	Division of Water Resources
EA	Environmental Assessment
EC	Environmental Coordinator
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Program Requirements
ERL	Environmental Readiness Level
ESA	Endangered Species Act
FES	Fire and Emergency Service
FLTCYBERCOM	Fleet Cyber Command
fps	feet per second
GIS	geographic information system
GRC	GeoReadiness Center
HAZMAT	Hazardous Materials
HEP	Habitat Evaluation Procedures
IBP	Institute for Bird Populations
INRMP	Integrated Natural Resources Management Plan
ISA	International Society of Arboriculture
LFSB	Little Fork Shale Barren
LRMP	Legacy Resource Management Program
LRSB	Lick Run Shale Barren
MAPS	Monitoring Avian Productivity and Survivorship
MSL	mean sea level
MWR	Morale, Welfare, and Recreation Department
NAVFAC	Naval Facility
NAVGAS	natural gas

ACRONYMS AND ABBREVIATIONS
(continued)

Navy	U.S. Department of Navy
NEPA	National Environmental Policy Act
NETWARCOM	Naval Network Warfare Command
NGOs	non-governmental organizations
NIOC	Navy Information Operations Command
NIRP	Navy Installation Restoration Program
NMFWA	National Military Fish and Wildlife Association
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSGA	Naval Security Group Activities
NTR	Naval Technical Representative
O&MN	Operations and Maintenance, Navy
OMB	Office of Management and Budget
OPNAVINST	Operational Navy Instruction
ORV	off-road vehicles
PEM1A	palustrine emergent, persistent, temporarily flooded
PEM1C	palustrine emergent, persistent, seasonally flooded
PFO1A	palustrine forested, broad-leaved deciduous, temporarily flooded
PFO1C	seasonally flooded
PUBKx	palustrine unconsolidated bottom, artificially flooded, excavated
QRP	Qualified Recycling Program
R&D	Research and Development
R2UBG	riverine, lower perennial, unconsolidated bottom, intermittently exposed
ROICC	Resident Officer in Charge of Construction
S1	critically imperiled
S2	imperiled
S3	rare
SAF	Society of American Forester
SAIA	Sikes Act Improvement Amendments
SBRC	Shale Barren Rockcress
SCS	Soil Conservation Service
SERDP	Strategic Environmental Research and Development Program (SERDP)
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WVDA	West Virginia Department of Agriculture
WVDEP	West Virginia Division of Environmental Protection
WVDF	West Virginia Division of Forestry
WVDNR	West Virginia Division of Natural Resources
WVNHP	West Virginia Natural Heritage Program

1.0 INTRODUCTION

1.1 Background

Navy Information Operations Command Sugar Grove (NIOC Sugar Grove) is located in Pendleton County, West Virginia, between the towns of Brandywine and Sugar Grove (Figure 1-1). The primary land use in the sparsely populated area is agriculture. NIOC Sugar Grove comprises two sites about 5 miles apart: Main Base (117 acres) and Operations Area (477 acres). The Main Base has 1,126 meters (3,696 feet) of river frontage on the South Fork South Branch of the Potomac River (hereafter called South Fork River) in the valley between Hoover Mountain and the foothills of Shenandoah Mountain. The Main Base is bounded by the South Fork River on the south and west, with State Route 21 and on the east. The Operations Area is bounded by Lick Run on the west and by Wolf Run and Little Fork on the east. The central portion (about 50 percent) of the area was leveled and cleared for development of antenna sites and buildings; the landscape is mostly maintained as planted grasses. The steep side slopes and narrow riparian areas are forested and contain unique natural areas.

South Fork River.

The U.S. Department of Navy (Navy) acquired the Sugar Grove lands in 1955 for the Naval Research Laboratory to conduct advanced electronic communications research. The National Radio Quiet Zone was established in 1958 to protect the area from radio interference and future encroachments. The facility was converted to the Naval Radio Station in 1962 as part of the Naval Communications Area Master Station, Atlantic, headquartered in Norfolk, Virginia. The facility became the Naval Security Group Activity (NSGA) Sugar Grove when it was transferred to Naval Security Group in 1992. On October 1, 2005 the facility name changed to NIOC Sugar Grove and became part of Naval Network Warfare Command (NETWARCOM). On January 1, 2010 NIOC Sugar Grove became part of the newly formed Navy 10th Fleet Cyber Command (FLTCYBERCOM).

NIOC Sugar Grove engages in communications research and development for the Navy, and occasional research in communications phenomena in support of various elements of the U.S. government. Approximately 183 military and 87 civilian personnel work at NIOC Sugar Grove. The Command unclassified Mission Statement for Sugar Grove is:

> *"Congressionally-designated isolated and remote Information Operations command. Performs unique communications R&D to fulfill national, theater and tactical requirements. Satisfies critical information needs for U.S. combatant commanders worldwide."*

NIOC Sugar Grove owns a natural gas (NAVGAS) pipeline that provides energy to the Main Base and extends northward about 26 miles to near Milam, West Virginia. The Navy does not have a fee title to the land and cannot direct land management practices on the right-of-way. An easement across private property permits operation and maintenance of the pipeline. The pipeline is located in the South Fork River valley along State Route 21 to Brandywine, State Route 33 to Oak Flat, and State Route 3 past Milam. Vegetation along the 26 miles of right-of-way is maintained twice a year, during the spring and fall, by removing vegetation with the use of hand tools such as hatchets and saws. Vegetation control using mowing is conducted as needed, usually every 10–20 years.

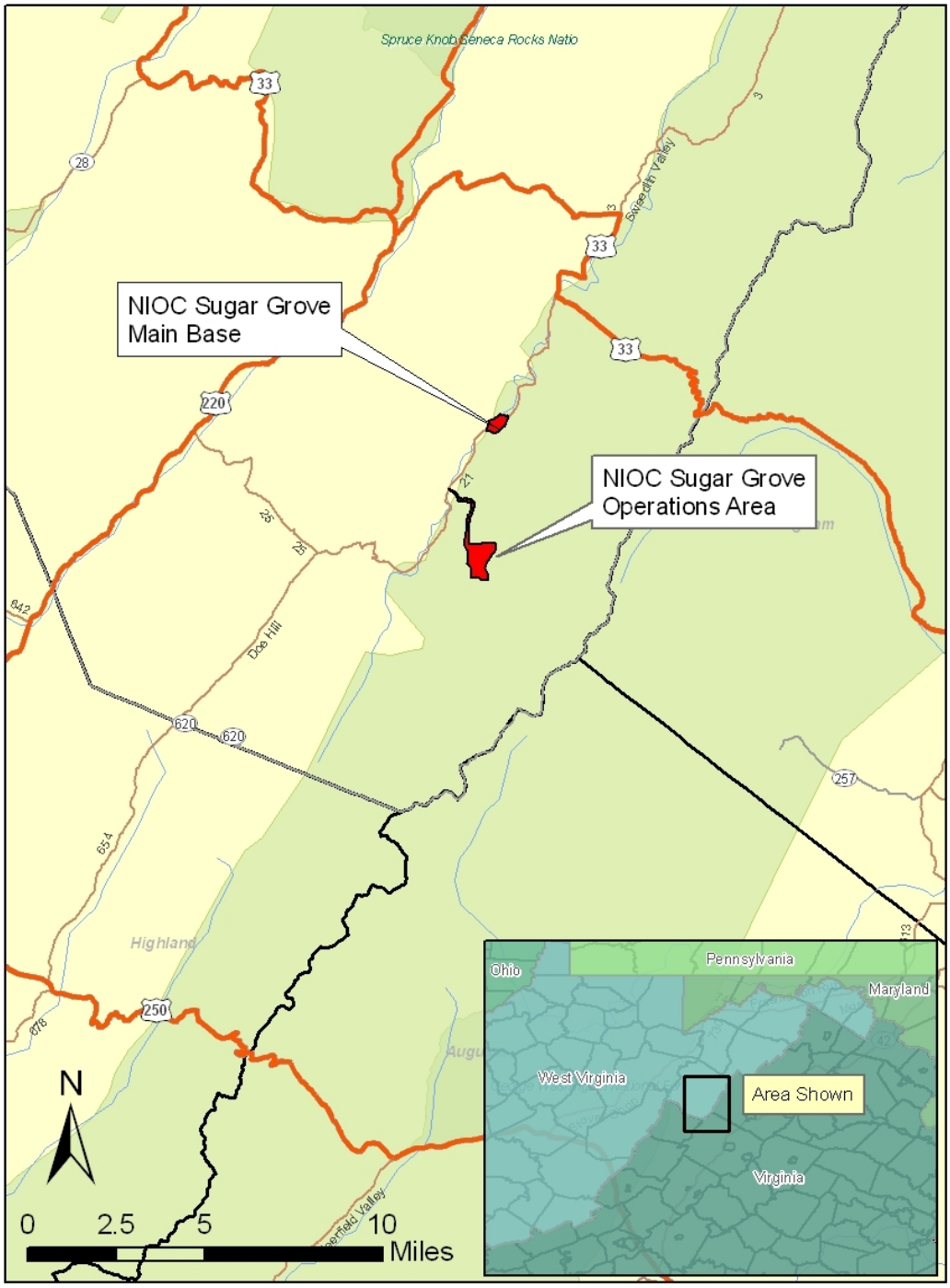
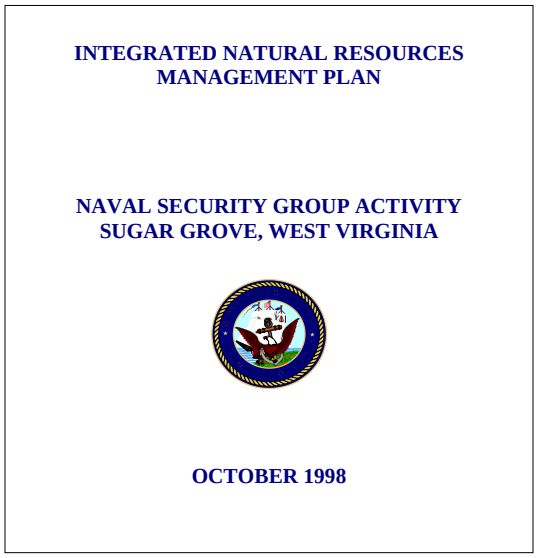


Figure 1-1. Vicinity Map of NIOC Sugar Grove.

1.2 Overview of the Natural Resources Program

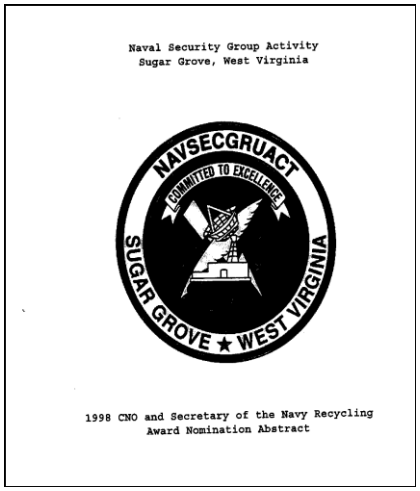
NIOC Sugar Grove has had a Natural Resources Program since development of a forest management plan in 1974. Various plans were prepared in 1983, including a Pest Management Plan, Soil Survey, revised Forestry Plan, and Fish and Wildlife Plan. The first onsite Environmental Protection Specialist was hired in 1993. Prior to that, environmental and natural resource issues were handled by NAVFAC Atlantic in Norfolk, Virginia. A Prefinal Integrated Natural Resources Management Plan (INRMP) was prepared in 1998 and submitted to the U.S. Fish and Wildlife Service (USFWS) and West Virginia Division of Natural Resources (WVDNR) in 2001 for review and concurrence. To address agency comments (Appendix A), NIOC Sugar Grove decided to implement the five-year update of the 1998 INRMP. The INRMP update was completed in 2003, and this document reflects the five-year update for the current plan prepared in 2009.



1998 INRMP.

The Public Works Department administers the Natural Resources Program. Management responsibilities include forestry, fish and wildlife management, threatened and endangered species protection, habitat conservation and restoration, outdoor recreation, overseeing the hunting program, and preservation of cultural resources. Other important functions include the following: ensuring compliance with federal, state, and regional environmental regulations; promoting environmental awareness; and addressing any other natural resources issues that arise on the installation. The largest known population of an endangered species, shale barren rockcress ([SBRC] *Arabis serotina*), was recorded on NIOC Sugar Grove Operations Area in 1992 and has been cooperatively studied by the WVDNR. The Annual Health and Safety Fair, Earth Day, Energy Awareness Day, National Public Lands Day, and Arbor Day are examples of outreach activities to promote environmental awareness. NIOC Sugar Grove has cooperated with West Virginia University Extension Service, WVDNR, USFWS, U.S. Department of Agriculture (USDA), U.S. Forest

Service (USFS), Potomac Headwater Interagency Water Quality Office, Lightstone Foundation, The Mountain Institute, Brandywine Elementary School, and the Boy and Girl Scouts, for conservation of natural resources.


Naval Security Group Activity
Sugar Grove, West Virginia

NAVSECGRUACT
COMMITTED TO EXCELLENCE
SUGAR GROVE ★ WEST VIRGINIA

1998 CNO and Secretary of the Navy Recycling
Award Nomination Abstract

Recycling Award.

In addition to the natural resources management responsibilities, the staff at NIOC Sugar Grove is responsible for production of drinking water, processing of wastewater, recycling, and other environmental duties. NIOC Sugar Grove has been the recipient of many awards over the past 10 years. The Naval Security Group's Recycling Award was awarded to NIOC Sugar Grove for three straight years (1997–1999), the Chief of Naval Operations (CNO) Recycling Award was received in 1998, and the Naval Security Group Command Environmental Quality Award was received in 2001. In addition, the Community Service Environmental Stewardship Flagship Award – The Medium Shore Command Honor, was received for three consecutive years in 2007, 2008, 2009. This award recognizes the best year-round volunteer supported program or special project that promotes education and good stewardship of environmental resources.

Safety Fair 2005.

NIOC Sugar Grove was the winner of the Natural Resources Conservation Award (Small Installation Category) during the Chief of Naval Operations Environmental Awards Competition in 2005 and 2006. The Environmental Coordinator (EC) for NIOC Sugar Grove, Steven Niethamer, received the Natural Resource Conservation

Communication – Promoting Public Awareness Award in 2008 from the National Military Fish and Wildlife Association (NMFWA).

The Natural Resources Program at NIOC Sugar Grove includes the following plans and specifications:

- Wastewater Treatment Plant
- National Pollutant Discharge Elimination System Permit
- Storm Water Management Plan
- Invasive Species Management Plan
- Spill Prevention, Control, and Countermeasures Plan
- Pollution Prevention Plan
- Solid Waste Management Plan
- Consolidated Hazardous Materials Reutilization and Inventory Management Program

1.3 Purpose and Authority

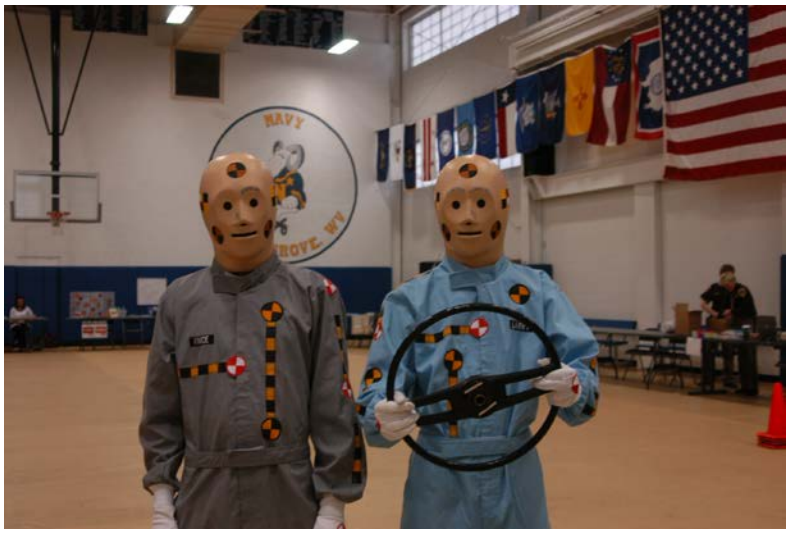
This INRMP was prepared to ensure compliance with Department of Defense Instruction (DoDI) 4715.3, Operational Navy Instruction (OPNAVINST) 5090.1C Ch. 24, P-73 Vol. II, and Section 101 of the Sikes Act (16 U.S. Code [USC] 670a et seq.). These regulations require the Navy to implement and maintain a balanced and integrated natural resources program. Consistent with Navy policy, the goals of this INRMP are to restore, improve, preserve, protect, and properly use natural resources while supporting the military mission. Ecosystem management is the fundamental process for planning actions that affect natural resources. This includes providing quality outdoor recreational opportunities, reducing nuisance and damage conflicts caused by exotic and native wildlife or plant species, conserving protected species, coordinating natural resources interests with various users, and ultimately enhancing overall biodiversity in the area.

The Sikes Act Improvement Act (SAIA) of 1997 requires military installations in the United States to prepare and implement an INRMP that provides for the following management activities, to the extent that such activities are consistent with the use of the installation for military preparedness:

- The conservation and rehabilitation of natural resources on military installations;

- The sustainable multipurpose use of the resources, to include hunting, fishing, trapping, and nonconsumptive uses; and,
- Public access to the installation, subject to safety requirements and military security.

As of fiscal year 2009, the National Defense Authorization Act (NDAA) provides authority to Department of Defense (DoD) to make payments to wetland mitigation banks and "in-lieu-fee" conservation mitigation sponsors to facilitate military testing, operations training, construction or any other military activity.



2007 Safety Fair.

The basic objective of this INRMP is to implement best management practices (BMPs) that are consistent with applicable laws and regulations that facilitate mission activities and that protect natural resources. Early involvement of natural resources considerations in project planning is critical to avoiding or minimizing potential impacts and developing viable alternatives. This INRMP identifies projects related to natural resource management issues at NIOC Sugar Grove.

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2.0 IMPLEMENTATION

Projects that directly address management issues and concerns are the basis for implementation of this INRMP. Currently there is one Environmental Program Manager in the Public Works Department who have the responsibility of managing the Natural Resources Program at NIOC Sugar Grove. Plans are in place to add an Environmental Protection Specialist position to assist the Environmental Program Manager with natural resource duties; however, this position has not yet been filled. These personnel coordinate with, and are supported by Command and regulatory agencies to achieve the goals and objectives specified in this INRMP. The Commander Officer, NIOC Sugar Grove, issued an Environmental Mission Statement and has overall responsibility for implementation of this INRMP to fulfill stewardship and compliance responsibilities for natural resources management.

The Navy recognizes that natural resources management is a dynamic field and encourages management training and professional development of personnel. Proper training and interaction with other natural resources professionals will ultimately lead to successful program implementation.

2.1 Natural Resources Planning Structure

The Environmental Conservation Program (DoDI 4715.3) established a policy for general conservation management on military installations. The primary policy recommendation is that all DoD conservation programs shall work to guarantee continued access to the land, air, and water resources for realistic military training and testing while ensuring the sustainability of natural and cultural resources for scientific research, education, and other compatible uses for future generations. The second policy issue states that all DoD facilities and installations shall, within available resources, plan, program, and budget to achieve, monitor, and maintain compliance with all applicable Executive Orders (EOs), federal natural and cultural resources statutory and regulatory requirements, and state regulations. The final policy issue states that the management and conservation of natural and cultural resources under DoD control, including planning, implementations, and enforcement functions, are inherently governmental functions that shall not be contracted. DoDI 4715.3 provides other general conservation management policy issues.

A variety of expertise and assistance in implementing sound management practices is needed to manage the diversity of natural resources on NIOC Sugar Grove. Partnerships with state and federal natural resources agencies as well as local conservation groups make such expertise available to the limited staff at NIOC Sugar Grove to accomplish mutually desired goals and objectives. An added benefit of inviting volunteers, conservation groups, and/or academic institutions 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.

As noted above, successful implementation of this INRMP requires input from internal and external stakeholders. Internal stakeholders include all users and managers of the natural resources on NIOC Sugar Grove. Internal stakeholders help in identifying and evaluating management issues and concerns, achieving goals and objectives, and volunteering for natural resources projects. External stakeholders include, but are not limited to, the WVDNR, USFWS, USFS, local community groups, and adjacent landowners, all of which have a vested interest in how the natural resources are managed in the region. A complete list of entities with which NIOC Sugar Grove currently has partnerships with is listed in Section 2.4.

2.2 Natural Resources Planning Process

This INRMP plays an integral part in the overall planning and management process at NIOC Sugar Grove. It is recognized that every activity has some potential to affect natural resources, and environmental conditions likewise may affect mission activities. Therefore, to achieve integration of natural resources management with the military mission, installation programs should be fully coordinated with natural resources plans (and vice versa) to avoid a conflict of program goals. In addition, coordination between internal and external stakeholders facilitates the planning process. The following principles and guidelines for ecosystem management should be the standards for implementation of natural resources management.

- Maintain and improve the sustainability of native biological diversity;
- Use adaptive management to keep management practices current;
- Use ecological units and time frames (not political boundaries and fiscal years);
- Support sustainable human activities as integral parts of ecosystem management;
- Use best scientific information available to make decisions;

- Coordinate activities with all interested agencies and organizations; and,
- Use benchmarks to monitor and evaluate management practices.

Periodic reviews of management goals provide the opportunity to incorporate new science and information as well as assess the performance of management actions. Implementation of this INRMP should be considered an ongoing experiment and subject to change if the expected results are not achieved.

This INRMP will be reviewed annually for necessary updates to ensure that the plan remains a functional document throughout the 10-year natural resources planning period of 2010–2020, and changes and recommendations will be recorded annually as described in the INRMP Review and Revision Process section. This document reflects the major review of the management issues and concerns, goals and objectives, and accomplishments, conducted in 2010 update. The next formal review for this INRMP is scheduled for the mid-point of the plan period in 2015.

2.2.1 Planning for National Environmental Policy Act (NEPA) Compliance

An INRMP is defined as a major federal action requiring NEPA analysis by the Council on Environmental Quality (CEQ). As a result, the preparation of NEPA documentation is required prior to INRMP approval per SAIA requirements for INRMP implementation. Most installation INRMPs can meet the NEPA requirements with the preparation of an Environmental Assessment (EA). However, if the implementation of the INRMP will have a significant impact on the environment, an Environmental Impact Statement (EIS) must be prepared. It is expected that annual updates and revisions would be covered under the original NEPA documentation unless there has been a major change in the installations mission or program scope.

An EA was conducted for the implementation of the INRMP for NIOC Sugar Grove in 2003. Environmental Assessments (EAs) are made available for public comment and are forwarded to West Virginia's State Clearinghouse for state intergovernmental environmental review. EAs are also sent to/made available to non-governmental organizations (NGOs) that have expressed interest in the management of natural resources at NIOC Sugar Grove. No major changes in installation mission or program scope have occurred since that time; therefore, no new NEPA documentation or opportunity for public review are required for this INRMP update. However,

individual projects and actions identified in this INRMP may require further NEPA documentation.

2.3 Natural Resources Consultation Requirements

Section 7 of the Endangered Species Act (ESA) requires Federal agencies to consult with USFWS when any proposed activity authorized, carried out, or conducted by that agency may affect a listed species or designated critical habitat. The consultation process may be either informal (telephone, email) or formal (official correspondence). At any point during informal consultation, either agency may request formal consultation. If the USFWS concludes through informal consultation that the proposed action will not adversely impact a listed species, the process ends and formal consultation is not required. However, if it is determined that an action is likely to adversely affect a listed species or its critical habitat, formal consultation is required. Consultation results in the USFWS issuing a biological opinion, which carries actions that the Federal agency must complete in order to conduct the proposed activity.

The ESA requires USFWS to preclude habitat on federal property that has been identified as essential to the protection and recovery of a listed species from Critical Habitat designation if adequate special management or protection is provided by an INRMP. The qualifying INRMP must address the maintenance and improvement of the primary constituent elements important to the species and must manage for the long-term conservation of the species.

2.4 Beneficial Partnerships and Collaborative Resource Planning

NIOC Sugar Grove has developed several beneficial partnerships in support of the natural resources protection and management of the installation. Developing and implementing sound management practices to protect the diversity of natural resources is enhanced in collaboration with partnering agencies, organizations and groups. The development of partnerships with state and federal resources agencies, local public schools and universities, and local conservation groups makes such expertise available to natural resources personnel to accomplish goals and objectives, and fosters good community relationships. Listed below are the various agencies and groups that have formed partnerships with NIOC Sugar Grove:

- U.S. Fish and Wildlife Service(USFWS)

- U.S. Forest Service (USFS)
- U.S. Department of Agriculture (USDA)
- U.S. Natural Resource Conservation Service (NRCS)
- West Virginia Department of Natural Resources (WVDNR)
- West Virginia Department of Environmental Protection (WVDEP)
- West Virginia Department of Agriculture (WVDA)
- West Virginia Division of Forestry (WVDF)
- West Virginia University Extension Service
- Boy Scouts of America (BSA)
- Pendleton County School District
- Pendleton County residents

2.5 Public Access and Outreach

The NIOC Sugar Grove Environmental Stewardship Program relies heavily on obtaining voluntary support from the base and local community. As a result, the base organizes various activities with the community to create positive change through such programs as recycling, educational outreach, and natural resource protection through highway and river clean-ups.

River Cleanup 2009.

NIOC Sugar Grove has developed several ways to improve its recycling efforts, not only for station personnel, but also within the host community. The installation serves as a primary location for many Pendleton County youth and adult athletic events, holiday events and concerts throughout the year. During these events, the base focuses on educating the visiting public on the beautification and preservation benefits of the recycling program. The base also diverts all recyclable material collected during

the Command's Adopt-a-Highway cleanup to the recycling center, by using strategic placement of recycling containers and the assistance of county and base volunteers.

The annual Environmental, Health and Safety Fair, held for 14 continuous years, is the bases primary educational outreach forum. The fair reaches out to all of the county's fourth grade students, home schooled students, parents and Command members, both military and civilian. Events included tree plantings, a tour of the recycling facility and wildlife shows.

The base is continuously involving the community in streamside restoration projects. Invasive plant species are removed and replaced with native species during National Public Lands Day. This annual event consists of eradicating invasive species and planting trees donated to the base. This has lead to the eradication of invasive species along a one-half mile section of the Potomac River. On Arbor Day 2009, volunteers planted over 200 Chestnut Oak trees and 200 native American Chestnut trees. The replanting of over 400 trees will decrease erosion and pollution and enhance wildlife habitat along the headwaters of the Chesapeake Bay.

Arbor Day 2009.

In addition to restoration and conservation activities, NIOC Sugar Grove is providing training for Navy and local Fire and Emergency services. An emphasis is placed on training and obtaining/maintaining the appropriate equipment to prepare NIOC Sugar Grove Fire and Emergency Services (FES) Department in the instance a hazardous material (HAZMAT) spill occurs. To support this effort and ensure continued readiness, re-certification training for HAZMAT Spill Response personnel was conducted during the year. Bringing training to the base allows all necessary base employees to be trained, and also allows vacant seats to be filled by area volunteer responders. This is critical, because, as Pendleton County's only Hazardous Material Response Team, the station must rely on these volunteer fire departments to assist with HAZMAT spill response. Properly training Pendleton

County's volunteer fire departments helps NIOC Sugar Grove's FES quickly isolate a spill and take action to prevent further damage to the watershed and surrounding environment.

2.6 Training of Natural Resources Personnel

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

The management of natural resources requires a specialized skill set on the part of personnel. In addition to holding science based degrees, environmental personnel acquire skills by attending training through the Civil Engineering Corps Officers School (CECOS), the Shipley Group, USFWS (National Conservation Training Center), U.S. Army Corps of Engineers (USACE), the wetland institute, various university programs and Defense Environmental Network and Information exchange (DENIX). Suggested professional training for NIOC Sugar Grove personnel include Field Techniques for Invasive Plant Management, Conservation Biology (both courses at the National Conservation Training Center) and Pest Applicator Certification Training (Armed Forces Pest Management Board). Table 2-1 lists contact information for available training.

Natural resources staff keeps abreast of current issues by attending annual workshops or conferences held by various professional societies. Societies such as National Military Fish and Wildlife Association (NMFWA), The Wildlife Society, Society of American Foresters, and Society for Ecological Restoration all host annual meetings focused on the management of natural resources. Additionally, it is recommended that persons interested in natural resources management familiarize themselves with the natural resources that are accessible within the vicinity of the particular installation. Some options available are visits to nearby parks, reserves

Table 2-1. Natural Resources Training Opportunities.

U.S. Government, DoD
Defense Environmental Network & Information Exchange (DENIX) Training and Education Website: https://www.denix.osd.mil/portal/page/portal/denix/conferences
U.S. Navy Civil Engineer Corps Officers School (CECOS) Environmental Training Program 3502 Goodspeed Street, Suite 1 Port Hueneme, CA 93043-4336 Tel: 805-982-2895 DSN: 551-2895 Fax: 805-982-2918 Website: https://www.netc.navy.mil/centers/csfe/cecos/
Armed Forces Pest Management Board Training and Certification Website: http://www.afpmb.org/pubs/courses/courses.htm
U.S. Army Corps of Engineers (USACE) Professional Development Support Center 550 Sparkman Drive Huntsville, AL 35816 Tel: 256-895-7401 Fax: 256-895-7465 Website: http://pdsc.usace.army.mil/
U.S. Government, non-DoD
U.S. Fish and Wildlife Service National Conservation Training Center Route 1, Box 166 Shepherdstown, WV 25440 Division of Training Tel: 304-876-7472 Aquatic Resources Tel: 304-876-7445 Environmental Conservation Tel: 304-876-7475 Wildlife Tel: 304-876-7434 Technical (e.g., GIS) Tel: 304-876-7456 Website: http://training.fws.gov/

Table 2-1. Natural Resources Training Opportunities (continued).

NGO's
Wetland Training Institute, Inc. P.O. Box 31 Glennwood, NM 88039 Tel and Fax: 877-792-6482 Website: http://www.wetlandtraining.com/
The Shipley Group P.O. Box 908 Farmington, UT 84025 Tel: 888-270-2157 Website: http://www/shipleygroup.com
Universities
Duke University Nicholas School of the Environment and Earth Sciences Continuing Education Program Box 90328 Durham, NC 27708-0328 Tel: 919-613-8082 Fax: 919-684-8741 Website: http://www.env.duke.edu/cee/execed.html
University of Wisconsin-Madison Gaylor Nelson Institute for Environmental Studies Science Hall, 550 North Park Street Madison, WI 53706-1491 Tel: 608-263-1796 Website: http://www.ies.wisc.edu/

and other natural areas with an in-depth field guide to develop a practical sense for the area's natural history.

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

The Commander, Navy Region Mid-Atlantic's (CNRMA) GeoReadiness Center (GRC) is the single, authoritative source and distribution point for all geospatial information within the area of responsibility of the Navy Mid-Atlantic Region and is managed by the Mid-Atlantic Facility Engineering Command Geographic Information System (GIS) Division. The GRC houses the most current geospatial information (including aerial photography) for the entire Navy Mid-Atlantic Region and provides access to the comprehensive data set and analysis tools to Regional

and DoD decision makers/managers, sponsored contractors, and other sponsored individuals via a secure government Internet site. GIS data for NIOC Sugar Grove, including those environmental layers used for the development of this INRMP, can be accessed through the portal at: (https://portal.navfac.navy.mil/portal/page/portal/am/mid-atlantic/am_ml_au/gis/).

Baseline environmental data layers include:

- Soils
- Topography
- Vegetation Cover
- Forest Stands
- Biosolids application areas
- Hunting compartments
- Property boundaries
- Wetlands
- Shale barren rock cress locations
- Storm water detention ponds
- Hiking trails

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

3.0 ENVIRONMENTAL SETTING

3.1 Land Use

NIOC Sugar Grove is located in a relatively isolated portion of the South River Valley. The federal government owns a large percentage of the land in the region, with the largest portion within the George Washington National Forest. State parks and forests in the region include Calvin, Price, Canaan Valley, Lost River, Brandywine Recreation Area, and Seneca. The area consists primarily of mountains with scattered farmlands for crops, pastures, and poultry production. The population in the adjacent towns of Brandywine and Sugar Grove is estimated at less than 500 people.

Since 1955, the primary land use has been for Navy communications research and development. Most of the Main Base is developed for staff housing, administrative buildings, recreational areas, and associated facilities. Construction of the Main Base was completed in 1970 to support Navy personnel working at the Operations Area. The Operations Area, located on several ridge tops of Shenandoah Mountain, is the site of several parabolic antennas of various sizes used to support Navy fleet operations.

Due to its rural setting, NIOC Sugar Grove provides all municipal services for military personnel and their families and civilian workers on the installation. All aspects of water treatment, wastewater collection and treatment, storm water collection, solid waste management, hazardous waste management, and energy distribution are provided through the Public Works Department. NIOC Sugar Grove is classified by the U.S. Environmental Protection Agency (EPA) as a conditionally exempt small quantity generator of hazardous wastes (EPA 1988). The 1988 preliminary assessment concluded that no further work is recommended under the Navy Installation Restoration Program (NIRP).

3.2 Constraints to Natural Resources Management

The communications research and development mission places few constraints on natural resources management at NIOC Sugar Grove. There are two mission objectives that constrain natural resources management maintenance of mowed areas around the parabolic antennas to avoid interference from vegetation with radio signals, and maintenance of mowed areas for

application of biosolids. Approximately 20 acres surrounding the parabolic antennas on the Operations Area are maintained in open grass ground cover. Approximately 36 acres are used as a field for applying biosolids in the Operations Area.

The presence and potential occurrence of threatened and endangered species on NIOC Sugar Grove represent constraints both to natural resources management and to the military mission. The specific habitat requirements of these species preclude certain natural resources management and mission activities that could potentially impact their survival. Activities such as timber harvesting and certain outdoor recreational activities would be constrained to protect habitats necessary for protection of threatened and endangered species.

3.3 Climate

Two weather stations provide climatic data for Pendleton County: (1) Spruce Knob for the western section, and (2) Franklin for the central and eastern sections of the county (National Climatic Center, Asheville, North Carolina). The divide of the Alleghenies, the main topographic barrier of the Appalachian Plateau, runs along the western edge of the county and forms a "rain shadow" that shelters most of the county from the prevailing storm systems that move from west to east. For this reason, climatic data from the western section of the county show lower average temperatures and higher average precipitation than areas in the central and eastern sections of the county. Rainfall on the western slopes of the high mountains in the central part of the state average 63 inches per year, whereas the average rainfall is only 25 inches per year just east (in some cases less than 80 miles) of the mountain peaks. The regression in rainfall due to the rain shadow effect has great impact on the floral distribution across Pendleton County; mixed hardwood forests west of the Appalachian Plateau are replaced by dry shale barrens and oak-pine forest in the ridges and valleys east of the plateau. Climatic data from the Franklin weather station are presented below (Table 3-1) to characterize weather at NIOC Sugar Grove.

Rainfall is evenly distributed during the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. Two years in 10 will have less than 10 inches of rainfall in April—September. Periodic summer droughts cause inadequate moisture for crops; however,

Table 3-1. Weather Data Recorded at Franklin, West Virginia, for the Period 1906-2008.

Record	Jan	Feb	Mar	Apr	May	June	July
Average High Temp. (°F)	43.6	45.7	54.2	65.2	73.8	80.5	83.8
Average Low Temp. (°F)	21.7	22.3	29.3	37.8	46.5	54.0	58.3
Precipitation (inches)	2.14	1.87	2.75	2.57	3.48	3.38	3.88
Snowfall (inches)	6.9	8.1	5.4	0.7	0.0	0.0	0.0
Record	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	
Average High Temp. (°F)	82.7	76.9	67.1	55.7	45.7	64.6	
Average Low Temp. (°F)	57.0	50.4	39.7	31.5	24.1	39.4	
Precipitation (inches)	3.46	3.14	2.62	2.39	2.14	33.83	
Snowfall (inches)	0.0	0.0	0.2	1.6	5.3	28.3	

°F degrees Fahrenheit
Source: Southeast Regional Climate Center 2009

normal annual precipitation is adequate for all crops. Flash flooding in narrow valleys can result from heavy rains that can occur at any time of the year. Thunderstorms occur about 44 days each year, and most occur in summer. The average relative humidity is about 60 percent in mid-afternoon and about 90 percent at dawn. The percentage of possible sunshine is 65 percent in summer and 50 percent in winter. The prevailing wind is from the northwest. Wind speed is highest in spring, averaging about 8 miles per hour.

3.4 Geology and Soils

NIOC Sugar Grove is underlain by a thick sequence of interbedded shale, sandstone, and limestone in the Harrell and Mahantango geologic formations. There are two physiographic provinces in Pendleton County. The Appalachian Plateau Physiographic Province makes up the highest elevations, and the Ridge and Valley Physiographic Province makes up the rest of the county, including NIOC Sugar Grove. The landscape clearly shows the effects of uplift, folding, and geologic erosion. The parallel ridges and valleys, including rock outcrops, are oriented northeast-southwest. The ridge tops are formed from the relatively erosion-resistant sandstone; the softer, erosive shale and limestone formed the valleys. A system of parallel northeast

flowing rivers drains this area to the Chesapeake Bay. The rugged, scenic topography of this area is the result of both uplift and faulting of ancient sedimentary rocks.

There are 11 soil series that occur on NIOC Sugar Grove (Figures 3-1 and 3-2). Each series is briefly presented in Table 3-2. Detailed soil descriptions, mapping, suitability, limitations, and management of the soils are provided in the soil survey conducted for NIOC Sugar Grove (USDA 1983 and USDA 1992). With regards to limiting soil types, Purdy silt loam, a hydric soil designated in the Hydric Soils of the United States (1987), occurs on the Main Base.

3.5 Topography

The South Fork and North Fork drainages of the Potomac River have carved deep gouges and V-shaped valleys throughout the length of Pendleton County. The highest point in West Virginia is the summit of Spruce Knob, approximately 16 miles northwest of NIOC Sugar Grove. Pendleton County has the most rugged topography of any county in West Virginia. The Operations Area is strategically located on a mountain ridge at 2,200 feet above mean sea level (MSL). The only relatively flat ground is man-made and is now occupied by antennas and buildings; the remaining property is mostly steep side slopes. The lowest point is 325 feet below the peak and the average slope is 40 percent. The Main Base is situated in a relatively flat valley at about 1,725 feet above MSL between mountain ridges. The topography varies approximately 15 feet with an average slope of 3 percent (Figures 3-3 and 3-4).

River Cleanup 2009.

3.6 Hydrology

NIOC Sugar Grove is located in the headwaters of the South Fork River Watershed. The South Fork River, a tributary of the South Branch of the Potomac, originates in Highland County, Virginia. It empties into the South Branch of the Potomac at Moorefield, West Virginia, after crossing the counties of Pendleton and Hardy in a north-northeasterly direction. This is a long, narrow, watershed and remarkably uniform in

outline. It is about 5 miles wide and 55 miles long, with a fall of nearly 28 feet per mile. The trellis-type drainage pattern was formed from the main stream following a soft shale belt, whereas the short and turbulent tributaries flowed across the more resistant rock strata and entered the main stream at right angles. The steep foothills on both sides of the river have low infiltration rates and a low moisture-holding capacity; consequently, runoff is very rapid following heavy rains.

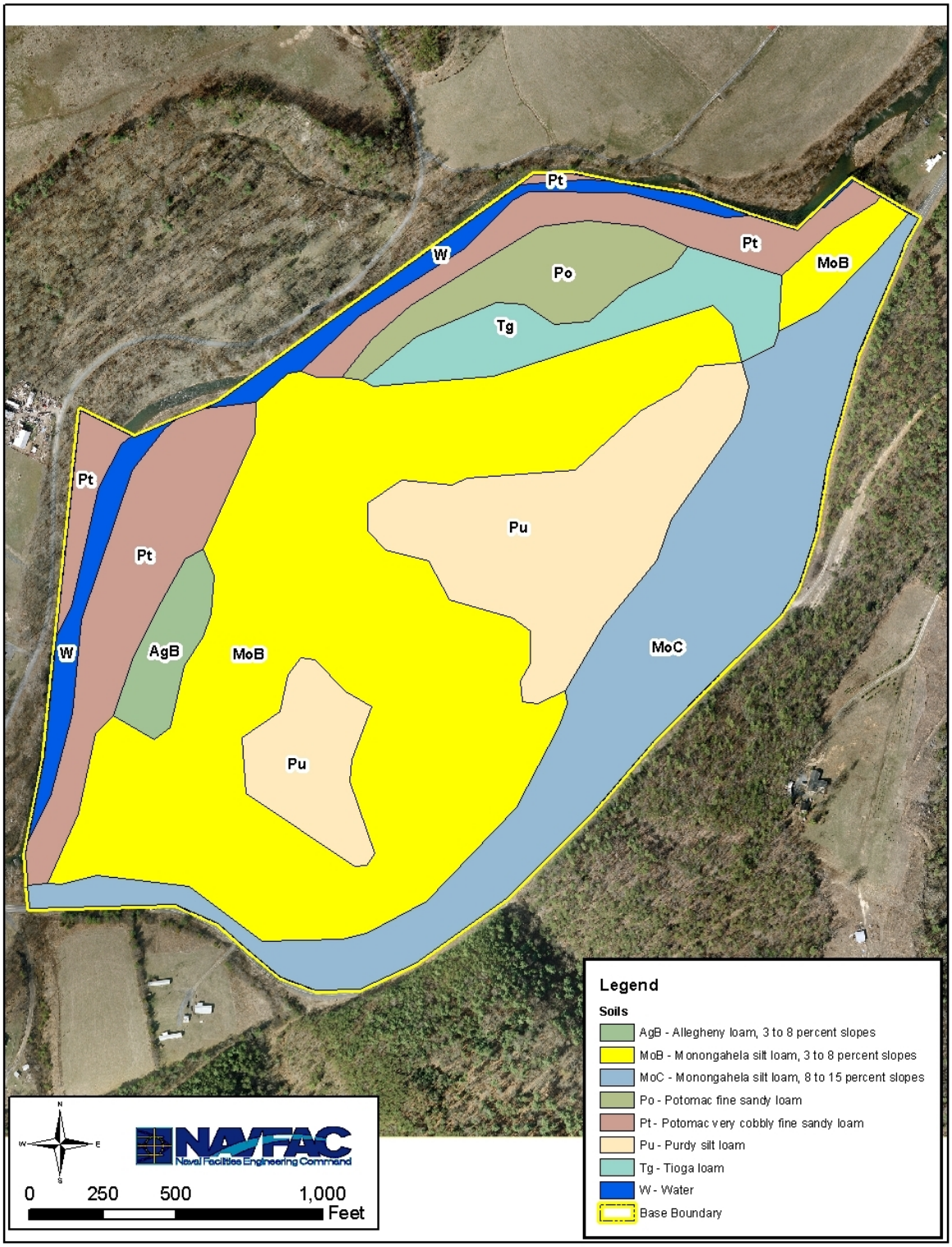

Figure 3-1. Soils on Main Base.

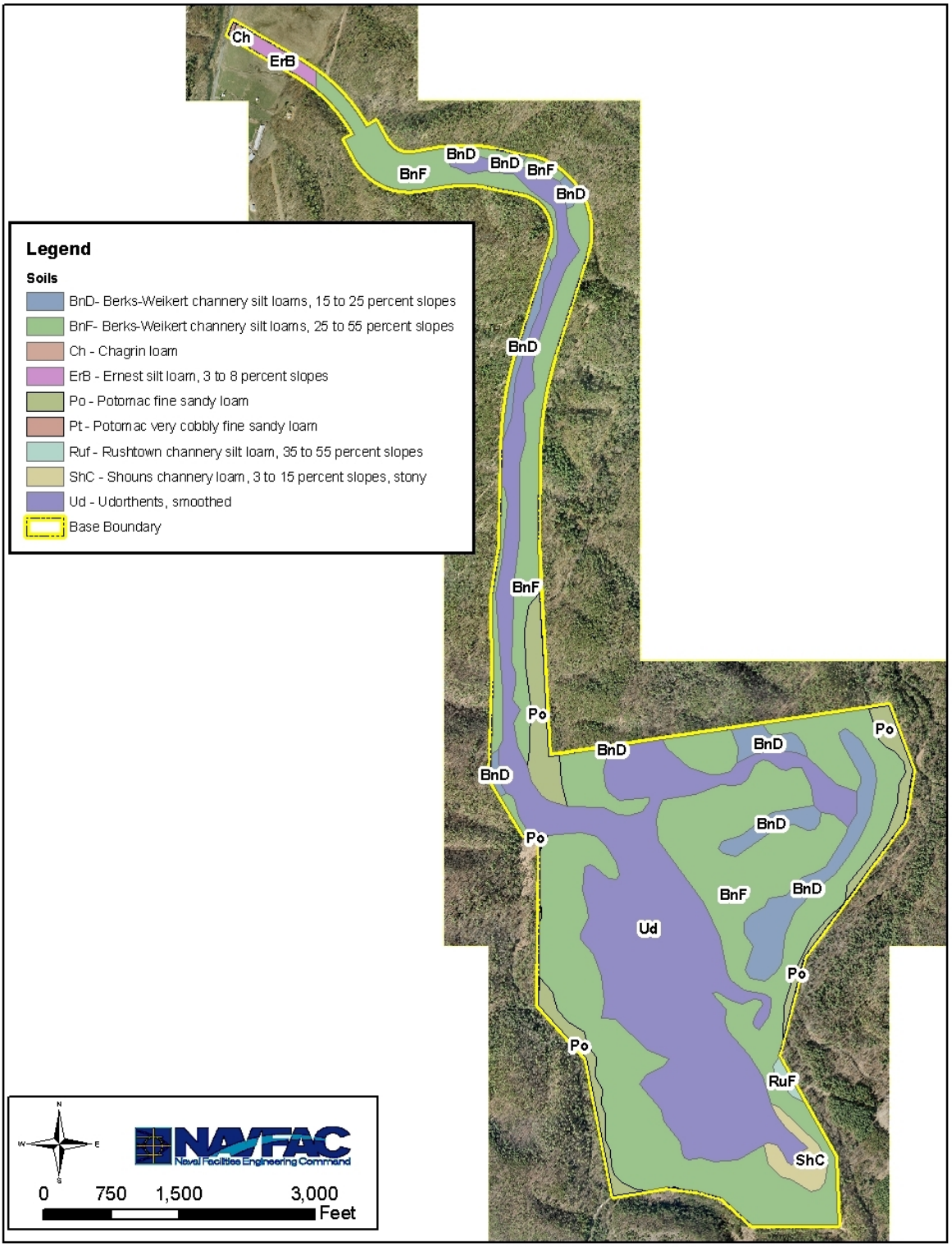

Figure 3-2. Soils on Operations Area.

Table 3-2. Soils of NIOC Sugar Grove.

Soil Series	Description
Allegheny Series	Deep, well-drained, low fertility soils that formed in alluvial material washed from acid soils on uplands. On terraces along the river, but above flooding. Depth to bedrock > 60 inches.
Berks Series	Moderately deep, well-drained soils on ridge tops, benches, and hillsides that formed in acid material weathered mostly from siltstone and shale with some sandstone. Depth to bedrock is about 35 inches.
Cut and Fill	Created by excavating and filling operations. These soils are mapped mainly in the areas that were graded for antenna sites and road construction. On-site examination is needed to determine suitability for specific uses.
Monongahela Series	Deep, moderately well-drained soils that formed in alluvial material washed from acid soils on uplands. On terraces along the river, but above flooding. Depth to bedrock is > 60 inches.
Potomac Series	Deep, somewhat excessively drained soils on floodplains that formed in gravelly alluvial material from lime-influenced soils on uplands. Depth to bedrock is > 60 inches.
Purdy Series	Deep, poorly or very poorly drained soils that formed in alluvial material washed from acid soils on uplands. On terraces along the river, but above flooding. The depth of bedrock is > 60 inches. Hydric soil of the United States.
Rushtown Series	Deep, excessively drained soils on hillsides that formed in acid material weathered from shale. Depth to bedrock is > 60 inches.
Shouns Series	Deep, well drained soils on ridge tops that formed in acid material that moved downslope from soils on uplands. The depth to bedrock is > 60 inches.
Tioga Series	Deep, well-drained soils on floodplains and subject to flooding that formed in alluvial material washed from lime-influenced soils on uplands. The depth to bedrock is > 60 inches.
Tyler Series	Deep, somewhat poorly drained soils that formed in alluvial material washed from acid soils on uplands. On terraces along the river, but above flooding. Depth to bedrock is > 60 inches.
Weikert Series	Shallow, well-drained soils on ridge tops, benches, and hillsides that formed in acid material weathered from siltstone and shale with some sandstone. Fractured shale bedrock occurs at 16 inches.

Source: USDA Soil Survey, Pendleton County, West Virginia.

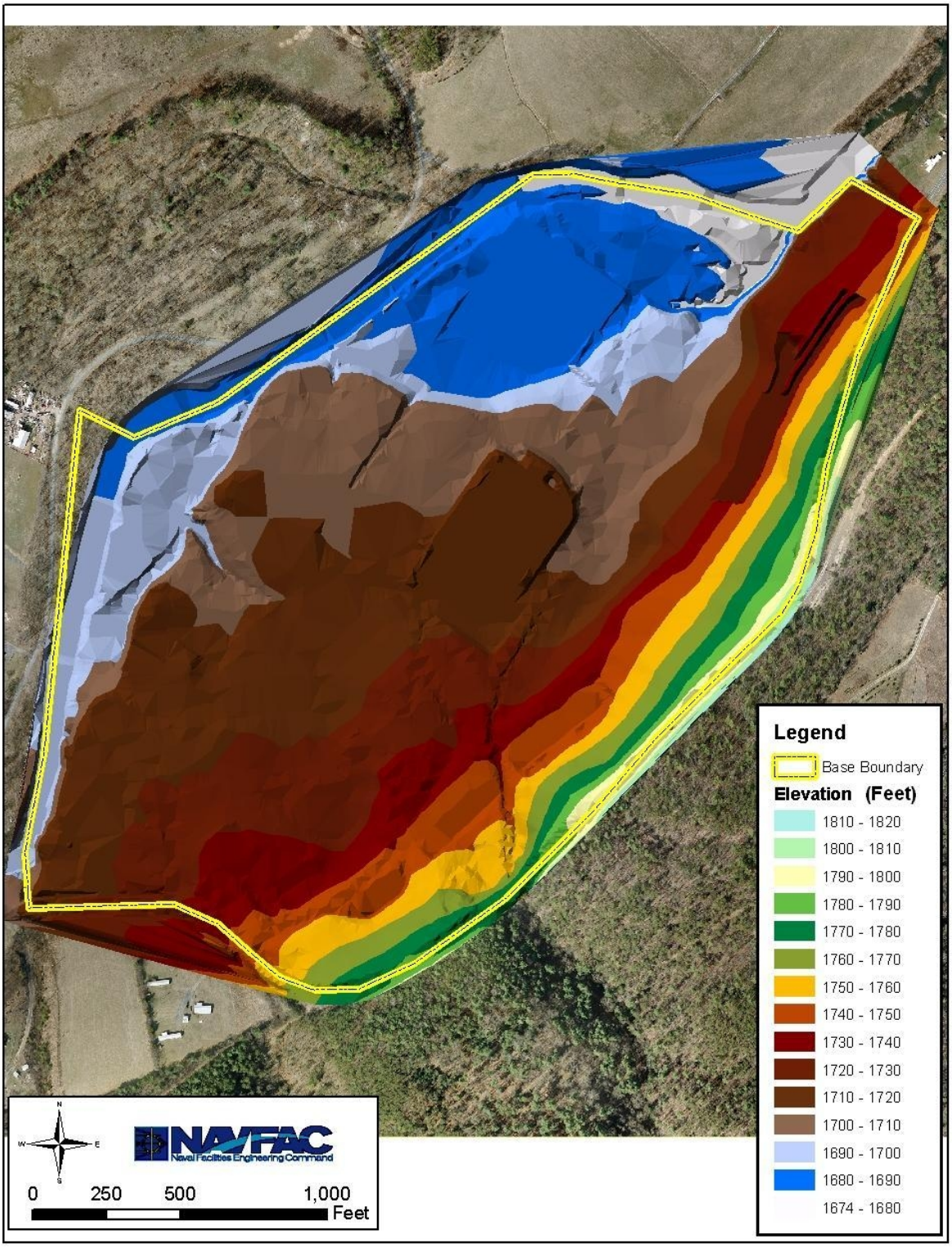

Figure 3-3. Elevation on Main Base.

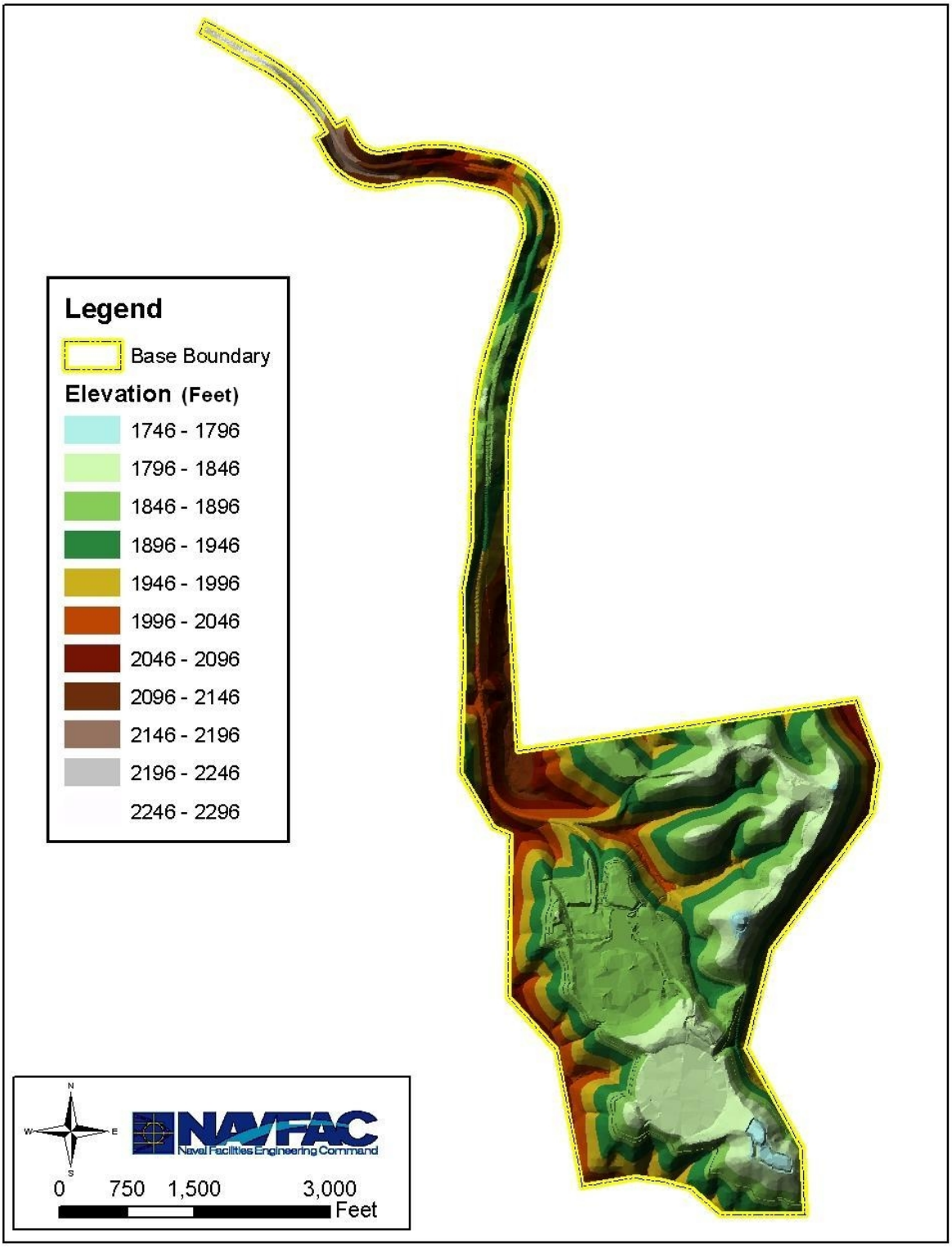

Figure 3-4. Elevation on Operations Area.

Storm water from the Main Base drains into the South Fork River via concrete waterways, open ditches, and overland flow. Twenty (20) percent (23 acres) of the area is within the floodplain; there are no buildings in the floodplain (below 1,700 feet MSL), which is subject to periodic inundation. The Operations Area is mostly drained by Lick Run and a series of intermittent and ephemeral tributaries.

River at Main Base.

Lick Run is a perennial stream that flows into Little Fork, a tributary of the South Fork. Extreme rainfall events may cause flooding and realignment of stream channels in both areas. Water quality throughout the area is generally good, with infrequent sedimentation and some naturally occurring iron seepages reducing quality.

Wetlands on NIOC Sugar Grove are primarily associated with the narrow riparian zones, drainage ditches, and seepage areas (Figures 3-5 and 3-6). The largest wetland area on the Main Base, the old polishing pond, serves as an emergency overflow pond for the wastewater treatment plant. Field reconnaissance in 1999 was used to locate potential wetlands for planning-level wetland maps (Navy 1998). Cover classifications were assigned to wetland areas according to Cowardin et al. (1979).

Typical wetlands of NIOC Sugar Grove.

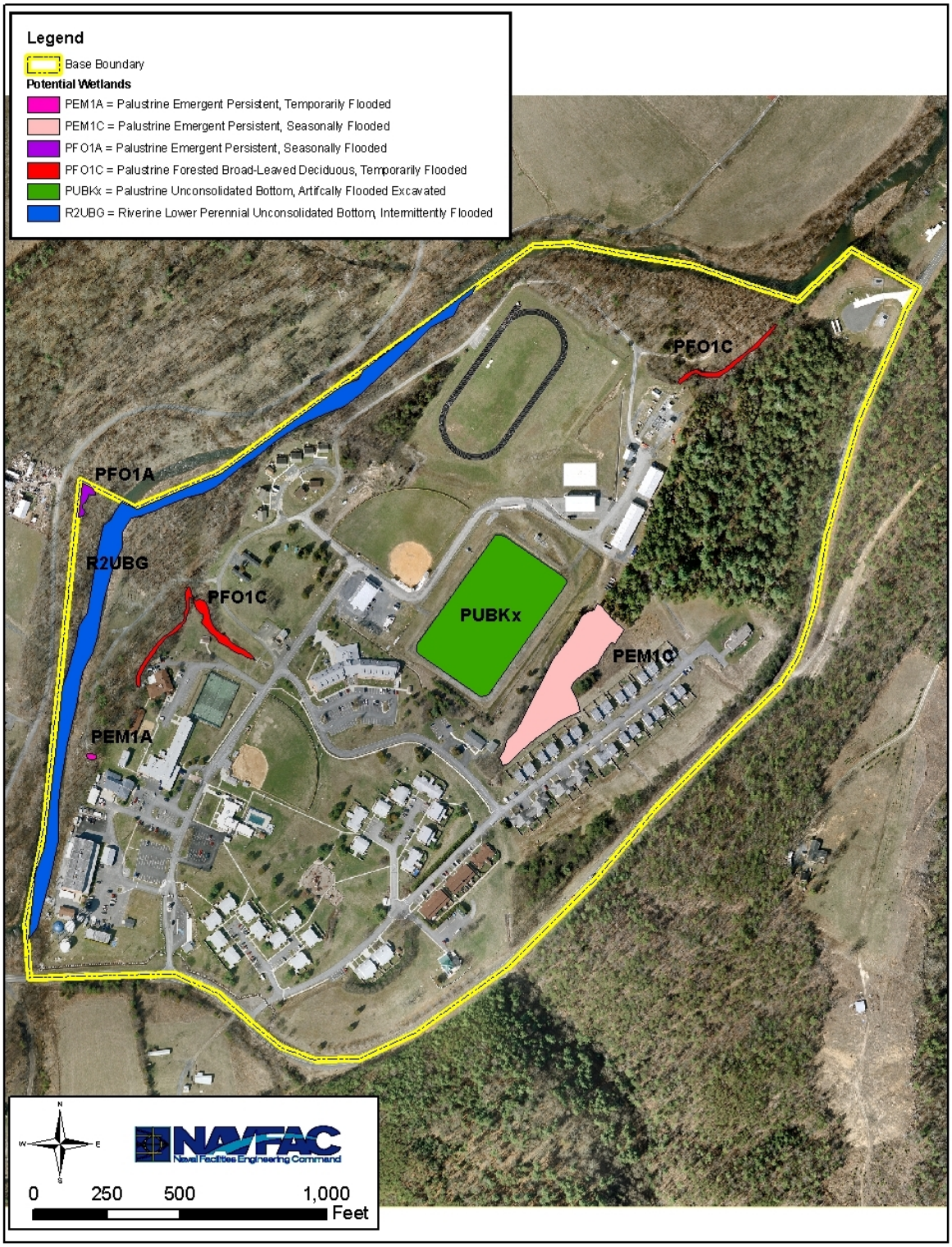

Figure 3-5. Potential Wetlands on Main Base.

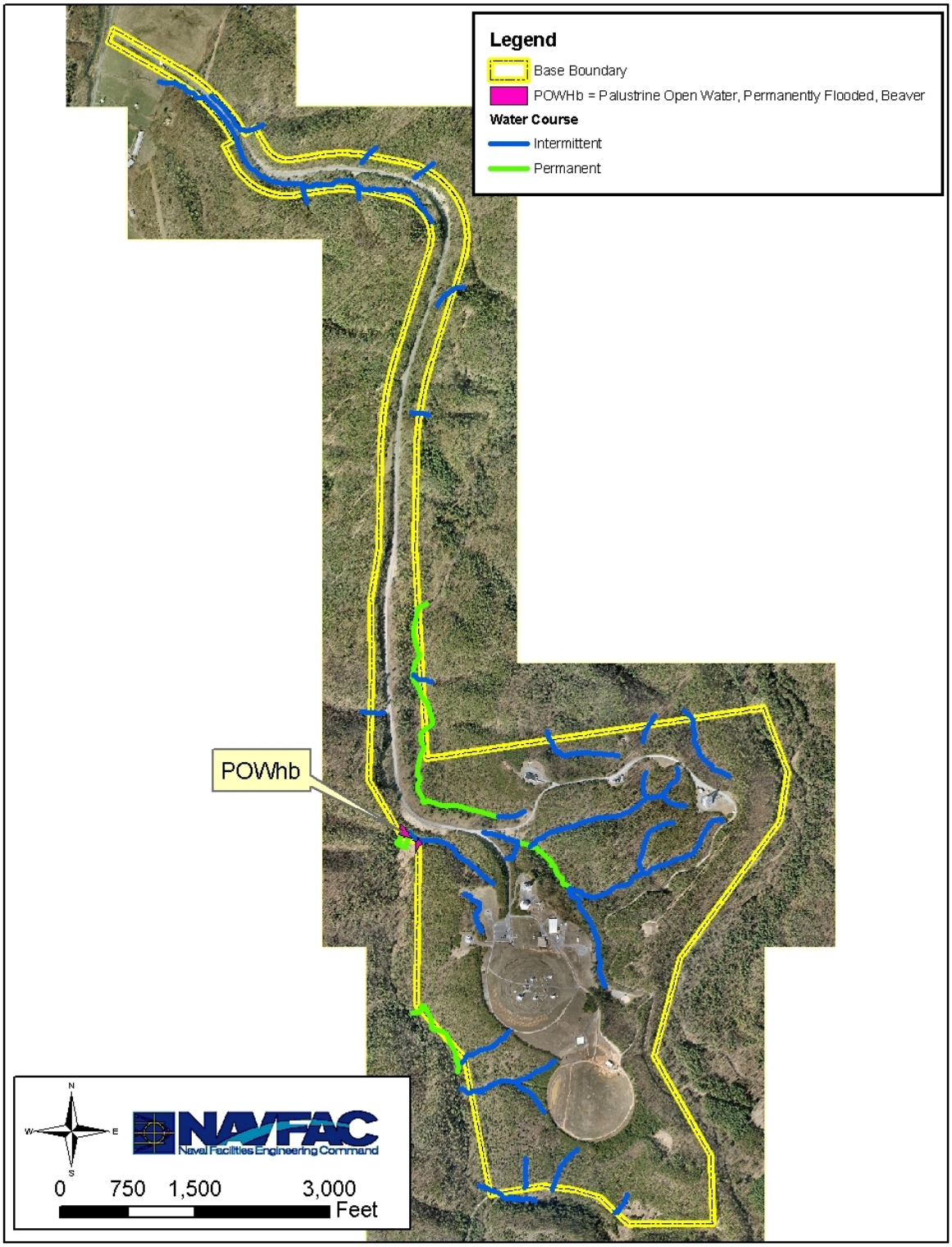

Figure 3-6. Potential Wetlands on Operations Area.

3.7 Fauna and Flora

Common names of plant and animals species are used throughout the text except for references to protected species. Scientific names are presented in the appendices for fauna and flora to uniquely identify each species referenced (Strausberg and Core 1977). Survey sites for fauna and flora are presented in Figures 3-7 and 3-8. The final reports for these studies are included in Appendix C.

3.7.1 Mammals

The major cover type that supports mammals on NIOC Sugar Grove is forest. Forests on the Operations Area provide suitable habitat for black bears, bobcats, red and gray squirrels, bats, beavers, raccoons, gray fox, skunks, and weasels. In addition to multi-cover type species such as white-tailed deer and eastern cottontails occur throughout the Operations Area and Main Base. Deer are the most important game animal on the installation. Small mammals, such as deer mice and voles, and individual species are distributed in accordance with their habitat preferences.

Processing bats during the 2003 bat survey.

A total of 85 bats representing six species were captured on the Operations Area in a mist net survey conducted by the WVDNR in 2001. Additional surveys were conducted in summer and fall of 2002 in accordance with USFWS recommendations. The Indiana bat (*Myotis sodalis*) and Virginia big-eared bat (*Corynorhinus townsendii virginianus*) were not found in these surveys.

The most recent bat survey was conducted in July 2009 at NIOC Sugar Grove to meet the protocols outlined by the USFWS Indiana Bat Revised Recovery Plan. Two trap sites and four acoustic monitoring sites were each sampled for two nights. A total of 23 bats representing five species were captured including nine little brown myotis, eight big brown bats, three northern

myotis, one red bat, one tri-colored bat, and one unknown myotis that escaped before identification (BCM 2009). No state or federally threatened or endangered species were captured. A total of 556 high-frequency recordings were made at the acoustic monitoring sites. Recordings included calls with characteristics indicative of the presence of big brown bat, silver-haired bat, red bat, hoary bat, little brown myotis, northern myotis, and tri-colored bat.

Hoary bat (Lasiurus cinereus) collected during 2003 bat survey.

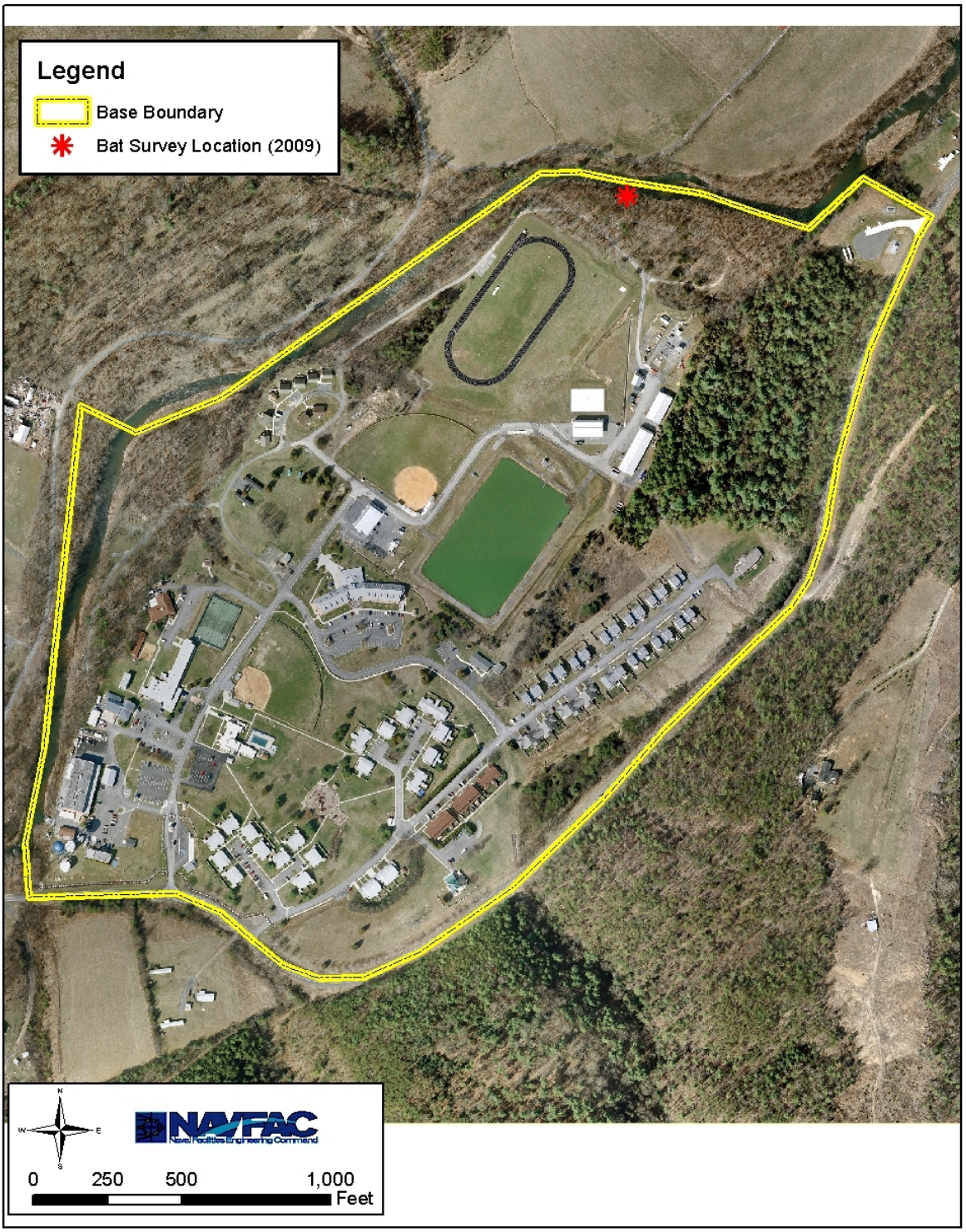

Figure 3-7. Survey Sites for Fauna on Main Base.

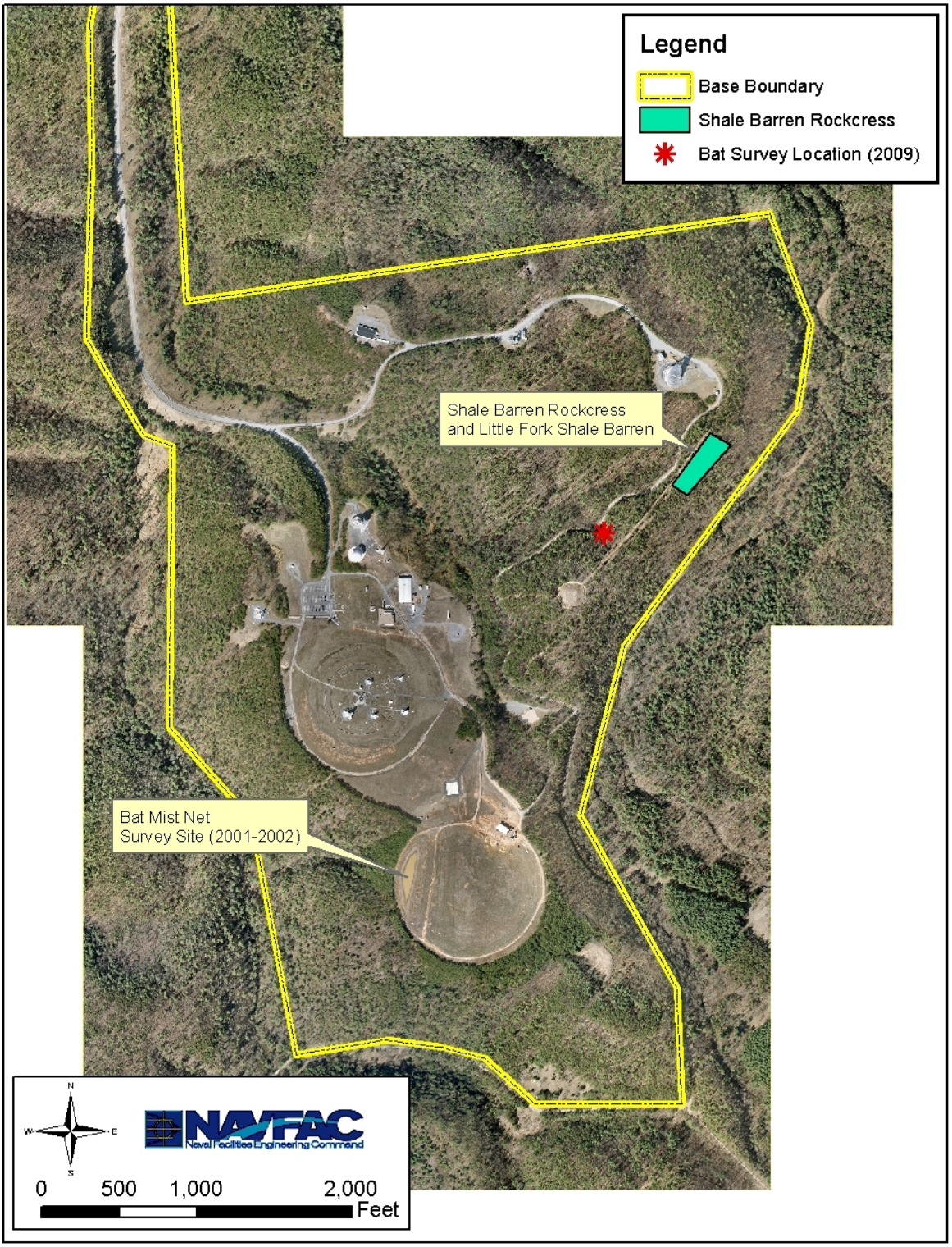

Figure 3-8. Survey Sites for Fauna and Flora on Operations Area.

Additional calls identified with a high degree of confidence include Rafinesque's big-eared bat, evening bat, and the cryptic species little brown/Indiana myotis. Additional physical capture efforts to target these species are warranted to confirm their presence (BCM 2009). A list of bats identified in these surveys, and other mammals likely to occur in the area is provided in Appendix B, Enclosure 1.

Mist net construction for bat survey.

3.7.2 Birds

The Ridge and Valley Physiographic area provides suitable habitat for an abundance of resident and neotropical migratory birds. Species groups include the following: waterfowl; birds of prey such as vultures, eagles, hawks, and falcons; fowl-like birds such as turkey, grouse, and quail; long-legged wading birds such as herons; nonpasserine land birds such as pigeons, doves, nighthawks, kingfishers, and woodpeckers; and, a variety of passerine (perching) birds. Infrequent birds to the area include a flock of double-crested cormorants that visited the polishing pond on the Main Base in the spring. Other migratory species that may use the available habitat at NIOC Sugar Grove include golden-winged warbler, pine warbler, prairie warbler, and vesper sparrow. A list of birds likely to occur in the vicinity of NIOC Sugar Grove as residents or migrants is provided in Appendix B, Enclosure 2. Surveys conducted by the Institute for Bird Populations (IBP) in 2002 recorded 95 bird species on NIOC Sugar Grove. The breeding status was recorded as visitor for 21 species, confirmed breeding for 45 species, probable breeder for 25 species, and rare migrant for four species identified at the base.

The bald eagle (*Haliaeetus leucocephalus*) is a known transient of NIOC Sugar Grove, however, no nests have been documented on the base. The bald eagle was removed from the federal list of threatened and endangered wildlife on 7 July 2007 (U.S. Department of Interior 2007), and the USFWS established National Bald Eagle Management Guidelines (USFWS 2007d) in 2007 that include protective measures outlined in the Bald and Golden Eagle Protection Act (16 USC 668–668c) and the Migratory Bird Treaty Act (16 USC 703–712). Transient bald eagles are covered by the National Bald Eagle Management Guidelines.

The IBP has been coordinating the Monitoring Avian Productivity and Survivorship (MAPS) Program at the Base since 1989, to provide population and demographic data for landbirds found on federally managed public lands, such as military installations, national forests, national parks, and wildlife refuges. Under this program, two MAPS stations were re-established and operated at NIOC Sugar Grove in 2007: the South Fork Potomac River station and the Beaver Creek station. Data were gathered from 10 mist nets installed at each station in the same locations at which they were established in 2001. There was substantial and significant or near-significant decreases in breeding populations, numbers of young, and reproductive success between 2001 and 2007, which were generally observed both region-wide and species-wide (IBP 2008). The 2008 MAPS study completed the 8th year of studies conducted at NIOC Sugar Grove, which targeted the following seven species: eastern towhee, chipping sparrow, song sparrow, northern cardinal, indigo bunting, common grackle, and American goldfinch.

Grasshopper sparrow (Ammodramus savannarum).

According to the 2008 MAPS study, breeding populations, numbers of young, and reproductive success all increased slightly between 2007 and 2008 (IBP 2009). Total adult population sizes in 2008 were highest at South Fork Potomac River and were lowest at Beaver Creek. Among the

eight target species, four species showed higher productivity at the MAPS stations than in the Northeast Region, three species showed slightly higher values, and only one species showed lower productivity at the MAPS stations at NIOC Sugar Grove than in the Northeast Region. Three species of management concern (USFWS Birds of Conservation Concern) were captured during the 2008 MAPS study, including worm-eating warbler (abundant; 6.6 adults per 600 net hours), Louisiana waterthrush (exceeded 3.0 adults per 600 net hours in 2007 but not in 2008), and wood thrush (two captures in 2008) (IBP 2009). The MAPS program at the Base has been discontinued, and there are no plans or funding in place at this time to continue monitoring in future years. A DoD Legacy Program project that involves surveying of the migratory birds was initiated in the spring and summer of 2009, and will be completed in 2010 at the Main Base. This research is intended to provide important information about birds breeding on military bases within the United States, which spend their non-breeding season in the tropics. These data will be included in subsequent updates of the NIOC Sugar Grove INRMP.

Red-tailed hawk (Buteo jamaicensis) at the 2007 Safety Fair.

3.7.3 Herpetofauna

Herpetofauna include amphibians (toads, frogs, and salamanders) and reptiles (turtles, lizards, and snakes). The abundance of most species of herpetofauna at NIOC Sugar Grove is relatively in proportion to their abundance throughout West Virginia. The exception is turtles, which are generally uncommon at NIOC Sugar Grove because of the lack of suitable habitat. Cool moist mountain slopes and moist coves provide ideal habitats for a wide variety of amphibians. Many amphibians require wetlands to complete their life cycle, but some, such as woodland salamanders, find suitable habitat in the moist interior of rotten logs or damp leaf litter. Reptiles that do occur throughout the area, are primarily associated with the riparian and other forested areas. There are 15 snake species that would be expected to occur in the vicinity of NIOC Sugar Grove; only the northern copperhead and timber rattlesnake are venomous. The WVDNR

conducted pitfall trapping for reptiles and amphibians in 2001 and 2002 (WVDNR 2003). A total of 105 reptiles and amphibians representing 14 species were caught in pitfalls. A list of the herpetofauna that may occur in the vicinity of NIOC Sugar Grove is provided in Appendix B, Enclosure 3.

Tree frogs (Hyla sp.).

3.7.4 Fish

The South Fork River and Little Fork are classified as high quality streams by the WVDNR, and they support a large variety of aquatic life that includes game fish species. Lick Run and Wolf Run also support fish and aquatic invertebrates, but the small size and ephemeral nature of the streams preclude the presence of game fish species. Smallmouth bass and rock bass are primary game species that occur in the South Fork River at the Main Base, but only a few small pools are available most of the year. Other fishes that occur include sunfish, darter, and minnow. The old polishing pond contains a remnant population of sunfish and bass from undocumented historic stocking efforts. A list of fish species likely to occur in the vicinity of NIOC Sugar Grove is provided in Appendix B, Enclosure 4.

3.7.5 Vegetation

The Main Base is mostly mowed lawn and landscaped areas except for a narrow, forested band along the river and one small white pine stand. The dense white pine stand includes eastern red cedar and eastern hemlock.

Floodplain communities are relatively uncommon throughout West Virginia because most streams tend to be incised with steep banks, and the narrow band of streamside trees on the Main Base is characteristic. Common trees along the river include sycamore, red maple, sugar maple, black walnut, eastern cottonwood, black cherry, basswood, shagbark hickory, and American elm. Understory species include spicebush, multiflora rose, smooth sumac, bladdernut, silky dogwood, and elderberry. Herbaceous vegetation includes bedstraw, water hemlock, giant ragweed, climbing buckwheat, bindweed, morning glory, greenbrier, asters, flatsedges, rushes,

and sunflowers. Atlantic Division, Naval Facilities Engineering Command conducted an urban forest inventory in 2001. Street trees were identified and mapped using AutoCAD. A list of plants expected to occur in the vicinity of NIOC Sugar Grove (WVNHP 1996) is presented in Appendix B, Enclosure 5.

Vegetative cover at the Operations Area includes oak-hickory-pine and cove forests and open fields dominated by broomsedges and fescue. Post, blackjack, scarlet, black, and chestnut oaks are most common on the driest slopes. Pitch, table mountain, and Virginia pines occur primarily on southern slopes as subclimax communities. Other associated species include pignut hickory, white pine, blackgum, black locust, sassafras, and flowering dogwood. Shrub layers include redbud, blueberry, mountain laurel, scrub oak, winged sumac, and azalea. Herbaceous vegetation is generally sparse due to the multilayer canopy of trees and shrubs. Pink lady's slipper, alumroot, foxglove, tickseed, and plantain occur in the ground layer.

The cove hardwoods community comprises a relatively large number of codominant species of trees, including yellow poplar, white basswood, sugar maple, red oak, white oak, white ash, red maple, sourwood, black walnut, shagbark hickory, American elm, and slippery elm. The understory also tends to be diverse, and common species include flowering dogwood, umbrella magnolia, Fraser's magnolia, blue beech, eastern hop-hornbeam, holly, and serviceberry. Shrubs include witch-hazel, pawpaw, hydrangea, blackhaw, alternate-leaf dogwood, and spicebush. Herbaceous vegetation appears before leaves develop on the deciduous trees; Jack-in-the-pulpit, white fawn lily, Indian cucumber-root, Solomon's seal, plumelily, hepatica, violet, wild blue phlox, and bluebells are outstanding species. Numerous ferns include fragile, marginal shield, Christmas, lady, and maidenhair ferns.

Shale barrens are a unique vegetative community found on the Operations Area. These are sparsely vegetated steep slopes with characteristic and endemic species. Representative species include hairy beardtongue, starry campion, woodland sunflower, bracted plantain, and early goldenrod.

There are seven primary forest cover classifications designated by the Society of American Forester (SAF) represented on NIOC Sugar Grove (Eyere 1980). The narrow band of riparian habitat and the remnant planted white pine stand represent two cover types on the Main Base.

The forested communities on the Operations Area are characteristic of the region. A brief summary of each type is presented below.

1. Eastern White Pine (Type 21). Eastern white pine comprises the majority of the stocking and characteristically occurs in pure stands. Associated species include yellow poplar, eastern hemlock, northern red oak, and white oak on moist sites; white and chestnut oaks, hickories, shortleaf and pitch pines occur on drier sites. Understory vegetation is usually sparse beneath fully stocked stands, compared to pine-hardwood mixtures at the same density.
2. Eastern White Pine, Hemlock (Type 22). Eastern white pine-hardwood comprises the majority of stocking at near equal rates. Red maple is the most common associate in this subclimax type. This type tends to occur in the moister mesic sites and frequently establishes itself following a disturbance such as drought, fire, or windthrow. The climax is usually hemlock unless there is a high hardwood component. Except for a mixture of shade-tolerant hardwood seedlings, understory vegetation is absent. Ground cover, if present, is usually bracken fern, clubmoss, and starflower.
3. Eastern White Pine, Northern Red Oak, Red Maple (Type 20). This type occurs in association with white ash, black cherry, basswood, sugar maple, and eastern hemlock. Other trees commonly associated include paper birch, yellow birch, and beech. Chestnut was once a prominent component before the chestnut blight eliminated the species. Understory vegetation is well developed including witch hazel, maple-leaf viburnum, mountain laurel, Canada mayflower, and woodfern.
4. Eastern White Pine, Chestnut Oak (Type 51). These species together comprise the majority of stocking. On dry sites such as ridges and upper slopes with southerly or westerly exposures, associated species include scarlet, white, post, and black oaks; hickory; blackgum; sourwood; red maple; and pitch, table mountain, Virginia, and shortleaf pines. Associates on moister slopes with northerly or easterly exposures include northern red and white oak, black locust, yellow poplar, red maple, and black cherry

   The white pine-chestnut oak type may represent a physiographic climax. Understory vegetation includes blueberry, huckleberry, flowering dogwood, Indian turnip, and hay-scented fern.
5. Yellow Poplar, White Oak, Northern Red Oak (Type 59). These species together comprise a majority of the stocking. Mesic associates include black locust, white ash, black walnut, hickory, and eastern hemlock. This type is designated “cove hardwoods” but occurs extensively on north- and east-facing slopes and well-drained flats. Common understory trees include maples, hickory, and black cherry. Dense colonies of ferns frequently form the major herbaceous cover.
6. River Birch-Sycamore (Type 61). River birch and sycamore occur as dominants in narrow bands along streams and in floodplains. Associated tree species include black willow, cottonwood, red maple, silver maple, boxelder, hackberry, American elm, slippery elm, and shagbark hickory. Hazel alder, American bladdernut, American hornbeam, grape, poison ivy, Joe pye-weed, small yellow crownbeard, and spotted jewelweed occur in the understory.

7. Virginia Pine, Oak (Type 78). Virginia pine-oak type includes a variety of oak species including scarlet, black, chestnut, white, and post oaks. Shortleaf pine, table mountain pine, persimmon, blackgum, hickory, and sourwood are also associated species. On upper slopes and ridges, this type occurs on dry shale barrens and shallow rocky soils where drought-resistant pine can compete successfully with the hardwoods. Characteristic understory vegetation includes winged sumac, blackberry, Virginia creeper, broomsedge, and wintergreen.

3.7.6 Invasive Species

An invasive species survey was conducted at NIOC Sugar Grove during August 2003 (Appendix C). The checklist of invasive plant species compiled by the West Virginia Native Plant Society was used to identify invasive plant species located on the Main Base and the Operations Area. The West Virginia Native Plant Society classifies invasive plants under one of four categories according to their severity of threat: severe threat, significant threat, lesser threat, or watch list species. Results of the invasive species survey identified 14 species classified as a "severe threat", which are those species that spread easily into native plant communities and displace native vegetation in West Virginia. Two invasive species identified on the base are classified as a "significant threat", which are those species that have the capacity to invade natural communities, but have fewer characteristics of invasive plants compared to species in the severe threat category. Twenty three (23) invasive species were identified on the base that can be classified as a "lesser threat" or "watch list" species. The "lesser threat" category defines those species that tend to remain in disturbed corridors and do not readily invade natural areas; and the "watch list" category defines invasive plants that are problematic elsewhere, but currently do not

Table 3-3. Invasive Plant Species Observed on NIOC Sugar Grove, August 2003. Severe and Significant Threat Category.

Scientific Name	Common Name	Occurrence-Observations
Severe Threat Category		
Arctium minus	common burdock	Operations Area - scattered along roadsides, especially along the south boundary road.
Centaurea biebersteinii [maculosa]	spotted knapweed	Main Base – scattered throughout open areas and along the South Fork River streambank. Operations Area – Scattered throughout open areas and along roadsides.
Coronilla varia	crown vetch	Main Base – scattered throughout open areas. Operations Area – Scattered throughout open areas and on slopes.
Dipsacus laciniatus	laciniate wild teasel	Main Base - scattered along the South Fork River streambank. Operations Area – scattered throughout open areas, especially on the leach field by the ammo bunker.
Eleagnus umbellata	autumn olive	Main Base and Operations Area – scattered individuals occur on forested edges.
Glechoma hederacea	ground ivy	Main Base – scattered throughout turf grass areas.
Hesperis matronalis	dame's rocket	Main Base - scattered along the South Fork River streambank in small clumps.
Lespedeza cuneata	sericea	Main Base – scattered throughout and along roadsides adjacent to the running track. Operations Area – established as dense stands throughout the open areas and along all roadways.
Lonicera japonica	Japanese honeysuckle	Main Base and Operations Area – widely scattered throughout open areas along woodland borders and on slopes.

Table 3-3. Invasive Plant Species Observed on NIOC Sugar Grove, August 2003. Severe and Significant Threat Category (continued).

Scientific Name	Common Name	Occurrence-Observations
	Severe Threat Category	
Lonicera tatarica	tartarian honeysuckle	Main Base – scattered throughout the South Fork River riparian woodland. Operations Area – Scattered along woodland borders and openings, and along the main entrance access road.
Lythrum salicaria	purple loosestrife	Main Base - Main Base - scattered along the South Fork River streambank in two small clumps.
Melilotus officinalis	white sweet clover	Main Base – scattered along roadsides adjacent to the running track. Operations Area – scattered in the antenna fields and along slopes adjacent to the main entrance access road.
Rosa multiflora	rambler rose	Main Base – scattered throughout the South Fork River riparian area. Operations Area – scattered individual clumps along woodland borders and Little Fork Road.
Microstegium vimineum	eulalia	Main Base – scattered small stands along the South Fork River streambank. Operations Area – dense stands along the Little Fork Road.
	Significant Threat Category	
Cirsium vulgare	common thistle	Main Base – scattered throughout open areas. Operations Area – Scattered throughout open areas and on slopes.
Verbascum thaspus	great mullein	Operations Area – scattered individuals in the open antenna fields and slopes adjacent to the main entrance access road

demonstrate a threat to natural areas in West Virginia. Table 3-3 lists the severe threat and significant threat invasive species documented on the base, and a description of their location.

The most common invasive species in terms of abundance and distribution on the Main Base were tartarian honeysuckle and rambler rose. The most common invasive species on the Operations Area were sericea and spotted knapweed. The other invasive species observed were either widely scattered individual plants or low-density populations confined to small areas. However, these less abundant species are also capable of becoming problematic. Management recommendations to control the spread of invasive species are provided in Section 5.0.

3.8 Rare, Threatened, and Endangered Species

Requests for information on rare, threatened, and endangered species were submitted to the USFWS and West Virginia Natural Heritage Program (WVNHP) (Appendix A). An inventory was conducted by WVNHP in 1989 to identify rare species or communities that exist on NIOC Sugar Grove (WVNHP 1989). The intent of the study was to conduct floristic surveys of all ecosystems on the station, to search for rare butterflies on the shale barrens, and to search for shale barren endemic rare plants. Only species with a state rank of critically imperiled (S1), imperiled (S2), or rare (S3) are regularly inventoried by the WVNHP.

3.8.1 State-Listed Species

No rare, threatened, or endangered species are known to occur on the Main Base. A search of the WVNHP database indicated that several species of concern are known to occur on the Operations Area, including five rare plant species and one state imperiled plant species (also listed as federally endangered) at the Little Fork Shale Barren (LFSB), and three rare plant species, one state imperiled butterfly species, and one state critically imperiled butterfly species at the Lick Run Shale Barren (LRSB) (see Table 3-4). The presence of rare and endangered species on the LFSB and LRSB makes them among the most significant shale barrens in this region of the state.

Additional rare species occur near the beaver pond and on the northern portion (secondary dry-mesic forest) of the Operations Area, southeast of the supply depot.

Table 3-4. State Rare, Threatened, and Endangered Species on Operations Area.

Scientific Name	Common Name	State Rank[1]
Little Fork Shale Barren		
Clematis albicoma	white-haired leatherflower	S3
Calystegia spithamaea ssp. *purshiana*	shale barren bindweed	S3
Solidago arguta var. *harrissii*	shale barren goldenrod	S3
Arabis serotina	shale barren rockcress	S2, LE
Taenidia montana	mountain pimpernel	S3
Helianthus laevigatus	smooth sunflower	S2
Lick Run Shale Barren		
Euchloe olympia	olympia marble butterfly	S2, S3
Pyrgus wyandot	grizzled skipper butterfly	S1
Clematis albicoma	white-haired leatherflower	S3
Calystegia spithamaea ssp. *purshiana*	shale barren bindweed	S3
Oenothera argillicola	shale barren evening-primrose	S3
Beaver Pond		
Pseudotriton ruber ruber	red salamander	S3
Zapus hudsonius	meadow jumping mouse	S3
Synaptomys cooperi	bog lemming	S2
Secondary Dry-Mesic Forest		
Prunus alleghaniensis	Allegheny plum	S3

[1] S1 critically imperiled in state; S2 – imperiled in state; S3 – rare in state; LE – federally endangered

Although state-listed species have no protection under the ESA of 1973, as amended, Navy policy is to include these species in considerations for environmental planning and to avoid adverse impacts whenever possible.

3.8.2 Federally Listed Species

The USFWS database search indicated that three federally listed species occur on or in the vicinity of NIOC Sugar Grove (Table 3-5). The entire facility provides foraging and roosting habitat for the endangered Indiana bat and foraging habitat for the endangered Virginia big-eared bat. However, neither of these species were documented during the bat survey conducted at the installation during July 2009.

The bald eagle was recently delisted by USFWS (72 FR 37345-37372; 9 August 2007). NIOC Sugar Grove is within the foraging range of a nesting pair of bald eagles, which have fledged young every year since 1997 from a nesting site located between the Main Base and the Operations Area. Currently, no eagle nests have been observed on base, however transient eagles can be observed occasionally.

Table 3-5. Federally Listed Species and Species of Concern on or in the Vicinity of NIOC Sugar Grove.

Scientific Name	Common Name	Status[1]
Haliaeetus leucocephalus	bald eagle	Delisted Taxon-Recovered
Myotis sodalist	Indiana bat	E
Corynorhinus townsendii virginianus	Virginia big-eared bat	E
Arabis serotina	shale barren rockcress	E
Prunus alleghaniensis	Allegheny plum	SC
Lanius ludovicianus migrans	loggerhead shrike	SC
Plethodon punctatus	Cow Knob salamander	SC
Scutellaria ovata ssp. *pseudoarguta*	heart-leaved skullcap	SC
Paxistima canbyi	Cranby's Mountain lover	SC
Monarda fistolosa ssp. *brevis*	horse mint	SC
Delphinium exaltatum	tall larkspur	SC
Pyrgus wyandot	grizzled skipper butterfly	SC

[1] T - threatened; E - endangered; SC - species of concern

Eight species of concern have distributions that include Pendleton County. Species of concern are those species for which the USFWS has information indicating that protection under the ESA may be warranted, but for which it lacks sufficient information on status and threats to proceed with preparation of a proposed listing. As of 5 December 1996, species of concern lack formal recognition as candidates for possible future listing under the ESA. However, the USFWS and the WVDNR encourage continued consideration of these species in environmental planning.

Shale Barren Rockcress (SBRC). In addition to the listed species, the shale barren rockcress (SBRC) was federally listed as endangered on 14 August 1989 (WVNHP 1996). Locations of these sensitive habitats are retained in the natural resources office at NIOC Sugar Grove. The SBRC is endemic to the mid-Appalachian shale barrens in the Ridge and Valley Physiographic

Province of the mid-Appalachian Mountain Range in West Virginia and Virginia (USFWS 1992). The SBRC is found in six Virginia counties and three West Virginia counties. The largest known population was recorded in 1992 at LFSB on NIOC Sugar Grove. One of the key pollinators of SBRC is the grizzled skipper butterfly, which once inhabited the areas where SBRC and Canada cinquefoil were common. During the late 1980s and early 1990s the populations of grizzled skipper became fragmented and eventually disappeared due to the spraying of chemicals used to control gypsy moth (Markham and Niethamer 2009).

As part of a biological assessment report for SBRC submitted to Navy in 2006, a reintroduction project for the grizzled skipper was proposed (Nott 2006), as well as reestablishment of other species endemic to the rare shale barren habitats of the Appalachians. This report suggested the reintroduction of two species of butterfly in the shale barrens, the grizzled skipper and the Olympia marble, and recommended that the use of pesticides to control gypsy moth infestations be restricted in the vicinity of shale barrens. The LFSB provides an ideal location for reintroduction for several reasons. First, access to this high security DoD installation is extremely limited. Secondly, grizzled skipper larvae feed exclusively on Canada cinquefoil, which appears to benefit from minimal invasive management of the trails and open clearings adjacent to the barren, and thirdly, the pesticide spraying program provided by the USFS can be controlled, in order to limit impacts to the barren and adjacent habitats.

Attempts to locate historical populations of the grizzled skipper, and reintroduce the two butterfly species in the 2008 field season were conducted under the supervision of Dr. Phil Nott (IBP) with help, advice, and guidance from Steve Niethamer of NIOC Sugar Grove (Nott 2008). To recover the lost populations of grizzled skipper, the WVDNR has now chosen NIOC Sugar Grove as one of its primary sites for the recovery program, largely due in part to Sugar Grove's successful collaboration with WVDNR over the past 10 years to protect SBRC (Markham and Niethamer 2009).

The LFSB is typical shale barren, being classified in the Virginia pine woodland group (USFWS 1996). The typical shale barren is Virginia pine woodland at 1,700–2,600 feet elevation in the south half of the West Virginia shale barren range (Pendleton, Greenbrier, and Monroe counties).

Vegetative cover of the shale barrens ranges from 5–40 percent, litter ranges from 5–55 percent, and soils are primarily shale fragments (channery soil type).

3.9 Cultural Resources

Human occupation in the region began during the Paleo-Indian Period (ca. 10,000–8,000 B.C.), and consisted of bands of nomadic hunters and gatherers exploiting a range of food resources, perhaps including Pleistocene megafauna. Settlements may have included quarry sites, outlying hunting stations, and riverine base camps. Four prehistoric sites have been identified at NIOC Sugar Grove. These sites include two lithic scatters of unknown temporal affiliation, one Late Prehistoric site, and one short-term camp site that were occupied during the Middle through Late Archaic periods (Atlantic Division, Naval Facilities Engineering Command 1998).

European settlers first entered the region of Pendleton County, which was then part of Virginia, during the 1740s and 1750s. The earliest tracts were patented in the middle and lower parts of the South Branch and South Fork valleys, in the vicinity of Fort Seybert and Mill Creek Valley. Two historic archeological sites have been identified at NIOC Sugar Grove. Both sites represent late nineteenth- to mid-twentieth-century farmsteads. The first site was the residence of the Pitsenbarger family and the second belonged to the Logan family (Atlantic Division, Naval Facilities Engineering Command 1999).

South Fork Valley, West Virginia.

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4.0 MANAGEMENT ISSUES

Management issues are primarily indicative of the limited amount of land available on the Main Base for facilities development and past land use practices, environmental stewardship opportunities, and requirements for regulatory compliance. In addition, opportunities exist to cooperate with the USFS and WVDNR on forest management, outdoor recreation, protection of rare and endangered species, and development of wetlands. Due to the location of NIOC Sugar Grove within the Chesapeake Bay watershed, management of natural resources at NIOC Sugar Grove is further reinforced with the passing of EO 13508 on May 15, 2009. This EO established requirements for controlling pollution from all sources, protecting and restoring living habitat, and conserving lands of the military installations existing within the watershed. Hence EO 13508 will strengthen the involvement of the Base with several projects that are planned to help restore water quality within Chesapeake Bay.

4.1 Storm Water

Surface drainage is a critical management issue on the Main Base because of the storm water runoff on steep slopes in the housing areas and the close development of facilities in the administrative areas. Storm water runoff has historically created severe problems on the Operations Area and continues to be a management issue. The Storm Water Management Plan establishes a comprehensive program to minimize storm water pollution at NIOC Sugar Grove (Mid-Atlantic Division Naval Facilities Engineering Command 2008). Best Management Practices (BMPs) identified in the 2008 plan that satisfy the requirements of the minimum control measures

Inspection of biolog installed in base housing area.

required by the National Pollutant Discharge Elimination System (NPDES) are identified as follows:

1) Public education and outreach on storm water impacts.

2) Public participation / involvement.

3) Illicit discharge detection and elimination.

4) Construction site storm water runoff control.

5) Post-construction storm water management in new development or redevelopment.

6) Pollution prevention / good housekeeping for municipal operations.

The Storm Water Management Plan contains detailed information on storm water BMPs, and practices that will help the base meet the six minimum control measures provided above. With the exception of the outfall associated with the wastewater treatment lagoon (described in Section 4.1.1), none of the outfalls are presently subject to the NPDES storm water regulation.

4.1.1 Main Base

The surface drainage problems experienced at the Main Base are representative of an inadequate storm drainage system. Historically, because of inadequate system sizing or improper site grading, surface water runoff ponds in low-lying areas. Ten (10) surface drainage and erosion problem areas were addressed in 1998, and engineering designs were implemented for making improvements to surface drainage systems at the Main Base (Navy 1998b). In addition, nine surface drainage problem areas were identified in 2002 for developing corrective measures. Triad Engineering, Inc. provided 35 percent designs for correction of surface drainage problems.

A total of 18 outfalls are located on the Main Base, including 16 point source outfalls, and two sheetflow outfalls (Mid-Atlantic Division Naval Facilities Engineering Command 2008). The Main Base also has a non-discharge area, ND-001, associated with the wastewater treatment lagoon. Storm water flows from this area drain to the waste water treatment lagoon where they are treated and discharged under NPDES permit WV0103110. Waters collected by the storm water outfalls of the Main Base discharge into South Fork River.

4.1.2 Operations Area

Surface drainage has been a management issue since development of the Operations Area. Storm water runoff caused severe erosion along the hillside slopes adjacent to the antenna sites. Nine storm water runoff problem areas were identified in 1998. Installation of riprap and development of storm water detention ponds based on erosion control studies have reduced erosion problems associated with surface drainage (Navy 1998b). However, routine maintenance of riprap channels and detention ponds is required for management of surface drainage features.

A total of 23 outfalls are located in the Operations Area, including 14 point source outfalls, and nine sheetflow outfalls (Mid-Atlantic Division Naval Facilities Engineering Command 2008). Outfalls associated with the Operations Area are dispersed over a mountainous area predominantly consisting of undeveloped, wooded and steeply sloped topography. Some of the outfalls that receive sheetflow discharge to drainage ditches located downstream of the developed area, and prior to the waters discharging into state waters. Waters collected by the storm water outfalls of the Operations Area discharge into Lick Run and unnamed tributaries to Lick Run, Lick Fork, and Little Fork.

4.1.3 Nonpoint Source Pollution Control

Projects that impact 1 acre or greater require a NPDES permit to control or prevent discharge of pollutants. The West Virginia nonpoint source pollution control plan addresses projects less than 3 acres in size. There are five basic components used to implement the state management program including, education, technical assistance, financial incentives, and regulation (DWR 1989a). The key to success of the program is greatly dependent on implementation of BMPs by landowners.[1]

The EPA Nonpoint Source Guidance defines the cause of non-point source pollution as alterations or land use resulting in an adverse impact to water quality and integrity (USEPA 1987). NPS does not result from a discharge at a single specific site, but generally results from surface water runoff, precipitation, atmospheric deposition, or percolation. NIOC Sugar Grove is in the Potomac/South Branch Drainage Basin and South Fork Watershed identified in West

[1] The state point of contact for compliance with West Virginia's NPS pollution control plan is Mr. Bill Brannon, NPS Program Manager, Office of Water Resources, Division of Environmental Protection, (304) 558-2108.

Virginia's Non-point Source Pollution Assessment (DWR 1989b). The 1989 assessment indicated that the South Fork River was only partially supporting use as a domestic water supply because of siltation, high ammonia concentration, organic enrichment, and low dissolved oxygen. The once pristine integrity of the watershed has been severely degraded due to extensive stream channelization resulting from past flooding.

Erosion and sedimentation are the primary sources of potential non-point source pollution at NIOC Sugar Grove. BMPs pertinent to NIOC Sugar Grove include those methods, measures, or practices designed to prevent or reduce pollution. These may be structural or nonstructural controls and operation and maintenance procedures. The USDA Soil Conservation Service (SCS) Technical Guide (USDA 1989) and the Construction Best Management Practices Manual, DWR, state of West Virginia, provide lists of acceptable BMPs for non-point source pollution categories (DWR 1983). Coordination with the SCS and DWR is helpful to implement selected BMPs for development or redevelopment activity that might result in non-point source pollution. The West Virginia Erosion and Sediment Control Handbook for Developing Areas, revised May 1993 (USDA 1993a), provides technical guidance and guidelines for implementation of erosion and sedimentation control practices. These documents should be available to the Natural Resources Manager and constitute the basis for non-point source pollution control at NIOC Sugar Grove.

The most important aspects of using BMPs are timing of installation and maintenance of erosion and sediment control devices and structures. It is obvious that the BMP must be functioning to be effective in reducing pollution, but this obvious fact is often neglected during plan development and construction. Planning developments to best fit the environment, minimize earthwork, and maintain natural vegetation and forested riparian buffers are primary considerations to reduce non-point source pollution. Maintenance of vegetative cover is the most efficient and effective practice to control erosion. Typically, structural and nonstructural measures include the following:

- Mulching, temporary seeding, permanent seeding, filter fabrics, and straw bales to control raindrop, sheet, and rill erosion;
- Diversions to shorten slopes;
- Sodding or riprapping concentrated flow areas to prevent gully erosion; and,

- Sediment basins and/or detention basins to capture sediment flow and to decrease peak volumes of flow resulting from increasing impermeable areas.

BMPs that are included as part of the storm water management program at NIOC Sugar Grove are listed below, with brief narrative descriptions:

Structural BMPs

- Infiltration trenches – incorporate infiltration trenches (backfilled with coarse aggregate) into multi-site developments where open area is restricted (such as the Main Base) to provide temporary storage of storm water runoff and groundwater recharge.
- Grassed swales – increase pervious area and improve water quality.
- Vegetative filter strips – increase pervious area and improve water quality.
- Vegetated natural buffers – increase pervious area and improve water quality.
- Open spaces – increase pervious area and improve water quality.
- Detention ponds – collect storm water runoff and to control peak discharges for one or more design storm frequencies.

Nonstructural BMPs

- Pollution prevention – focus on eliminating the use of pollutants, reducing the quantity and/or toxicity of pollutants, and recycling waste materials; reduce or eliminate pollutants at their source, thereby reducing or avoiding pollutant loads in storm water runoff. ;
- Preventive construction techniques – focus on practices designed to control pollution at the construction site, including developing an overall construction management plan that addresses erosion and sedimentation, equipment maintenance and repairs, waste collection and disposal, storm sewer inlet protection, dust control, storage of construction materials, demolition areas, and sanitary facilities.
- Outreach and education programs – include educating and encouraging station personnel to participate and support pollution prevention efforts through storm drain stenciling, recycling brochures, litter control, lawn and landscaping maintenance guidelines, safe use and disposal of household chemicals, and water conservation.
- Riparian areas – maintain natural vegetation along riparian areas helps to slow storm water runoff, trap sediments, and filter associated pollutants.

Combining structural and nonstructural BMPs in series rather than using a single method may improve control of non-point source pollution in storm water runoff. Sequencing may extend the lifetime of BMPs and reduce maintenance costs.

4.2 Soil Erosion and Sediment Control

Erosion and sedimentation are typically caused by runoff velocities that exceed the channel capacity, such as 5 feet per second (fps) for vegetative-lined channels. The erosion typically occurs downstream of a storm culvert or a storm sewer system where the runoff is concentrated and high velocities are obtained within the storm sewer or the ditch. All vegetative, structural, and management erosion and sediment control practices should be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook (1992) and West Virginia Erosion and Sediment Control Handbook for Developing Areas (USDA 1993).

4.2.1 Main Base

Soil erosion control problems exist in the housing and administrative areas. Engineering design solutions were implemented for 10 erosion control areas on the Main Base in 1998 (Navy 1998). Nine additional erosion problems have developed due to the construction of the new family housing and facilities in 2000. In addition to addressing these erosion problems, the 2008 Storm Water Management Plan provides recommendations for three structural BMPs that should be implemented at the Main Base to address sediment and soil erosion. These include stabilizing the swale leading from the vehicle fueling station; placement of riprap at Outfall 010 to prevent erosion of the riparian buffer; and placement of stone and compacted dirt around the catch basin located between the wastewater treatment plant and the running track.

4.2.2 Operations Area

Six detention ponds were constructed in 1999 to provide control of storm water runoff and subsequent erosion and sedimentation control (Figure 4-1). The ponds also have been designed to provide habitat diversity for a variety of aquatic species of wildlife by maintaining shallow flooding (Fredrickson and Taylor 1982). Pipes have been installed to completely drain the ponds if necessary. However, the shale clay surface soils are nutrient poor and lack adequate vegetative cover to prevent erosion or serve as useful wildlife habitat. Ponds 3 and 9 are located north of Building 303 and have an approximate combined capacity of 17,000 cubic feet. Pond 4 is located east of Building 303 and has an approximate capacity of 31,000 cubic feet. Pond 5 is located west of the Wullenweber II (Natural Resources Development Area) and has an

approximate capacity of 343,700 cubic feet. Pond 7 is a broad shallow pond located west of Building 350 and the Wullenweber No. 1 (Antenna Field); the approximate capacity is 120,000 cubic feet. Pond 8 is located northwest of Building 301 and has an approximate capacity of 61,400 cubic feet. Due to the well-drained soils in the area, only Pond 5 holds water. Development of ground vegetation around the detention ponds is necessary to provide adequate erosion and sediment control.

Pond 5 Erosion Control. To establish sufficient ground vegetation around the retention pond for erosion and sediment control, a 4-inch layer of topsoil was incorporated by light disking to establish a planting bed approximately 25–30 feet wide around the pond in September 2002. The prepared site was hydroseeded with red and sheep fescue. A variety of native plant species adapted to grow in the moist soil surrounding the pond, from water level extending out to 3 feet, and native plant species in the upland area from 3–25 feet from the edge of the retention pond, were hydroseeded in the spring 2003. The use of native warm season grasses and forbs was emphasized for the upland planting area. No chemical fertilizers or pesticides were used in the planting area.

The 2008 Storm Water Management Plan provides recommendations for four structural BMPs that should be implemented at the Operations Area to address erosion of soil. These include placement of riprap at Outfall 327-1 and 327-2 to prevent further erosion along the hillside; stabilization of the banks and ditch, and placement of erosion control logs at the end of the ditch located at the east end of Building 389 to prevent discharge of sediment; and, repair of the erosion associated with the gully located along the north side of the road between building 389 and the range, and along the road leading to the range.

Figure 4-1. Storm Water Detention Ponds on Operations Area.

4.3 Landscaping and Land Management

A major focus of landscaping and land management should be implementation of the President's Executive Memorandum on Environmentally Beneficial Landscaping – EO 50737. In support of this directive, the Navy issued guidance affecting use and selection of native plants on Navy lands. The cover letter from the Commander, Naval Sea Systems Command, which accompanied this guidance, encourages activities with natural resources managers to appoint a single point-of-contact to review all actions that may create new landscapes or alter existing ones. Under EO 50737, federal agencies are directed to implement the following items where cost-effective and practicable:

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

In 1997, the WVNHP compiled a draft checklist of invasive plant species of West Virginia. These species potentially threaten the quality of natural areas by invasion and competition with native species, and use of these plant materials should be avoided in landscaping and land management. In addition, invasive and exotic species should be eliminated on NIOC Sugar Grove where possible. The identification of invasive species and their locations around the Base provided in the invasive species inventory study will help to focus invasive species removal efforts in those areas that pose the most impact, and the continued use of volunteers and partnerships to assist with the removal of invasive species at the Base, will ensure that invasive species populations are addressed annually. Under EO 13112, Invasive Species, federal facilities are required to prevent the introduction of invasive species, detect and control such species, monitor invasive species populations, provide for restoration of native habitats that have been

invaded, conduct research on invasive species to prevent introduction and for sound control, and promote public education on invasive species.

Plants conserve water and improve water quality by intercepting water from precipitation, reducing flow velocities, and capturing and storing some of the water. This helps reduce storm water runoff that in turn reduces non-point source pollution. Erosion control is enhanced because the plant's roots help bind the soil at the same time the foliage is deflecting water and reducing flow velocities.

Maintenance of existing landscaping should be directed at implementing standard tree and shrub care practices and preventing unnecessary damage to landscaping from construction activities or careless grounds maintenance activities. Mower and string trimmer damage can facilitate insect pest infestation or disease infection. Implementing standard grounds maintenance practices that address protection of existing trees and shrubs can help resolve this problem. The American National Standards Institute (ANSI) has published a standard practices guide for tree, shrub, and other woody plant maintenance (ANSI A300-1995) and fertilization (ANSI A300 Part 2-1998). These standards documents complement ANSI Z133.1-1994, another national standards document that provides guidance on pruning, trimming, repairing, maintaining, removing trees, and cutting brush. These documents may be ordered through the ISA. The ISA has also published its own tree-pruning guidelines that incorporate the ANSI standards and provide more detailed instruction in pruning methods (ISA 1995b).

Planning for new landscaping should consider selection of plants or trees that are suited to the particular site conditions or the regional climate, planting trees or large shrubs sufficient distances away from buildings, and use of proper pruning practices (ISA 1997). Another consideration for landscape planning is potential tree and utility conflicts. Both existing utilities and proposed utilities should be considered when selecting plant material for use in landscaping and for siting the plant material within the landscape. Trees or shrubs that are to be planted in areas with overhead utilities should be selected for height and growth characteristics that will not cause problems later once the trees or shrubs have matured.

Another tree and utility conflict area involves tree roots and underground utilities. When planting in the vicinity of underground utilities, plants should be selected which have root

systems that will have the least likelihood of interfering with utilities. The ISA publishes a brochure with guidance for selecting trees and shrubs to avoid utility conflicts (ISA 1995c). This brochure illustrates acceptable zones for planting around buildings to avoid conflicts with utilities.

Arbor Day 2007.

Land management of the lawns and recreation fields includes mowing to 3-inch height and fertilizing. All control of weeds and unwanted woody vegetation is conducted by mechanical methods. Use of chemical fertilizers is minimized according to periodic soil tests coordinated with the Natural Resources Conservation Service (NRCS) to avoid over-application of nutrients and subsequent runoff into the Potomac River. Ditches that are used to direct storm water off site are not fertilized to avoid nutrient enrichment in runoff.

4.3.1 Main Base

The maintenance of urban landscaping, particularly urban shade trees, is very important. An inventory of trees was conducted in 2001 for managing urban forests and street trees (Atlantic Division Naval Facilities Engineering Command 2001b). The benefits of trees (Table 4-1) can be grouped into social, community, environmental, and economic categories (International Society of Arboriculture [ISA] 1995a). Carefully planned and designed landscaping can achieve any or all of these benefits (see also Grey 1996).

Construction of the boundary fence line around the Main Base was completed in 2009. A riparian buffer consisting of native and non-native (naturalized) oak trees was planted in disturbed areas along the South Fork River (Figure 4-2). Width of the riparian buffer is variable, but averages approximately 40 feet. The removal of invasive species in the riparian buffer will be performed annually during the month of September, using a volunteer workforce.

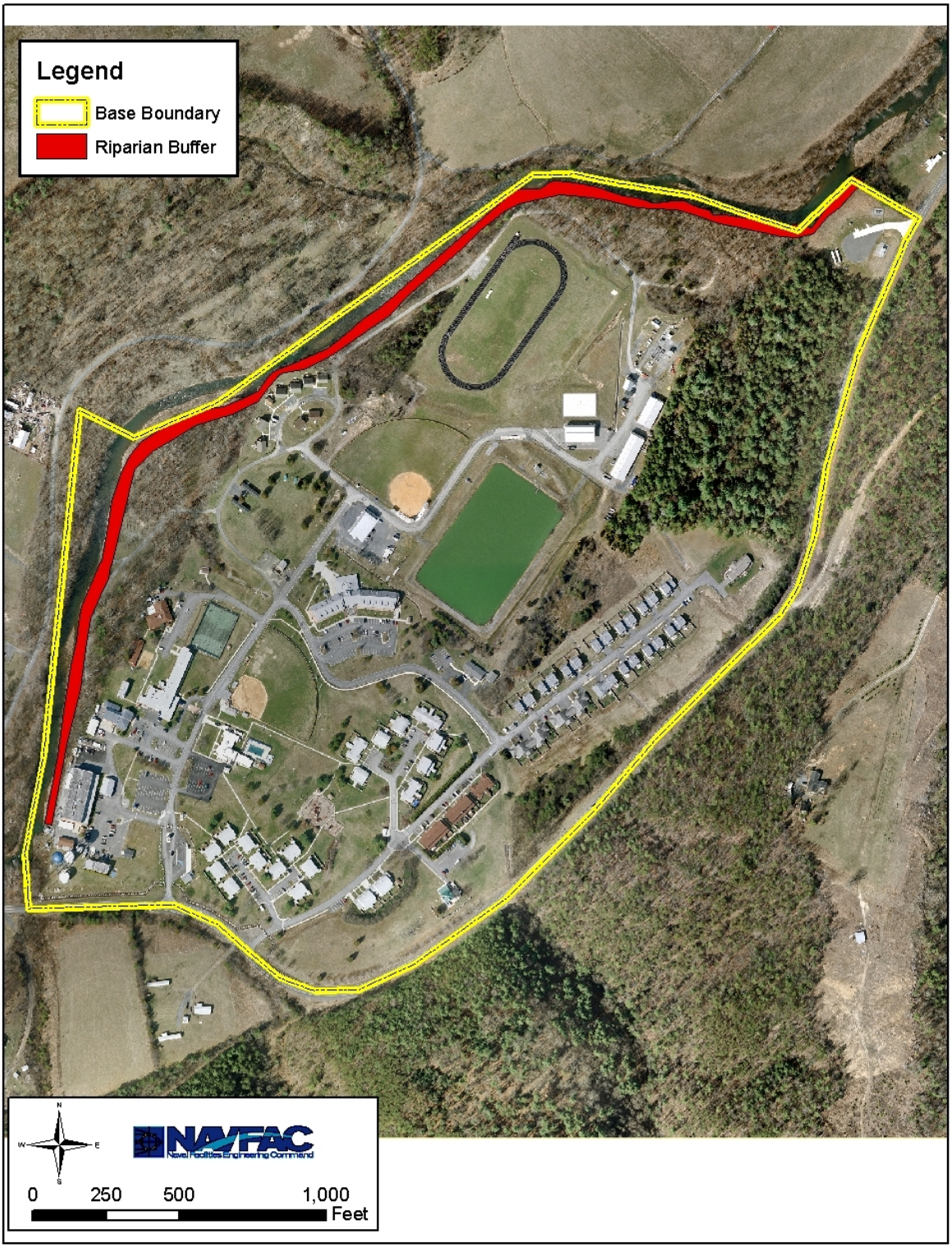

Figure 4-2. Main Base Riparian Buffer.

Table 4-1. Urban Shade Tree Benefits.

Group	Benefit
Social	Aesthetic beauty of trees Living memorials
Community	Provide privacy and emphasize views Screen out objectionable views Reduce glare and reflection off buildings Direct pedestrian traffic Provide backgrounds that soften, complement, or enhance architecture
Environmental	Moderate climate Improve air quality Improve water quality and conserve water Provide habitat for wildlife
Economic	Reduce grounds maintenance and energy Increase property values Community reductions in costs associated with treatment of storm water pollution Reduce demand for electricity during peak demand times Less requirement for expensive measures to control air pollution

4.3.2 Operations Area

Forested cover provides the best protection against soil erosion and sedimentation on the Operations Area. The severe erosion that resulted when the antenna sites were cleared is an indication of the potential impact when forest is removed. Prior to any change in land management from a forested landscape, careful considerations should be made on the potential for soil erosion, and BMPs to avoid or minimize soil erosion and sedimentation. Lawn maintenance around the buildings and antenna sites is another vital component of erosion control efforts. Mowing for weed control and unwanted woody plants, seeding bare areas, and proper fertilization according to soil test requirements, are conducted to maintain a permanent vegetative cover. Special attention is provided to maintenance of herbaceous vegetation and debris clearance in outlets and drainageways. In addition, special attention is provided for

protection of LFSB. Fertilizers and herbicides are not used upslope of the shale barren or in drainage ditches to avoid possible contamination in runoff.

Planting trees and shrubs in urban settings can, if appropriate species are selected, return disturbed sites to a more natural environment, as well as provide habitat for wildlife. Arbor Day is celebrated every year, and is one way that NIOC Sugar Grove personnel can become involved with natural resource management at the Base. In 2009 the Operations Command Sugar Grove celebrated Arbor Day by planting over 400 trees donated by NIOC Sugar Grove Chief Petty Officers Association.

4.3.3 Land Application of Treated Biosolids

Approximately 36 acres on the Operations Area are designated for land application of treated biosolids generated from the Main Base (Figure 4-3). No applications of biosolids are conducted on the Main Base. In addition, no applications are conducted upslope of the LFSB. The purpose of the treated biosolids application is primarily to recycle wastewater, but it is also an important component of wildlife habitat management on the Operations Area. Application of treated biosolids provides an opportunity to improve the site conditions for vegetation restoration in the cleared antenna sites.

In 1997, NIOC Sugar Grove applied for a permit from the West Virginia Division of Environmental Protection (WVDEP) to land apply the treated biosolids from the Main Base Wastewater Treatment Plant in accordance with EPA's 40 CFR Part 503 Biosolids Rule. Permission to land apply treated biosolids in designated sites on the Operations Area was granted under the existing NPDES permit (copy provided in 2008 Storm Water Management Plan). Specific restrictions and authorizations for application of treated biosolids are provided in the NPDES permit.

A maximum rate of five dry tons or 30,000 gallons per acre of treated biosolids from NIOC Sugar Grove Wastewater Treatment Plant may be applied according to the NPDES permit. The 36-acre land application area provides a 72-year loading capacity at a rate of two dry tons per year of treated biosolids produced from the Main Base. Since 1997, approximately six dry tons have been land applied on the Operations Area. Hydrated lime is used to kill all pathogens prior to land application.

Treated biosolids acts as a soil conditioner by providing nutrients, increasing water retention, and improving soil texture. Light disking to incorporate the biosolids into the surface soils improves the soil conditioning benefits. BMPs that mitigate the migration of pollutants into and through the environment are required under West Virginia's treated biosolids management program. These specifications are required conditions for operation under the NPDES permit. The following BMPs taken from the state's management program apply to NIOC Sugar Grove.

- Do not store or apply treated biosolids within 100 feet of a stream, 50 feet of a public road, and 100 feet of a wellhead;
- Prohibit long-term storage of treated biosolids at the application site;
- Do not exceed slopes of 15 percent on the application site;
- Mow grass to 4 inches or less prior to application;
- Do not apply treated biosolids to frozen ground; and,
- Lightly disk biosolids into surface soils within one week of application.

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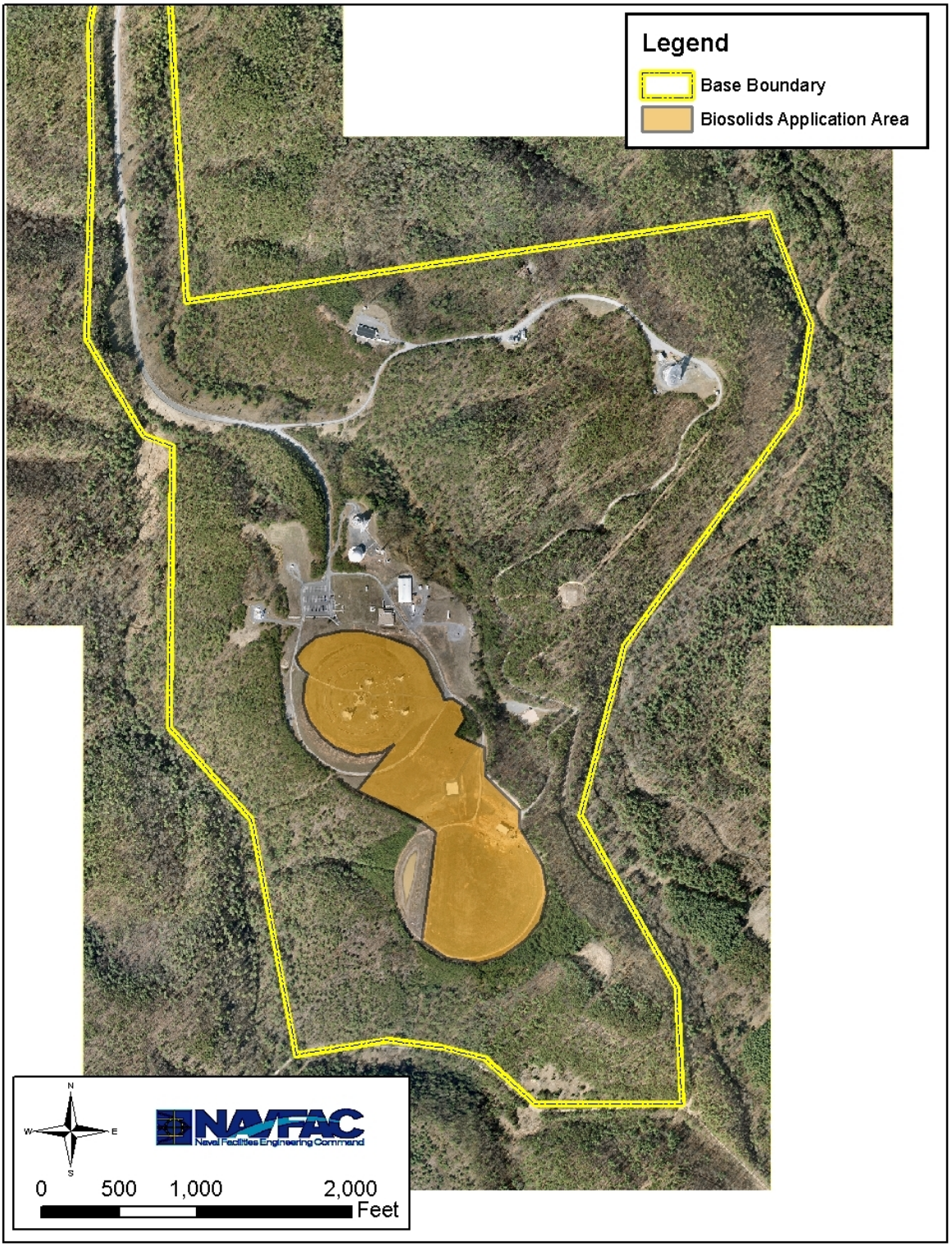

Figure 4-3. Biosolids Application on Operations Area.

4.4 Invasive Species

EO 13112, Invasive Species, requires Federal agencies to restore native species and habitat conditions in ecosystems that have been invaded, and DoD Instruction 4150.7 states that an Invasive Species Management Plan should be consulted before initiating invasive species control measures at the military installations. An invasive species plant survey was conducted for the Main Base and Operations Area during August 2003. Based on the information collected as part of this survey, an Invasive Species Management Plan was developed to help installation personnel prioritize, plan, and implement management actions to control existing populations of invasive species on the base, prevent further spread, and to minimize the economic and ecological impacts to natural vegetative communities that can result from invasive species (Appendix C). The NIOC Sugar Grove Invasive Species Management Plan identified nonnative plant species that have the potential to become invasive, documented the threat posed by specific invasive plant species, and provided management recommendations to address problematic invasive species populations.

The Invasive Species Management Plan prepared for NIOC Sugar Grove (Appendix C) provides guidance for site managers for implementation of invasive species control measures, including follow-up monitoring after treatment of infested areas and restoration with natural plant communities following control of invasive species. It is important to recognize that control of invasive species is often labor intensive, and may require successive treatments over several years. Prioritizing management actions when performing invasive species control efforts will provide the greatest environmental benefits, and include establishing the following priority levels for action:

- Priority 1. Invasive species that are easy to control and have a high impact on the site.
- Priority 2. Invasive species that are hard to control and have a high impact on the site.
- Priority 3. Invasive species that are easy to control and have a low impact on the site.
- Priority 4. Invasive species that are hard to control and have a low impact on the site.

Additional factors that should be considered when prioritizing invasive species management actions include minimizing disturbance to adjacent natural communities, and protecting human health. In addition to treatment methodologies, restoration efforts should also be considered for

control of invasive species; however, complete eradication of invasive plant species from NIOC Sugar Grove may not be possible due to the continual re-infestation that occurs as a result of the widespread distribution and uncontrolled sources of established invasive species populations in the region.

4.4.1 Main Base

There are two primary invasive species management issues for the Main Base, based on the results of the Invasive Species Management Plan. These include control of tartarian honeysuckle and rambler rose in the South Fork River riparian area, and annual monitoring of other invasive species on the Main Base to avoid buildup of infestations.

4.4.2 Operations Area

The primary invasive species management issues for the Operations Area, according to the results of the Invasive Species Management Plan, include control of sericea and spotted knapweed in the open antenna sites, and restoration with native vegetation. Annual monitoring of other invasive species on the Operations Area should also be conducted, and control actions implemented, when necessary to avoid buildup of infestations.

4.5 Forestry

Forest management efforts began at NIOC Sugar Grove in 1974 with the development of a Long-Range Forest Resource Management Plan for the Operations Area. Forest management activities are not warranted on the Main Base because of the limited amount of forested area. The Forest Management Plan for NIOC Sugar Grove was revised in 1983. A forest inventory was conducted for this plan, and forest compartments and stands were identified. Timber types (Figure 4-4) include oak-hickory (eastern and northern slopes), oak-pine (southwest and west slopes), pine-oak (northwest and west slopes), northern hardwoods (riparian Commercial timber sale was conducted in 1980 and 30 acres were harvested. Since then no other timber sale has occurred on the Operations Area. areas and moist northern and eastern slopes), and pine (south and west slopes). Many of the stands are not suitable for timber production because of steep slopes.

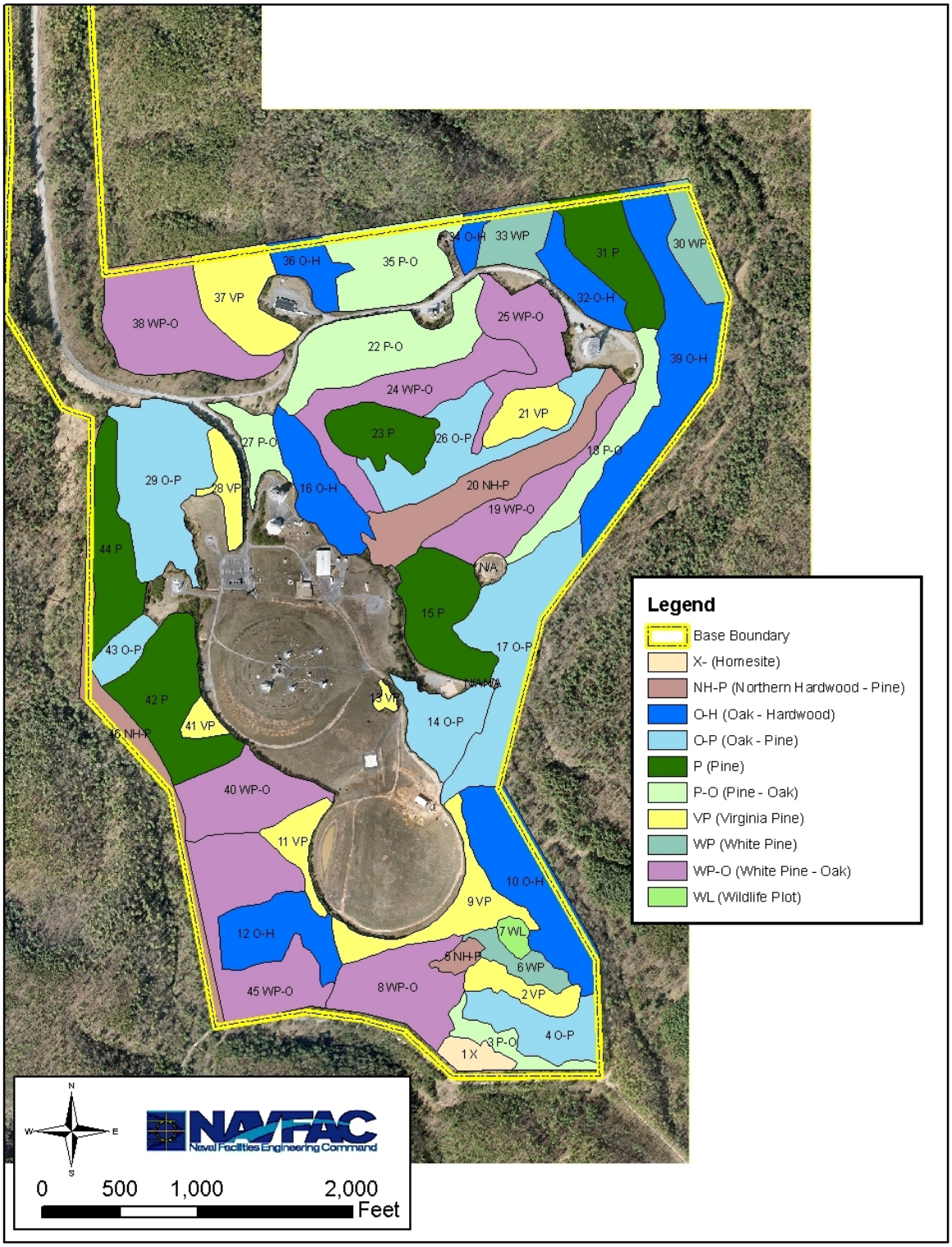

Figure 4–4. Forest Stands Map on Operations Area.

Most of the forested area is pine-oak cover type (Table 4-2). Steep slopes and narrow strips of forested area along the access road preclude timber management activities. Forest management

Table 4-2. Forest Cover Types on Operations Area.

Cover Type[1]	Acreage[2]
Northern Hardwood-Pine	20.2
Oak-Hardwood	44.2
Oak-Pine	46.4
Pine	37.3
Pine-Oak	30.4
Virginia Pine	25.4
White Pine	9.2
White Pine-Oak	65.8
Total Cover Types	**278.9**

[1] Two additional cover types are abandoned home sites (2 acres) and wildlife food plot (1 acre). Forested stands along the access road are primarily oak-pine mixtures and inoperable for timber management due to steep slopes and narrow distribution.

[2] Acreage does not include forested area along the access road.

under this INRMP shall be primarily for watershed protection. It is not necessary to designate forest compartments for the limited acreage, but timber stands have been delineated and numbered to recognize cover types.

A greater understanding of the existing forest conditions is necessary to achieve the following management goals:

- Conserve soil resources;
- Protect rare, threatened, and endangered species;
- Enhance the forest ecosystem to promote biological diversity;
- Enhance game and nongame wildlife habitat;
- Protect forests from wildfires;
- Prevent insect and disease outbreaks; and,
- Maintain aesthetic qualities.

Compatible activities include limited timber harvesting, brush cutting for salvaging timber resources, and enhancing the forest environment. Timber stand improvement practices may be

conducted to advance the ideals for forest management (Smith 1962)[2]. Controlled burning is generally not required as a forest management practice, but may be used for wildfire protection on the Operations Area. Management of the Operations Area at NIOC Sugar Grove should be consistent with the general guidelines for forest management of the surrounding George Washington National Forest. This is consistent with the idea of managing natural resources based on ecological boundaries and cooperative management. Some of the management techniques and objectives may appropriately be modified for the limited acreage on the Operations Area. The adjacent USFS management areas (15 and 16) include management to maintain or enhance habitat for wildlife, favoring an early and mature forest environment with both temporary and permanent clearings, and freedom from disturbance during nesting and brood-rearing seasons. Maintaining the forested habitats around the antenna clear zones is consistent with this management objective. Species benefiting from this management include wild turkey, ovenbird, gray squirrel, raccoon, great horned owl, white-tailed deer, ruffed grouse, common flicker, prairie warbler, yellow-breasted chat, mourning warbler, and various other species.

Forest management is focused on optimizing hard and soft mast production and providing a dispersed system of permanent forest openings. Soft mast species, such as dogwood and serviceberry are retained in site preparation where available. Open park-like understories are created and maintained to promote moderate herbaceous undergrowth. Forest openings and other suitable areas are managed to provide herbaceous ground cover and abundant insect populations for brood habitat. A mosaic of hardwood and pine stands with varying ages provides habitat for a variety of wildlife species. A sustained yield forest of balanced age classes with a minimum of 60 percent of the stands in mast-bearing age is considered desirable.

The average rotation is 120 years for hardwoods and 80 years for pines. No artificial conversion of hardwood or hardwood-pine forest types to pine or pine-hardwood forest types is allowed. The pine component of pine-hardwood types can be maintained in regenerated stands by natural regeneration. Harvested areas vary between 2 and 25 acres. The decision on any specific timber harvest method is based on site-specific analysis.

[2] Coordination with the NAVFAC Atlantic Division's Forester (Jack Markham, 757-322-4882) and technical assistance specified in the Cooperative Agreement with the USFS should be used to identify timber harvest requirements or opportunities, and coordinate controlled burning.

Even-aged management is used to maintain oak regeneration, create open understory conditions, and provide stand diversity. Regeneration cuttings include shelterwood, seed tree, and patch cutting. Intermediate cuttings include improvement, release, salvage, sanitation, and thinning.

Wildlife habitats are sustained through long rotations, limited harvests, and retention of wildlife food and cover plants. Uneven-aged management is used for stands on slopes less than 20 percent and near existing roads. Ten (10)-year to 15-year cutting cycles are used. Regeneration cuttings include group and single tree selection. Intermediate cuttings such as improvement, salvage, and sanitation cuttings may occur as long as progression toward the uneven-aged character of the stand is maintained.

Nonmotorized dispersed recreational opportunities, particularly hunting, fishing, wildlife viewing, and hiking, predominate. Trail systems may be maintained, upgraded, expanded, or reduced depending on demand.

Control of insect and disease outbreaks is considered to meet management objectives. Salvage of dead or dying trees can occur from existing or new roads to achieve wildlife habitat objectives, ensure safety, provide scenic rehabilitation, or capture value of deteriorating timber using ground-based or helicopter logging methods. Perpetuating the establishment of hard mast species (oak and hickory) is the primary wildlife habitat objectives for salvage. Roads are designed to the lowest standard necessary to meet management objectives.

Periodic mowing, burning, or selective herbicide treatment periodically maintains permanent wildlife openings. Savannas, grape arbors, old home sites (open areas, orchards), spring seeps, and landform features that create unusual habitats are managed as key wildlife areas. Grapevine eradication is not allowed because of the value of the food and cover it provides for wildlife.

Planting trees and shrubs with a high value for wildlife is recommended. Mast-producing species may be planted when it is determined that natural regeneration will not provide adequate future mast sources. Mast-producing species may be planted in permanent wildlife clearings to increase mast diversity. Noninvasive tree and shrub species are used.

According to the 2008 MAPS study, tree management actions could be implemented to increase the suitability of the habitat for the indigo bunting at NIOC Sugar Grove. The indigo bunting has

lower than expected productivity and a declining population trend at Sugar Grove and is expected to have a long term decline across West Virginia. Management actions designed to increase nesting opportunities for this species, such as ensuring the availability of dense understory in woodlands, may increase local productivity and lead to higher rates of recruitment. The availability of understory vegetation can be seriously depleted by foraging white-tailed deer, which has high rates of overpopulation across the northeastern United States. The recent security fence enclosure installed around the Sugar Grove satellite dish site, (site of S. Fork Potomac River MAPS station) may have a positive effect on bird populations by excluding deer from foraging in the forest understory within this area, which may also allow more dense foliage to develop. However, the soils of the ridge and valley geology are thin and poor such that tree growth is slow, and along riparian corridors invasive plant species, especially vines, tend to choke undergrowth.

4.6 Fish and Wildlife

Fish and wildlife management on NIOC Sugar Grove provides opportunities to enhance environmental awareness through stewardship actions, fishing and hunting outdoor recreation, and nongame wildlife populations and habitats. Mr. Steven W. Niethamer, the Environmental and Natural Resources Programs Manager at NIOC Sugar Grove, participates extensively with WVDNR's to implement the *West Virginia Wildlife Conservation Action Plan.* The goal of this plan is to conserve the diversity of West Virginia's fish and wildlife resources by emphasizing those species in greatest need of conservation.

Wildlife Area.

4.6.1 Main Base

Planning and development of wildlife habitats on the Main Base, especially in the housing area, is important biologically and socially because wildlife presence may serve as an indicator of environmental quality and represents urban stewardship of natural resources. The mowed open areas lack structural vegetation attractive to wildlife. Development of backyard wildlife habitats is one means of creating environmental awareness and environmental education among station personnel. Creation of small islands of multilayer vegetation within the mowed open areas would attract various wildlife species for viewing. Creation of habitats for viewing wildlife has the added benefit of reducing the mowing requirement. However, development of wildlife habitats should not interfere with existing activity functions or security. Urban landscaping to benefit wildlife is in accordance with the President's Memorandum on Environmentally Beneficial Landscaping. Placement of an old-growth forest characteristic, such as large diameter logs (preferably hollow), would especially enhance the habitats for wildlife. Increased habitat diversity has other benefits as well; insectivorous wildlife species such as bats, shrews, toads, and songbirds contribute to integrated pest management. Nonnative (naturalized) plants may be used to develop these habitats, but invasive exotic species should be avoided. Native plants are usually better adapted to local soil and climate conditions and have better defenses against insects and diseases (EO 50737).

Artificial feeding of songbirds should be encouraged as a stewardship activity and for enhancing appreciation of wildlife. However, feeding other wildlife such as deer and raccoons cause injury or transmit disease to people, as well as interfering with natural population/habitat cycles. Conditioning these animals to accept close human interaction could result in harm to wildlife or people.

Seasonal availability of food and cover is necessary to attract wildlife year-round. Seeds and persistent winter fruits are important in winter and spring. Berries, wildflowers, and seeds are key summer foods. Fruits, nuts, seeds, and wildflowers sustain wildlife as the days shorten in the fall. Evergreen trees and shrubs are especially valuable for winter cover. Artificial boxes could be placed in or around the wildlife habitats to provide nesting and roosting cover. Information on native plants for wildlife habitat is provided in the Internet references section of this INRMP.

Recreational Fishing. There is low potential for recreational fishing opportunities on the South Fork River because of limited access and low flow throughout much of the year. Fishing opportunities on the Main Base have become limited due to the installation of a perimeter fence that inhibits access to the Potomac River. Smallmouth bass, rock bass, and sunfish may be caught in the small pools. The President's EO 12962, Recreational Fisheries, authorizes conservation, restoration, and enhancement of aquatic systems to provide for increased fishing opportunities on military installations.

Nuisance Wildlife. Feral cats are a nuisance wildlife problem to birds, squirrels, and rabbits on the Main Base. Songbirds have been found dead with obvious cat bite marks. Domestic cats left behind by Navy personnel moving from the installation and abandoned cats that have wandered onto NIOC Sugar Grove have become feral and pose a public health threat to Navy personnel and to wildlife, especially birds. A policy letter preventing feral cat and dog populations on Navy property was issued by CNO on 10 January 2002. This letter requires Navy commands to institute proactive pet management procedures in order to prevent free-roaming cat and dog populations. Cats are removed as needed from the installation after notifying the environmental office. No other nuisance wildlife is controlled at the Base.

4.6.2 Operations Area

The profound effect that forest management practices can have on wildlife populations emphasizes the importance of cooperation and coordination between forest and wildlife managers in planning. Forest and wildlife communities are interrelated and interdependent. Forest stand characteristics such as size, shape, age, age class distribution, species composition, and density affect wildlife habitat, as do forest management practices such as rotation length, regeneration, controlled burning, and thinning. The quality of wildlife habitat depends primarily on the availability of food and cover, which varies as a function of forest management practices and natural development of forest communities.

The existing open areas for antenna fields should provide sufficient edge habitat on the Operations Area. The surrounding habitats should remain forested. The habitat edge (ecotone) between forests and the clear zone could be enhanced by creating vegetative borders to soften the habitat break and provide intergradations of habitat types from trees to shrubs, brush, and

herbaceous ground cover vegetation. Establishment of vegetative borders will help to control erosion, reduce mowing cost, and increase wildlife production.

Tree overstory conditions largely govern the growth and development of understory vegetation needed for wildlife habitat. Timber stand characteristics can provide a practical means of forecasting understory production, which influences carrying capacity for wildlife. Timber stand density is inversely proportional to forage and fruit production for wildlife. Stand size and shape are primary habitat components for most wildlife. Smaller stands generally have more between-stand diversity and more value for wildlife than large contiguous stands; however, unless habitats (stands) are connected by corridors and streamside management zones, they may become fragmented into scattered islands too small to support breeding populations. Irregularly shaped stands provide more diversity than square blocks because food and cover areas are more likely to be intermixed over a large area.

Clear cutting (even-aged management) can alter habitat and wildlife populations more than any other method of forest regeneration because of the immediate removal of food and cover and the increased potential to create stands with little diversity. However, small irregular clear cuts (less than 25 acres) increase habitat variety through better age class distribution that is beneficial to many wildlife species. Selective harvest of timber (uneven-aged management) is probably the best method for most wildlife species because habitats are modified slowly over time and trees of all ages are dispersed throughout a stand. But for species that prefer early successional stages, significant understory development may not occur unless the overstory is adequately opened. Shelterwood and seedtree harvest cuts are intermediate regarding the influence on wildlife habitat and populations. However, any of these methods can accommodate wildlife when conducted with due consideration for wildlife values.

Game Species. Hunting for white-tailed deer and wild turkey, the two primary game species at NIOC Sugar Grove, is permitted on the Operations Area. Basic habitat requirements for white-tailed deer and eastern wild turkey are briefly described below. Featured species management is not the objective here, but to highlight opportunities for management within the framework of ecosystem management. Management guidelines should not necessarily optimize the habitat for any one species, but provide a diversity of habitat types and components for a wide variety of

species. Where rare, endangered, and threatened wildlife species occur, providing for their specific habitat requirements should override the objectives for management of other species.

Eastern wild turkey. Like other wildlife, turkeys require cover, water, and food, which are provided by their habitat. Cover in close proximity to food is important and turkeys need cover for shelter from weather, escape from predators, nesting, brood-rearing, roosting, and feeding. However, any cover too dense for turkeys to see and identify predators is usually avoided. Turkeys select seasonal ranges that have a diversity of habitat types that provide optimum conditions. Turkeys require water daily and can obtain water from food or free water.

The size of daily home ranges and movements of turkeys affect habitat management. The more suitable the habitat is for turkeys, the smaller the home range will be. In good quality habitat, conservative estimates are that one turkey per 40 acres or one flock per 1,000 acres can be supported. The annual range for turkeys is about 1,000 acres; however, it may be 3,000 acres in poorer habitat or where disturbance is a factor. Wild turkeys are highly adaptable and may occupy small wood lots, areas with limited forest range, and habitats previously believed unsuitable. Protection from man (poaching), not habitat, is the most important factor affecting turkey populations.

The essential feature of turkey brood habitat is adequate herbaceous vegetation, and the lack of high-quality brood-rearing habitat may be a limiting factor for turkeys in some areas. The presence of high-quality brood-rearing habitat increases the rate of turkey poult survival. Seasonal nutritional needs and food availability determines habitat types used by turkeys. In fall and winter, native stands of pine-hardwood or hardwood are prime habitat, especially cove and northern hardwoods. Turkeys increase their use of forested areas during fall and winter in search of food and roosting cover. Turkeys are opportunistic omnivores and will eat almost anything that is available. The diet of adult turkeys consists of 90 percent plant and 10 percent animal material taken by whole ingestion, picking, stripping, clipping, and scratching. Principal plant food groups in the diet include mast, fruits, seeds, greens, and agricultural crops. Acorns are an important food item year-round, but primarily in fall and winter. Insects account for the majority of animal foods taken and are important summer foods for young turkeys. Poults need a high-protein diet (28 percent) to provide rapid growth and allow for almost constant molting

(replacement of feathers), which they satisfy by eating mostly animal matter. After about four weeks of age, poults shift their diet to mostly plant foods, similar to that of adults.

White-tailed deer. White-tailed deer occupy every habitat type available in the eastern United States; however, areas that include hardwoods provide the most productive habitat for deer. Habitat quality is primarily determined by food resources, and throughout the southeast, deer forage is frequently deficient in protein and essential minerals except during spring (Halls 1984). Water and cover are seldom limiting factors for deer because these resources are generally abundant and widespread throughout the eastern United States.

Deer need an interspersion of habitat types to ensure their basic requirements for survival and population growth. Good habitat with a high population may support individual annual home ranges of 200 acres, whereas in poor quality habitat, home ranges may cover 3,000 acres. Forest management practices have been identified as the most critical factor controlling the degree of interspersion affecting deer food and cover.

Principal foods of deer include leaves and twigs of woody plants, fruits (including soft and hard mast), herbs (including grasses and sedges), mushrooms, and agricultural crops (including plants grown in supplemental food plots). When oak mast (acorns) is available, deer often feed on it to the exclusion of most other forages. Deer diet is generally limited to those foods available within the normal travel range, about 1 mile. The most essential diet requirement is considered to be about 14 percent protein and 0.4 percent phosphorus. The daily food requirement for deer is about two pounds (dry weight) of good quality forage for a 50-60 pound deer, four pounds for a 100-pound deer, and six pounds for a 150-pound deer.

A major component of deer habitat management involves evaluating the food supply and subsequently appraising the deer range. One of the most widely used techniques in evaluating deer range habitat is a deer browse survey. In general, a deer range appraisal consists of identifying important browse species, determining how browse is used by deer (relative palatability of deer browse) and assessing under-stocking or over-stocking of deer based on browse utilization rates. Obvious signs of general overuse such as development of browse lines indicate that the deer population has exceeded the carrying capacity of the area and has damaged

the habitat. Deer browsing was cited as one of the potential threats to the endangered SBRC. Specific attention should be made for over-utilization in the vicinity of the shale barrens.

Nuisance Wildlife. No significant nuisance wildlife problems currently exist on the Operations Area. Beavers have placed several dams on Lick Creek upstream of the access road. The primary nuisance concern is plugging the drainage under the access road and burrowing in the embankment. These have not been significant problems in the past. Beavers have girdled several large hardwoods along the drainage, but most of the beaver pond and the activity are on the adjacent George Washington National Forest. Bridgewater District, USFS personnel have stated that the ponds and marshes that beavers have created add significantly to habitat diversity in the area. Here, beavers play an important role in riparian habitat management by increasing and improving water quantity and quality, fish and wildlife habitat, recreational opportunities, and aesthetic values for wildlife viewing.

Nongame Wildlife. Many activities that benefit game animals will also benefit nongame wildlife; however, activities should be integrated to ensure considerations for management of all wildlife. Protection of the shale barrens, custodial timber management, and maintenance of early successional habitat in the cleared antenna sites provide suitable habitat for non-game wildlife as well as game animals.

Wildlife Food Plants.

To provide cover and nesting habitat for a variety of wildlife species the planting of hedgerows in the Natural Resources Development Area with a variety of fruit-producing species (serviceberry, chokeberry, hawthorn, crabapple, wild plum, blueberry, black elderberry, blackberry, and other native fruit-producing species) was performed in 2008. These plantings had a zero percent success rate, primarily due to the poor soil quality, and steep topography in a portion of the planting area. No plans are in place to reattempt to establish hedgerows in this area.

Placement of nesting boxes (such as eastern bluebird, American kestrel, and flycatcher) and bat roosting boxes in the area will facilitate wildlife viewing opportunities. Cooperative efforts with local birding groups may also be helpful. In addition, long timber rotations will help ensure a variety of habitats, den sites, and mature forest elements to accommodate wildlife species.

The six storm water detention ponds provide opportunities to enhance the habitat for many wildlife species. Managing these areas as moist soil units would be attractive to reptiles and amphibians for reproduction, butterflies, insect-eating neotropical migrant birds, and bats. These ponds should become an integral part of the wildlife habitat management on the abandoned antenna site.

The MAPS program, as previously described, was designed to provide data for implementation of effective practices to manage North American landbirds, especially neotropical migrant species. NIOC Sugar Grove and the IBP have established MAPS stations on the Operations Area and Main Base to monitor productivity and survivorship of landbirds. Data from this effort will benefit management throughout North America as well as provide the basis for site-specific management actions.

4.7 Protected Species

Protection and management of rare, threatened, or endangered species is primarily a management issue on the Operations Area. No protected species were found on the Main Base in an inventory conducted by the WVDNR in 1989. However, bald eagle, Indiana bat, and Virginia big-eared bat could occur, at least as transients, on the Main

Erecting mist net during 2009 bat survey.

Base. Neither the Indiana bat, nor the Virginia big-eared bat, was captured during the 2009 bat surveys conducted at NIOC Sugar Grove (BCM 2009). One species, the bald eagle, was listed as a federally endangered species for the previous INRMP, but has since been delisted. However, the USFWS encourages continuing efforts to avoid potential harm to this species and careful consideration in project planning.

Protected wildlife species that occur at NIOC Sugar Grove will be managed in accordance with the *West Virginia Wildlife Action Plan* (WVDNR undated). The *West Virginia Wildlife Action Plan* was developed to function as a proactive plan for examining the health of wildlife, and includes conservation and habitat management actions for individual species, including those that are rare or are protected under the ESA. The plan focuses on conservation actions, and includes a collaborative approach for implementation. In addition to species-specific research, monitoring and data requirements, the plan also includes management recommendations for the habitats that these species are dependent upon. Individual plans are provided for each of the 128 species covered by the plan, which function as part of the broader comprehensive plan. The plan covers a 10-year period, but updates to the plan will occur every 2 years as new information and results become available, allowing for an adaptive and collaborative management approach to be applied to the conservation of fish and wildlife resources and the habitats that sustain them.

Bald Eagle.

4.7.1 State-Protected Species

West Virginia does not have an endangered species law; instead, it relies on the ESA. An eagle protection act prohibits the taking of bald and golden eagles and provides for penalties (West Virginia Code §20-2-5c). State-listed species are associated with the shale barrens, beaver pond, and secondary dry-mesic forest cover type on the Operations Area (see Table 3-4). Surveys conducted by WVDNR at LRSB since 1981 indicate that road dust is a disturbance concern; and

expansion of Forest Road 25 could destroy the habitat. A survey conducted by WVDNR at LFSB since 1982 indicates that deer browse on SBRC was observed in every year surveyed. Management recommendations to protect shale barrens are critical to conservation of state rare plants and animals. Preservation of the habitat surrounding the beaver pond could enhance survival of the two rare mammals: bog lemming and meadow jumping mouse. Opening the canopy to reduce competition around the Allegheny plum, a federal species of concern, might enhance the survival of these species.

4.7.2 Federally Protected Species

The ESA provides the primary legislation for preservation of threatened and endangered species. The act requires all federal agencies to ensure that any federal action undertaken is not likely to jeopardize the continued existence of a federally listed threatened or endangered species. A copy of the endangered species consultation handbook is available on the USFWS website. The de-listed bald eagle, three endangered species, and eight species of concern are discussed below.

Bald Eagle. The National Bald Eagle Management Guidelines were established by the USFWS that include protective measures outlined in the Bald and Golden Eagle Protection Act (16 USC 668–668c) and the Migratory Bird Treaty Act (16 USC 703–712) (USFWS 2007). Several management requirements specifically designed to protect the recently delisted bald eagle, a possible transient of NIOC Sugar Grove, are to be implemented if this species is confirmed to nest or visit the base or surrounding area. In accordance with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act the following management actions are required:

- If bald eagles are documented at NIOC Sugar Grove, ensure land managers are aware of the general location of the nests or eagles on the base, and know how to identify this bird species.

Release of immature bald eagle (Haliaeetus leucocephalus) along South Fork riparian buffer zone.

- If bald eagle nests are confirmed at NIOC Sugar Grove or within the immediate area, disturbance will be minimized as defined by USFWS.

  "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

- To avoid disturbing nesting bald eagles, the following recommendations will be implemented:
  - Establish a distance buffer between disturbance activity and the nest to minimize visual and auditory impacts associated with human activities;
  - Maintain preferably forested (or natural) areas between the disturbance activity and around nest trees (landscape buffers); and,
  - Avoiding certain disturbance activities, such as noise and construction-related disturbances, during the breeding season.

If additional guidance is needed in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, NIOC Sugar Grove will consult with the local USFWS Field Office[3].

Indiana Bat and Virginia Big-Eared Bat. These endangered species could be attracted by moths and other flying insects that are concentrated around brightly lighted areas on NIOC Sugar Grove and over ponds and stream corridors (USFWS 1975, 1977).

Based on the surveys conducted by the WVDNR in 2001, 2002, and 2009, the Indiana bat is either absent or in very low numbers on NIOC Sugar Grove between 1 April and 15 August. Summer foraging habitats include riparian, bottomland, or upland forests and old fields or pastures with scattered trees. When pregnant, females eat soft-bodied insects, and while lactating they eat moths. After lactation, females eat moths, beetles, and hard-bodied insects. Roosting/maternity habitat consists of live or dead hardwood trees with exfoliating bark that provides space for roosting between the bark and bole of the tree. Tree cavities, crevices, spits, or hollow parts of tree boles and limbs also provide roosting sites. There are 29 known hibernacula in the limestone region of West Virginia in Preston, Tucker, Randolph, Pendleton, Pocahontas, Greenbrier, Monroe, and Mercer counties with a population range from one to 9,000

[3] USFWS Field Office, 694 Beverly Pike, Elkins, WV 26241

Indiana bats. There are two caves within approximately 5.5 miles of NIOC Sugar Grove that provide winter hibernacula for the Indiana bat. Recent data indicate that the area within an approximate 5-mile radius of a hibernaculum is important foraging and roosting habitat in the fall swarming period from 15 August through 14 November. A portion of the Main Base is just within the radius of one hibernaculum; therefore, fall swarming behavior can be expected to occur at the Main Base. A recent capture of an adult male Indiana bat between 15 May and 15 August near NIOC Sugar Grove supports the assumption that some males stay near the winter hibernaculum area during the summer. However, the summer roost of adult males is often near maternity roosts (USFWS 2001).

Many of the Virginia big-eared bats live in West Virginia, including one of the two largest known concentrations of hibernating individuals. Unlike the Indiana bat, this species raises its young in caves. There are three known caves in the vicinity of NIOC Sugar Grove that are used by Virginia big-eared bats. Food habits are poorly known, but moths apparently make up part of their diet, and they forage primarily near the maternity colony. It is unknown where males spend the summer, but it is believed that they are solitary. It is likely that the Virginia big-eared bat uses habitats on NIOC Sugar Grove for summer foraging (USFWS 2001).

The USFWS typically requests that the site developer conduct a summer Indiana bat survey between May 15 and August 15. Sampling was conducted from July 21–24, 2009, at NIOC Sugar Grove. Two trap sites were sampled for two nights each and four acoustic monitoring sites were sampled for two nights each. No state or federally threatened or endangered species of bats were captured during the 2009 survey (BCM 2009).

SBRC. The Ecological Study of SBRC at LFSB (WVNHP 1996) provides specific information on sampling procedures and data analysis. The study was designed to fulfill a significant life history recovery task in the USFWS recovery plan for the SBRC. A brief summary of the highlights is given below; readers are encouraged to review the ecological study (available in NIOC Sugar Grove natural resources office) for further information on the species description and geographic distribution.

A 1.6 ha grid was established in 1991 to study SBRC at LFSB. The population trend observed in 1992–1995 was decreasing; however, large fluctuations in population size from year to year and possibly within a growing season may be a normal phenomenon of this ecosystem. SBRC

population fluctuations probably result from this species' sensitivity to variations in climate and herbivory. Flowering was observed from mid-July to September, depending on heat and drought stress. The SBRC is a minor component of the total herbaceous cover on the LFSB. Species diversity was relatively low; only 25 species and 14 taxa were recorded.

The WVNHP monitored the LFSB in 2002 and found that the population of SBRC appeared healthy and within the natural fluctuation range for this species (WVNHP 2002). The 50 x 320-meter grid has been surveyed every year since 1993. The WVNHP recommended that surveys be continuous as long as this species is listed as federally endangered. Additionally, it was recommended that surveys at the LFSB be conducted every other year. The following information provides recommendations for human interaction, goals, and objectives at the LFSB. Specific locations of protected species should not be published to avoid theft of plants by collectors.

Recommendations for human interaction at the LFSB:

- Use existing routes for each visit to the barren and avoid unnecessary travel;
- Limit travel across the barren to between late August and early September;
- Travel cautiously along paths parallel to the contour of the slope;
- Avoid or minimize access during drought periods;
- Approach the barren from above rather than climb the steep shale slope;
- Post the boundaries of the barren with signs that warn of the danger from disturbance;
- Include an announcement in the hunting brochure that this area is restricted for access;
- Do not adversely impact the site or SBRC during monitoring activities; and,
- Conduct periodic water releases for testing of the fire hydrant uphill of the shale barren in a way that avoids possible erosion on the barren.

The potential threat of exotic weed species to shale barrens and communities was evaluated in a report by the Maryland/District of Columbia Field Office of The Nature Conservancy in 1996. The 10 most-threatening shale barren weeds are presented in Table 4-3.

Table 4-3. The Ten Most Threatening Shale Barren Weeds.

Scientific Name	Common Name
Ailanthus altissima	tree-of-heaven
Alliaria petiolata	garlic mustard
Bromus sterilis	barren brome grass
Centaurea maculosa	spotted knapweed
Coronilla varia	crown vetch
Linaria vulgaris	butter-and-eggs
Lonicera marrowi	bush honeysuckle
Lonicera japonica	Japanese honeysuckle
Polygonum convovulus	black bindweed
Verbascum thapsus	common mullein

Source: The Nature Conservancy 1996

The representative habitat types on NIOC Sugar Grove were surveyed and monitored for invasive plant species in August 2003. Three invasive plant species documented on the site, spotted knapweed, crown vetch and Japanese honeysuckle, are considered species that pose a severe threat to native vegetative communities, including shale barrens. These invasive species were not associated with the LFSB, but were found scattered throughout the open areas, on slopes and along roadsides both at the Main Base and Operations Area. Great mullein, a species that represents a significant threat to native plant communities, was also documented on the base during the invasive species survey, however its occurrence was limited to scattered areas within the open antenna fields, and slopes adjacent to the main entrance access road of the Operations Area (NSGA Sugar Grove 2003).

While invasive species do not currently pose a threat to the LFSB, invasive species may pose a threat to this community in the future. The three methods generally available for control of invasive plants, biological (introduction of plant pathogens), prescribed fire, and mechanical removal, are not recommended for management of invasive plants on shale barrens. Careful hand pulling, use of hand tools, and chemical and thermal (scalding water) spot treatments are the recommended methods for control of invasive weeds on shale barrens (Keech 1996).

Species of Concern. There are eight species of concern that may occur on NIOC Sugar Grove (see Table 3-5). The USFWS (2001) has recommended surveys and monitoring for the grizzled skipper and inclusion of this species in any recommendations for the LFSB. Surveys conducted by WVDNR in 2002 on the Operations Area failed to find the grizzled skipper. This species historically inhabited the open shale barrens of NIOC Sugar Grove where SBRC and Canada cinquefoil are common. Because of the imminent risk of elimination of grizzled skipper within the local geographic area, WVDNR has developed an active recovery program in conjunction with NIOC Sugar Grove to reintroduce the lost population of grizzled skipper (Markham and Niethamer 2009).

The migrant loggerhead shrike is known to have nested in Pendleton County in 2000. This species prefers abandoned agricultural areas with short vegetation interspersed with scattered trees, shrubs, poles, posts, or hedgerows from which they forage on grasshoppers, crickets, beetles, mice, voles, shrews, birds, snakes, frogs, and worms. The loggerhead shrike nests in small trees, preferring hawthorns and red cedars. Grassy areas on NIOC Sugar Grove may provide suitable habitat for this declining species. The cow knob salamander is known from Shenandoah and North Mountains in Pendleton and Hardy counties. Dr. Tom Pauley of Marshall University conducted a survey for the cow knob salamander on the Operations Area and concluded that this species is not likely to occur on NIOC Sugar Grove. In addition to the Allegheny plum that occurs on the Operations Area, other species of concern that could occur on NIOC Sugar Grove include heart-leaved skullcap, Canby's Mountain lover, horse mint, and tall larkspur. Although species of concern lack protection under the ESA, Navy guidance (OPNAVINST 5090.1C CH 24) encourages cooperation with state and federal agencies to protect these species.

4.8 Outdoor Recreation

4.8.1 Main Base

The Morale, Welfare, and Recreation Department (MWR) offers rental of eight two-bedroom cabins, two three-bedroom cabins, and two suites at the Main Base. MWR manages outdoor fields for baseball, softball, football, and track, and maintains the swimming facility and manages the parking of recreational vehicles and trailers at the campground (Seabee Park). In

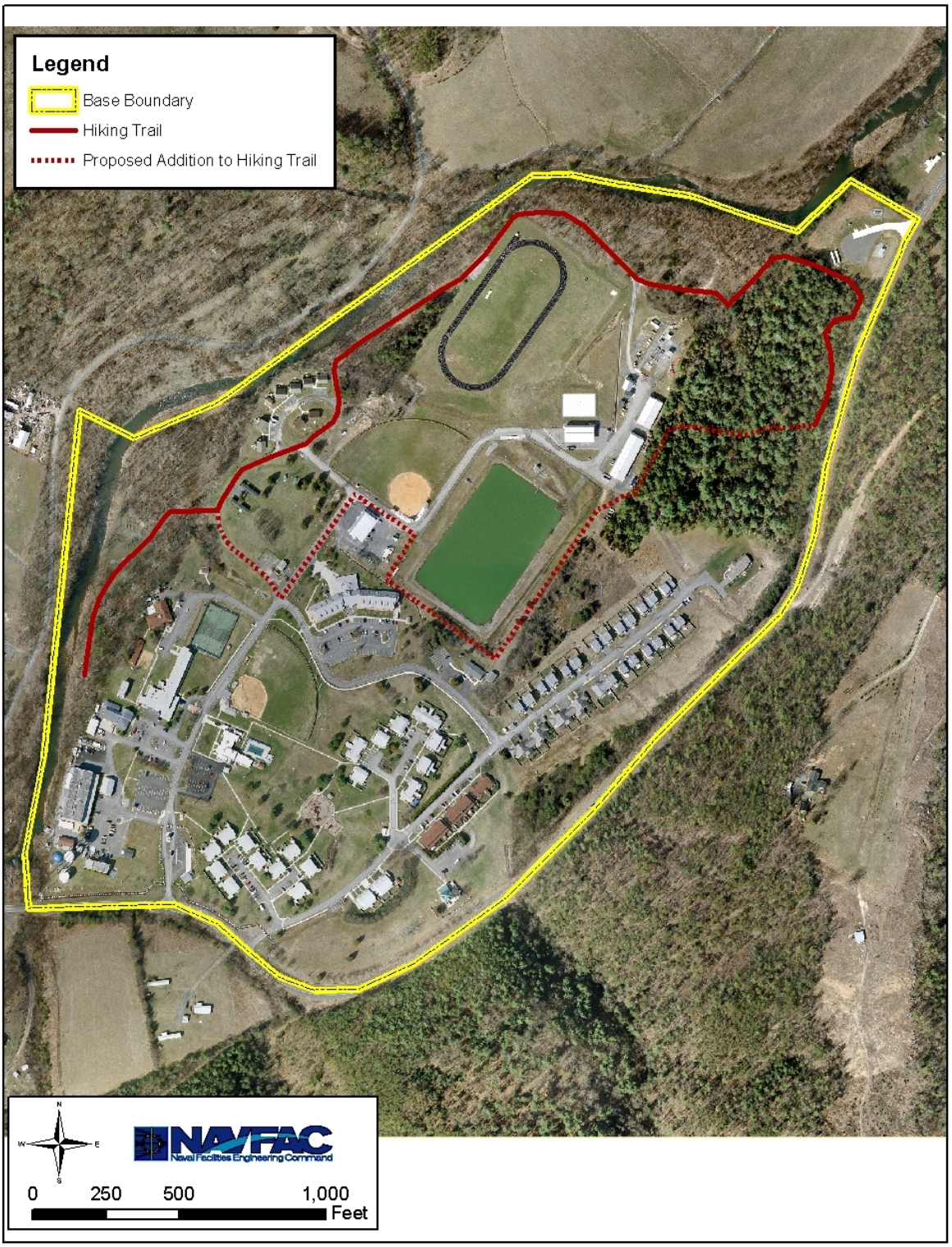

Figure 4-5. Hiking Trails on Main Base

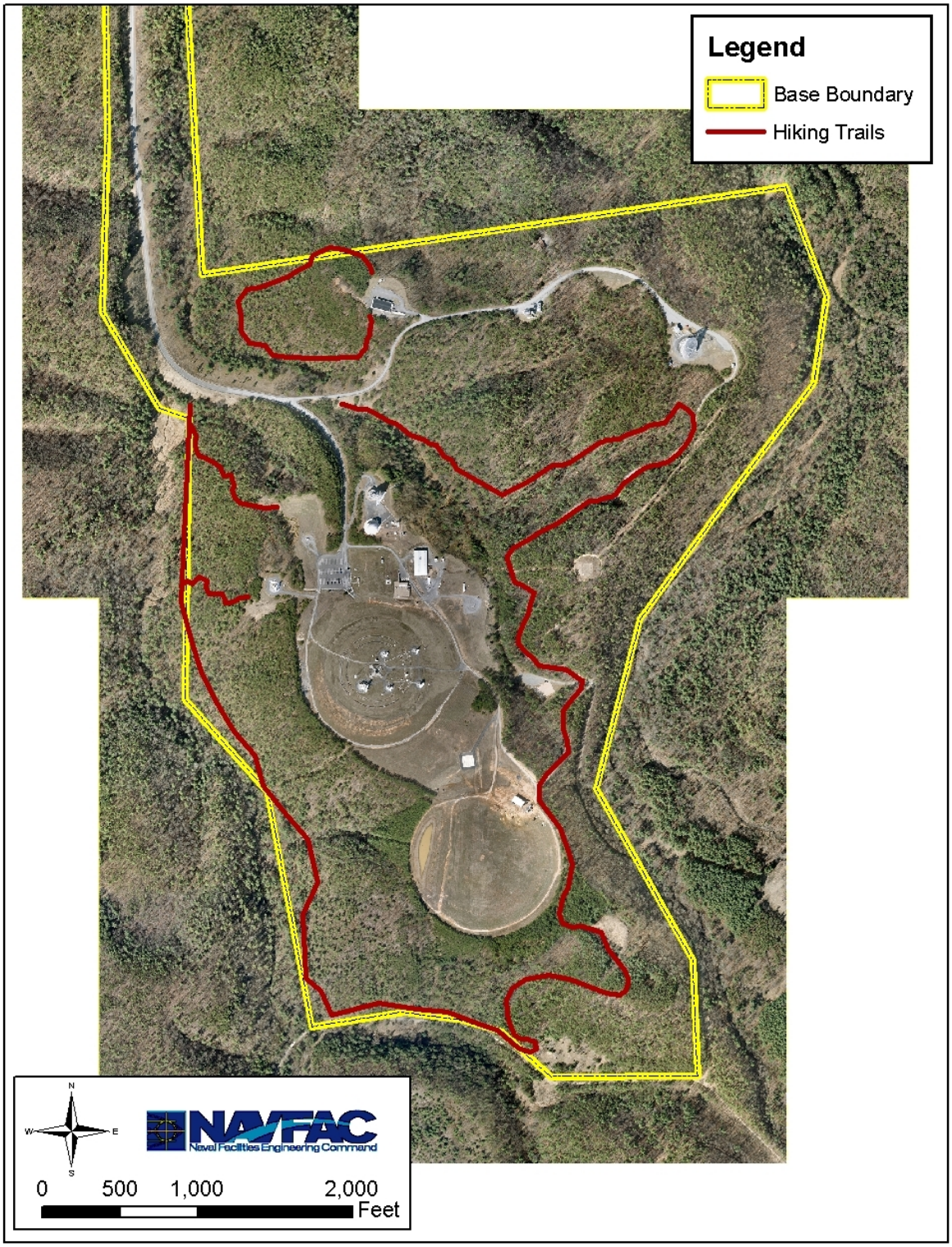

Figure 4-6. Hiking Trails on Operations Area.

addition to these outdoor recreational activities, a hiking trail with exercise stations runs through the river bottom forested area and white pine stand (Figure 4-5). Several interpretive signs were placed along the trail through the pine stand. However, the photographs and text have deteriorated due to weather. About half of the pine stand was cleared in 1999 for base housing. The trail ends abruptly at the new construction and should be rerouted to avoid the need to double back along the trail.

4.8.1 Operations Area

There are three hiking trails and a primitive campground on the Operations Area (Figure 4-6). The trails are designated by color (green, yellow, and black trail); however, sign posts have not been maintained. Interpretive signs are distributed along the trails, but most have deteriorated.

Construction of wooden steps from the access road down the steep slope to the beaver dam for wildlife viewing would provide an excellent opportunity to see a variety of wildlife and take natural history photographs. Installation personnel have developed a 3-dimensional (3-D) archery range and an all terrain vehicle (ATV) trail along an abandoned forest road in the northern portion of the Operations Area. In addition, a paintball court has been established by installation personnel in a forested area east of the Natural Resources Development Area. As directed by the Commanding Officer, ATV usage shall be restricted to official physical security use only and all trails should be limited to the base proper with no encroachment on adjacent properties. In accordance with EO 11989, use of off-road vehicles (ORV) on public lands, ATVs should be restricted to an officially designated area on the installation. A major concern by the WVDNR regarding use of ATVs on the Operations Area is the potential for disturbance to the shale barren habitats. ATV traffic on or above the LFSB would be highly detrimental to the barren because of the unstable nature of shale barren habitats. The Security Department is responsible for operation of the hunting program on the Operations Area. The Natural Resources Manager, through the Senior Conservation Officer, monitors the game harvest from a conservation standpoint. Hunting is generally not permitted on the Main Base, except as approved by the Commanding Officer. Personnel may hunt game animals on the Operations Area according to West Virginia hunting laws and NIOC Sugar Grove Hunting Instruction 11015.1 Series (Appendix A). There are 20 hunting zones designated, primarily for hunter safety (Figure 4-7). Personnel primarily interested in hunting the adjacent USFS property are

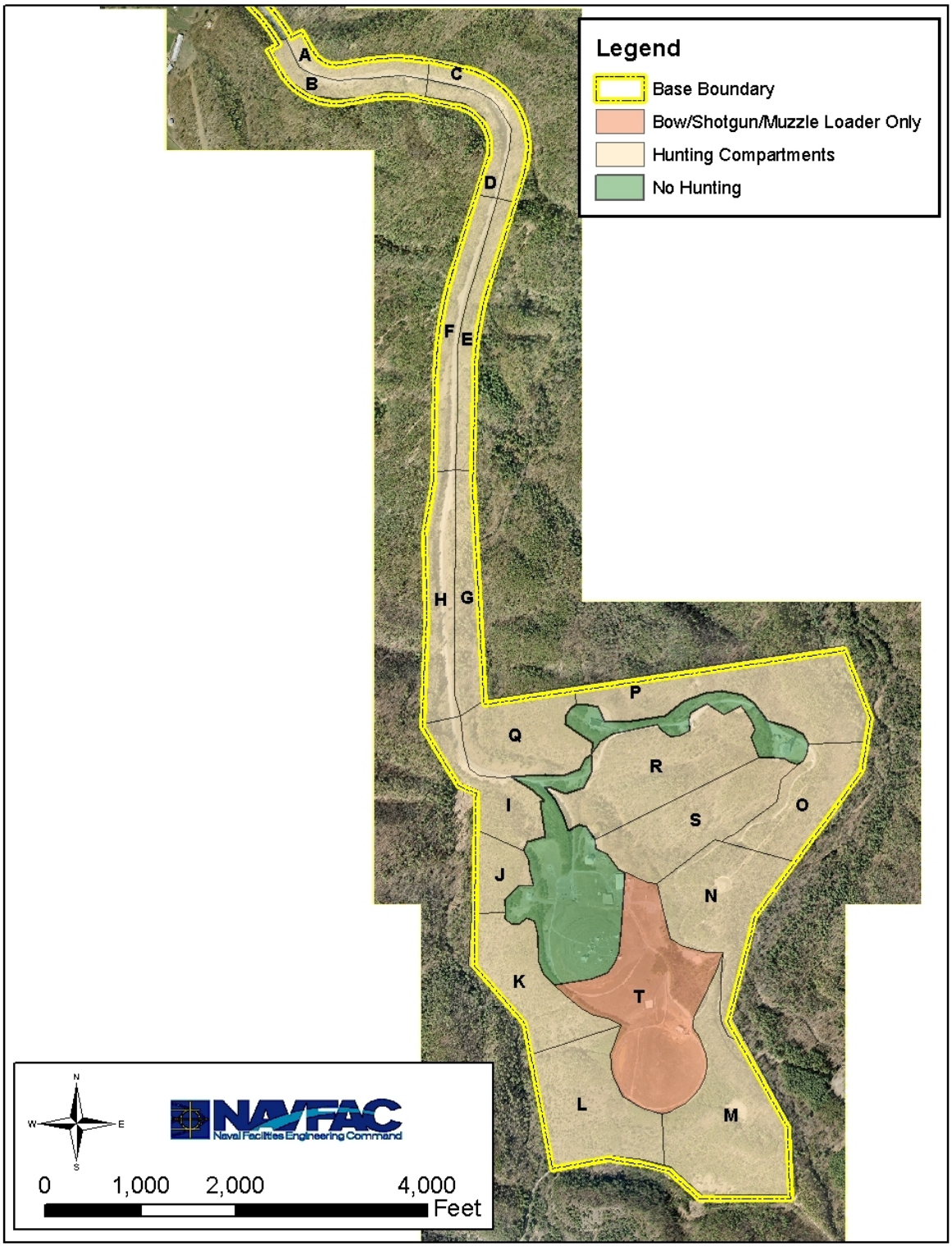
Legend
Base Boundary
Bow/Shotgun/Muzzle Loader Only
Hunting Compartments
No Hunting
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
N
W
E
S
NAVFAC
Naval Facilities Engineering Command
0
1,000
2,000
4,000
Feet

Figure 4-7. Hunting Compartments on Operations Area.

encouraged to access directly rather than reserving a hunting compartment on the Operations Area. Hunters are required to report all game that requires state reporting to the guard shack at the entrance to the Operations Area upon departure. Additional information obtained during checkout includes number of each game species observed; type and number of game taken; and age, weight, and antler points of harvested deer. Deer, turkey, squirrel, grouse, and rabbit are the primary game animals that may be taken at the Operations Area. A maximum of 10 hunters are permitted on the area during the deer rifle-hunting season to provide a buffer between hunters. The WVDNR maximum hunter density permitted on state land is one hunter per 40 acres. Small game hunters are assigned hunting zones individually, but two or more hunters in adjoining zones may hunt throughout the two (or more) zones. In 2002, an "Earn-A-Buck" program was instituted to reduce the large deer population.

4.9 Wetlands

Wetlands compose less than 5 percent of the land area on NIOC Sugar Grove. Regionally, wetlands are limited to narrow riparian areas and seepage slopes adjacent to drainages. Periodic flooding may cause severe streambank erosion in the narrow channels. Wetlands are regulated under the Clean Water Act (CWA), Sections 401 and 404, by the USACE.[4]

4.9.1 Main Base

Wetlands compose approximately 9 percent (10 acres) of the land area of the Main Base (see Figure 3-5). Palustrine forested, broad-leaved deciduous, temporarily flooded (PFO1A) and seasonally flooded (PFO1C); palustrine emergent, persistent, temporarily flooded (PEM1A) and seasonally flooded (PEM1C); palustrine unconsolidated bottom, artificially flooded, excavated (PUBKx); and riverine, lower perennial, unconsolidated bottom, intermittently exposed (R2UBG) wetlands occur on the Main Base. The emergent wetland downslope of the base housing functions as a storm water runoff filter. The South Fork River is a major watershed and subject to severe flooding, as was the case in 1996. The narrow riparian area on the north and west boundary of the Main Base has been impacted historically by road construction, farming operations, and channel realignment by the USACE. Wetland habitat quality has been

[4] Detailed information, including use of nationwide permits, regarding current regulatory programs of the USACE is available at www.wetlands.com (see also Internet references in Section 7.2).

significantly reduced, but the area still has full protection under provisions of the CWA. Any activities that may reduce the water quality or affect the wetlands are subject, at a minimum, to Sections 401 and 404 of the CWA. Streambank erosion is a significant concern behind the MWR rental housing on the river. In some areas the chain-link fence behind the rental houses is at the top bank of the river channel; however, exposed bedrock should halt any further cutting into the bank from water-caused erosion. Maintaining vegetated streambanks is the best management strategy for protection against erosion in these areas. Additionally, structural measures (such as rock rip rap) will be necessary to control erosion if vegetative cover is lost.

The forested riparian zone on the Main Base is an integral part of non-point source pollution control at NIOC Sugar Grove. This serves to control sediment and sediment-borne pollutants carried in surface runoff. Other benefits include modifying stream temperature by shading, enhancing habitat diversity, maintaining channel morphology, and enhancing species richness (USEPA 1985). Maintenance of forested riparian areas is consistent with the Chesapeake Bay Program Adoption Statement on Riparian Forest Buffers. NIOC Sugar Grove natural resources personnel and volunteers initiated a riparian forest buffer restoration project in 1999. A variety of hardwood trees and shrubs were planted in the narrow forested strip between the Main Base and the river; however, most of the planted trees and shrubs died from a combination of drought and improper planting methods.

Volunteers 2009.

4.9.2 Operations Area

Wetlands compose approximately 1 percent (5 acres) of the land area of the Operations Area (see Figure 3-6), and have been identified from field reconnaissance for planning purposes. A narrow

band of wetlands occurs along portions of Lick Run. Palustrine, unconsolidated bottom, semipermanently flooded, beaver wetlands and riverine, intermittent drainages occur on the Operations Area. A series of about nine beaver check dams upstream of the main pond has expanded the wetland area beyond the main channel. However, nearly all of the beaver wetlands are located across the installation boundary on USFS property. Bulrushes and cattails have become established in small marshes. Approximately 300 cubic feet of sediment eroded into the primary beaver pond adjacent to the access road during and after development of the antenna sites (mid to late 1960s). Construction of a storm water detention pond and installation of riprap diversion channels at Erosion Site 8 has halted further sedimentation into the beaver pond (Navy 1998a). It appears that some tree mortality has occurred from being flooded and covered with sediment. Other small wetlands may occur elsewhere such as in the drainage across Taylor Road to Lick Run. Although the riparian zones of Little Fork, Wolf Run, and Lick Run are just beyond the property boundary, BMPs specified in the West Virginia Nonpoint Source Management Program, August 1980, should be followed to protect adjacent wetlands during any land disturbance activity.

4.10 Pest Management

In accordance with DoD 4150.7, Pest Management Program, the pest management plan for NIOC Sugar Grove lists program objectives and identifies integrated pest management strategies. The primary emphasis for pest management at NIOC Sugar Grove is prevention of household pests. Basic considerations for pest management include human health and welfare, property loss potential, environmental protection, and benefit (cost of management). The Armed Forces Pest Management Board provides useful information regarding DoD pest management policy and issues (see Section 7.2 Internet references).

The Pest Management Plan for NIOC Sugar Grove is on file in the Public Works Department. Specific issues have been addressed with the USFWS. If necessary, live trapping and releasing of nuisance bats on the facility will be conducted by the in-house certified pest controller, and NIOC Sugar Grove will coordinate with the WVDNR in the event that assistance is needed. Although there are no planned pest control operations in the vicinity of the shale barren, NIOC Sugar Grove will coordinate with the USFWS in the event that pest management in the vicinity of the barren is needed for mission requirements. Although lethal bird control has not been

required for pest management on the facility, NIOC Sugar Grove will coordinate with USFWS in the event that bird control is needed for mission requirements.

4.10.1 Main Base

Pest management actions include prevention of pest-related health problems that affect human health; invasive species control; and, maintaining morale of DoD personnel and their dependents by controlling pest infestations in office spaces, work areas, and housing. The majority of pest management activities on the Main Base are indoors to protect real property and human health.

4.10.2 Operations Area

Pest management activities include prevention and control of all pests in Building 301; vegetation control around antennas; control of bees, wasps, and hornets; and, invasive species control. The majority of pest management activities are spot applications for specific pests.

The USDA-Animal and Plant Health Inspection Service-Plant Protection and Quarantine Office have conducted pest surveys on the Operations Area since 1995. Surveys for the presence of the Asian gypsy moth were conducted in 1995 and 2000; the results were negative. Surveys were conducted for the presence of wood borers and bark beetles in 1996 and from 1999 to 2002; the results were negative. A recommendation was made to dispose of foreign wooden moving crates, pallets, and boxes by an approved method as soon as possible to lessen the likelihood of introducing exotic foreign pests.

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5.0 MANAGEMENT GOALS AND OBJECTIVES

The overall goal of the INRMP is to implement an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission; integrates and coordinates management activities; provides for sustainable multipurpose use of natural resources; and provides public access for use of natural resources subject to safety and military security considerations. The management objectives are to integrate management of forests, fish and wildlife, land, and outdoor recreation with the military mission and established land uses.

5.1 Main Base

The primary management goals are to provide and maintain surface drainages to prevent storm water damage to facilities and nonpoint source pollution, protect Navy lands from erosion and sedimentation, enhance aesthetics with landscaping practices, enhance the quality of life for installation personnel, comply with applicable state and federal regulations and DoD policies, control nuisance wildlife, and promote environmental awareness.

There are 10 project-specific goals to address management issues on the Main Base. Some project management recommendations represent routine day-to-day duties for conservation and protection of natural resources. Other recommendations represent specific projects to be implemented with the assistance of outside stakeholders and/or contractor personnel.

1. Implement engineering design solutions for the nine storm water and erosion control problem areas.

    - Develop construction plans from the 35 percent designs and DoD Form 1391 cost estimating forms developed by Triad Engineering, Inc.
    - Review and provide input on designs and alternatives to protect natural resources and ensure compliance with applicable laws and regulations.
    - Provide support for the EA as necessary.

2. Ensure that proper erosion and sediment control, and storm water management practices are implemented for all development projects.

- Conduct routine erosion and sediment control inspections for all projects and provide findings to the Resident Officer in Charge of Construction (ROICC).
- Conduct review meetings as necessary with the ROICC on any outstanding erosion and sediment control and storm water management issues.
- Plant native grasses to revegetate the eroded access road between the wastewater treatment plant and the new base housing that was used during construction.

3. Manage urban forest resources for aesthetic and ecological benefits.

- Conduct annual inspections of dead and hazardous trees.
- Use GIS data layer for developing management recommendations.
- Review all landscaping plans for new development projects to ensure that appropriate native species are used and that appropriate maintenance procedures are incorporated into plans.
- Celebrate National and State Arbor Day in cooperation with West Virginia Department of Forestry and USFS to promote awareness and support for developing an urban forestry program.
- Plant container-grown trees to establish an urban forest on the slope between the new base housing and emergent wetland adjacent to the old polishing lagoon. Use a variety of native tree species and coordinate with NAVFAC Atlantic Navy Technical Representative[5] for landscaping technical support.

4. Maintain and enhance forested riparian buffers.

- Maintain 100-foot vegetated riparian buffer (i.e., resource protection areas) where possible in accordance with the Chesapeake Bay Preservation Act.
- Establish a riparian buffer as a demonstration project of the West Virginia State Management Program of the Department of Natural Resources, Division of Water Resources.
- Coordinate with Public Works Department to minimize any further encroachment into the riparian zone (elevation below 1,700 feet MSL) to protect the area from disturbances and encourage natural revegetation.

5. Protect wetlands and comply with state and federal regulations.

- Conduct an onsite routine method wetland delineation (1987 USACE manual).
- Update the planning level GIS map of potential wetlands.

[5] Jack Markham, NAVFAC Atlantic Navy Technical Representative (757-322-4882)

- Coordinate with Public Works Department on project-level specific jurisdictional wetland delineations as required ensuring no net loss of wetlands.

6. Monitor and control invasive and exotic plant species.

- Prioritize invasive species management measures such that the efforts produce the greatest environmental benefit. Priority levels for action should include (1) invasive species that are easy to control and have high impact at the base; (2) invasive species that are hard to control and have high impact at the base; (3) invasive species that are easy to control and have low impact at the base; and (4) invasive species that are hard to control and have low impact at the base.
- Consult the invasive species management plan for implementation of invasive species control measures, including species-specific management recommendations. Initiate actions to control tartarian honeysuckle and rambler rose in the South Fork riparian area on the Main Base. To avoid major disturbance in the riparian area, treated areas will be limited to 0.1-acre, and treated areas will be separated from untreated areas until all areas are treated.
- Monitor and document success of plant controls. Annual monitoring of treated areas, and surveys for other invasive species should be conducted, and control actions implemented as necessary to avoid buildup of infestations.
- Promote the use of native plants for landscaping. After removal and control measures for tartarian honeysuckle and rambler rose in the South Fork riparian area are completed, native shrubs such as spicebush and witch-hazel should be planted in the open sites.
- Continue to develop a partnership with the USFS and the Potomac Highlands Cooperative Weed and Pest Management Area program to assist with invasive species removal and public awareness.

7. Promote wildlife conservation for environmental awareness and appreciation.

- Coordinate with West Virginia Partners In Flight to celebrate International Migratory Bird Day and to obtain management information for migratory birds that may occur on the installation.
- Contact the Project Wild state coordinator for the National Wildlife Federation to host a workshop for kids that promotes natural resources conservation and environmental education.
- Install seating benches along the fitness/nature trail as focal points for viewing wildlife such as birds and butterflies.
- Identify suitable areas for installing bat roosting boxes and enlist volunteer cooperators to monitor roosting box activity and box maintenance.

- Identify suitable areas for installing eastern bluebird nesting boxes and enlist volunteer cooperators to monitor nest box activity and box maintenance.
- Post an interpretive sign along the perimeter road that the grassy areas around the running track and adjacent woodland edge are maintained to provide nesting and foraging habitat for the migrant loggerhead shrike.
- Participate in a stable isotope study of migrating breeding birds being conducted on DoD lands.
- Continue to provide logistics for the Pendleton County, West Virginia chapter of the Wounded Warrior Program.

8. Reconnect hiking trail and display interpretive signs.

- Extend the trail through the white pine woodland downslope toward the wastewater treatment plant, along the side of the old polishing lagoon, and northward to reconnect at Simmons Road.
- Locate 10 points along the trail to place interpretive signs (12-inch x-8 inch laminated posters) with text on land management, natural history, and species descriptions. Maintain the trail clear of debris and undesirable plants, especially poison ivy.

9. Implement integrated pest management practices.

- Coordinate with the Public Works Department to ensure that pest management practices do not adversely impact native wildlife populations.
- Coordinate with the Public Works Department to ensure that pesticide use is minimized and that pesticide applications follow all label directions.

10. Implement feral cat control measures.

- As needed, coordinate with the USDA for technical assistance in planning, scheduling, and conducting animal damage control activities in accordance with the Memorandum of Understanding between DoD and USDA Animal and Plant Health Inspection Service Animal Damage Control.
- Implement feral cat control procedures as necessary in cooperation with USDA personnel and in accordance with the Armed Forces Pest Management Board guidance.

5.2 Operations Area

The primary management goals are to control storm water runoff; control erosion and sedimentation; conduct biosolids land applications; protect forest resources; protect rare, threatened, and endangered species; provide outdoor recreational opportunities; promote

environmental awareness; and comply with applicable state and federal regulations and DoD policies.

There are 14 project-specific goals to address management issues on the Operations Area. Multiple projects may be conducted under some of the project-specific goals to achieve multiple objectives.

1. Develop moist soil management areas for storm water detention ponds.

    - Establish a water management regime to maximize wildlife habitats and provide storm water control.
    - Incorporate approximately 4 inches of clay soil in the basins as a substrate for development of vegetation and to help retain water.

2. Annually monitor effects of seasonal drawdowns, reflooding depths, and dewatering on vegetation response. Continue land application of treated biosolids generated from the Main Base.

    - Apply treated biosolids in accordance with the NPDES Permit issued by West Virginia Division of Environmental Protection (DEP).
    - Apply treated biosolids uniformly to the application areas mapped in the installation GIS.
    - Annually submit the Small Facility Sewage Sludge Management Report to WVDEP.

3. Develop wildlife habitat in the Natural Resources Development Area.

    - Coordinate with NRCS for a soil analysis to determine requirements for liming and fertilizer.
    - Plant only native tree and shrub seedlings and hydroseed native grasses and forbs.
    - Delay mowing and similar disturbances until after mid-July to enhance survival of ground nesting birds.

4. Update the threatened and endangered species data.

    - Coordinate with the WVNHP to develop a scope of work for updating information o the rare, threatened, and endangered species.
    - Incorporate the findings from the surveys to update the INRMP.

- Coordinate annually with the USFWS to ensure compliance with state and federal protection guidelines for bald eagles, Indiana bat, Virginia big-eared bat, and SBRC.

5. Continue SBRC preservation, and conduct LFSB survey and monitoring.

- Protect and preserve the LFSB by conducting sufficient research to gather baseline information for the protection and management of SBRC.

- Establish a Cooperative Agreement with WVNHP to continue surveys and monitoring based on previous demographic study and vegetation sampling, community characterization of the LFSB, and to provide technical assistance to NIOC Sugar Grove.
- Continue coordination with the USFWS and WVNHP for exchange of information.
- Establish the management goals for observation of a stable increasing trend for populations of SBRC at the LFSB for 10 years. This includes being able to detect a 75 percent change in population (frequency of occurrence) and 50 percent change in percent cover of SBRC each year for 10 years within the 1.6 ha grid using $4m^2$ circular plots sampled between 15 August and 5 September (90 percent power and 5 percent error); and measuring relative cover and frequency, species richness, and diversity to examine seasonal patterns of community composition;
- Construct deer enclosures in the shale barren and adjacent forested area to document deer browse use.
- Include a study of the potential impacts from erosion and sedimentation.
- Conduct surveying and monitoring of the grizzled skipper as a faunal component of shale barrens.
- Post signs around the site to alert installation personnel of the fragile nature of the shale barren and to avoid entry into the site.
- Contribute information toward down-listing and delisting SBRC and incorporate the findings from the surveys and monitoring to update the INRMP.
- Determine which activities should be encouraged or discouraged at the site;

6. Conduct a forest resources inventory.

- Contact the Bridgewater District USFS for technical assistance in obtaining timber stand data for each forest cover type.
- Contact the West Virginia Field Office, USFWS to adapt and conduct the USFWS Habitat Evaluation Procedures (HEP) for wildlife habitat evaluations.
- Conduct an assessment of the wildlife potential and develop prescriptions for controlled burning to prevent wildfires on the Operations Area.

- Analyze the data and use the results to update the INRMP.

7. Inspect forested areas for insect and disease control requirements.

- Coordinate annually with the NAVFAC Atlantic Forester and USDA Plant Protection and Quarantine Officer[6] for technical guidance and management actions to protect timber resources from damage and loss.
- Conduct reconnaissance site inspections annually of the entire forested area to identify potential problem areas.

8. Initiate formal deer harvest reporting.

- Coordinate with WVDNR for technical guidance.
- Monitor the number of deer harvested each year in each sex and age group and require every hunter using the area to report information.
- Collect data on age, weight (dressed), and antler development (total number of points, inside spread, main beam length, and basal circumference), and lactation rate of does to obtain an estimate of deer body condition and antler quality by age-class.
- Record the harvest of does as a percentage of total harvest and maintain antlerless harvest below 40 percent of total harvest and 80 percent of buck harvest.
- Prepare and submit a report each year for all wildlife harvested and hunter use to the WVDNR wildlife biologist for review and comments.

9. Conduct deer browse survey.

- Coordinate with WVDNR for technical assistance in conducting a deer browse survey.
- Report observations and any concern for SBRC to WVNHP for technical assistance and management recommendations.
- Analyze data and file a report with WVDNR as part of the deer management assistance program.

10. Develop outdoor recreation facilities.

- Inventory requirements for maintenance of trails, including condition and distance between sign posts, indications of trail erosion, natural history highlights along the trail, and need for replacement of environmental education/awareness signs.
- Designate the 3-D archery range as an outdoor recreation area.

[6] NAVFAC Atlantic Forester (Jack Markham, 757-322-4882) and USDA Plant Protection and Quarantine Officer (Wesley L. Drosselmyer, 304-229-3517)

- Coordinate with the Security Officer responsible for operation of the hunting program to formally designate the ATV trail as an outdoor recreation area and require regular monitoring of trail conditions to prevent off-site impacts from trail erosion.
- Coordinate with the Security Officer responsible for operation of the hunting program to formally designate the paintball court as an outdoor recreation area and require regular monitoring of conditions to prevent off-site impacts from erosion.

11. Implement integrated pest management practices.

- Coordinate with the Public Works Department to ensure that pesticide use is minimized and that pesticide applications follow all label directions.

12. Promote wildlife conservation for environmental awareness and appreciation.

- Coordinate with West Virginia Partners In Flight to obtain management information for migratory birds that may occur on the installation.
- Coordinate with WVDNR to construct a wildlife viewing platform overlooking the beaver pond and prepare an interpretive display on the variety of wildlife in the area, including the bald eagle.
- Identify suitable areas for installing bat roosting boxes and enlist volunteer cooperators to monitor roosting box activity and box maintenance.
- Identify suitable areas for installing eastern bluebird nesting boxes and enlist volunteer cooperators to monitor nest box activity and box maintenance.

13. Protect wetlands and comply with state and federal regulations.

- Conduct an on-site routine method wetland delineation (1987 USACE manual).
- Update the planning level GIS map of potential wetlands.
- Coordinate project-level specific jurisdictional wetland delineations as required ensuring no net loss of wetlands.

14. Monitor and control invasive and exotic plant species.

- Prioritize invasive species management measures such that the efforts produce the greatest environmental benefit. Priority levels for action should include (1) invasive species that are easy to control and have high impact at the base; (2) invasive species that are hard to control and have high impact at the base; (3) invasive species that are easy to control and have low impact at the base; and (4) invasive species that are hard to control and have low impact at the base.

- Consult the invasive species management plan for implementation of invasive species control measures, including species-specific management recommendations. Initiate actions for control of sericea and spotted knapweed in the open antenna sites. Treated areas will be limited to 0.5-acres to avoid major disturbance in the open fields, treated areas will be separate from the untreated areas until all areas are treated.

- Monitor and document success of plant controls. Annual monitoring of treated areas, and surveys for other invasive species should be conducted, and control actions implemented as necessary to avoid buildup of infestations.
- Promote the use of native plants for landscaping. After control measures for sericea and spotted knapweed have been implemented in the open antenna sites, native warm season grasses such as bluestem species and switchgrass should be planted in the cleared areas. Several years of weed control is essential for establishment of native warm season grasses.
- Continue to develop a partnership with the USFS and the Potomac Highlands Cooperative Weed and Pest Management Area program to assist with invasive species removal and public awareness.

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6.0 MANAGEMENT RECOMMENDATIONS SUMMARY

Implementation of this INRMP will follow an annual strategy that addresses legal requirements, DoD and Navy directive or policy requirements, funding, implementation responsibilities, technical assistance, labor resources, and technological enhancements. In order for this INRMP to be considered implemented, the following actions will need to be completed.

1. Funding is secured for completion of all Environmental Readiness Level (ERL) 4 projects, as described in Section 6.1.1.
2. Installation is staffed with a sufficient number of professionally trained natural resources management staff needed to perform the tasks required by the INRMP.
3. Annual coordination with all cooperating offices is performed.
4. Specific INRMP action accomplishments that are undertaken are documented each year.

The following sections provide an overview of Project Development and Classification, Funding Sources, and the INRMP project Implementation Schedule. For prioritization and budgeting purposes, the project table provided in Section 6.2 provides information for the implementation schedule, prime legal driver and initiative, class, Navy assessment level, cost estimate, and funding source for each of the projects proposed in this INRMP. Natural resources program administration and day-to-day program activities are not included in the table. Policy guidance provided in DoD Instruction 4715.3 states that each military service will be responsible for obtaining funding for natural resources projects. The prioritized natural resources projects summarized in this section utilize the program hierarchy and project classification system described Section 6.1.

6.1 Project Development and Classification

This INRMP is a public document that requires the mutual agreement of NIOC Sugar Grove, USFWS, and state fish and wildlife agencies. It is crucial therefore, that these entities reach a common understanding as to which projects are most likely to be funded through the funding sources identified in Section 6.2. An annual strategy must be adopted for INRMP funding that addresses the legal requirements of NIOC Sugar Grove. The Navy programming hierarchy is described in Section 6.1.1 and Project Classification is described in Section 6.1.2.

6.1.1 Programming Hierarchy

The Navy programming hierarchy is based on the following DoD funding level classifications.

- Class 0: Recurring natural and cultural resources conservation management requirements. Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing DoD's conservation program that are necessary to meet applicable compliance requirements (federal and state laws, regulations, presidential executive orders, and DoD policies) or which are in direct support of the military mission.

- Class I: Current compliance. Includes projects and activities needed because an installation is currently out of compliance (has received an enforcement action from a duly authorized federal or state agency, or local authority); has a signed compliance agreement or has received a consent order, or has not met requirements based on applicable federal or state laws, regulations, standards, presidential executive orders, or DoD policies, and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission. "Class I" also includes projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standards, DoD policies, or presidential executive orders, but deadlines have not passed or requirements are not in force) but shall be if projects or activities are not implemented in the current program year.

- Class II: Maintenance requirements. Includes those projects and activities needed that are not currently out of compliance (deadlines or requirements have been established by applicable laws, regulations, standards, presidential executive orders, or DoD policies) but deadlines have not passed or requirements are not in force), but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.

- Class III: Enhancement or actions beyond compliance. Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or executive order and are not of an immediate nature.

The Navy funding classification of recurring and non-recurring projects consists of the following four ERLs. The following descriptions of each ERL are presented in decreasing order of priority with ERL 4 having the highest priority as must fund compliance projects, through ERL 1 representing environmental stewardship projects.

Environmental Readiness Level 4:

- Supports all actions specifically required by law, regulation or Executive Order (DoD Class I and II requirements) just in time;
- Supports all DoD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, and reporting and record keeping;
- Supports recurring administrative, personnel and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DoD Class 0);
- Supports DoD policy requirement to comply with overseas Final Governing Standards (FGS) and Overseas Environmental Baseline Guidance Document (OEBGD); and,
- Supports minimum feasible Navy executive agent responsibilities, participation in Office of the Secretary of Defense (OSD) sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

Environmental Readiness Level 3:

- Supports all capabilities provided by ERL 4;
- Supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts;
- Supports proactive involvement in the legislative and regulatory process to identity and mitigate requirements that will impose excessive costs or restrictions on operations and training; and,
- Supports proactive initiatives critical to the protection of Navy operational readiness.

Environmental Readiness Level 2:

- Supports all capabilities provided under ERL 3;
- Supports enhanced proactive initiatives critical to the protection of Navy operational readiness;

- Supports all Navy and DoD policy requirements; and,

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

Environmental Readiness Level 1:

- Supports all capabilities provided under ERL 2;

- Supports proactive actions required to ensure compliance with pending/strongly anticipated laws and regulations in a timely manner and/or to prevent adverse impacts to the Navy mission; and,

- Supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

6.1.2 Project Classification

The list of projects described in this INRMP consist of both "must fund," compliance-type projects and stewardship-type projects. "Must fund" conservation requirements are those projects and activities that are required to meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including EOs. These projects are designated ERL 4 or 3 in the Navy funding classification system, described in Section 6.1.2.

"Must fund" or ERL 4 or 3 projects could include:

- Developing, updating, and revising INRMPs.

- Salaries and annual training of professional personnel, in accordance with Individual Development Plans (IDP), involved in the development and implementation of INRMPs.

- Terms and conditions of Biological Opinions issued by USFWS or NMFS.

- Baseline surveys to keep INRMPs current.

- Biological surveys to determine population status of endangered, threatened and sensitive species.

- Survey and monitoring programs to support the MBTA and related permits.

- Wetland surveys for planning, monitoring and/or permit applications.

- Erosion control measures required in order to remain in compliance with natural resources protection regulations and to maintain land condition for realistic training operations.

- Support of leadership roles or executive agent responsibilities for the Coastal America, Coral Reef Protection, Chesapeake Bay, and Mojave Desert Ecosystem Management Initiative.

- Memorandums of Agreement/Understanding (MOA/MOU) commitments.

This list is not meant to be all-inclusive, but is meant to provide an overview of the types of projects that could be classified as compliance or must fund projects.

INRMP projects are developed based on the unique circumstances facing an installation, and INRMPs should include only valid projects and programs that enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership and proactive environmental stewardship. These projects are considered "stewardship" projects and fall under ERL 1 or 2 in the Navy classification system. Examples of stewardship projects include, but are not limited to:

- community outreach activities, such as Earth Day and Migratory Bird Day activities;

- education and public awareness projects such as interpretive displays, oral histories, watchable wildlife areas, nature trails, wildlife checklists, and conservation teaching materials;

- biological surveys or habitat protection for non-listed species;

- management and execution of volunteer and partnership programs;

- demonstration plantings of native plant materials;

- experimental conservation techniques;
- agriculture outlease improvements;
- forest stand improvements and other management efforts; and,
- wildlife management efforts.

All INRMP Projects must be entered into the EPR-web system and receive approval up the chain of command prior to soliciting any signatures on the INRMP. CNO N45 is the final authority for designating the appropriate ERL for a given INRMP Project.

6.2 Natural Resource Funding Sources

The costs of implementing NRM actions may be funded from a variety of sources. Funding sources should be reviewed carefully to identify qualifying projects. There are restrictions on the use of Navy funding sources for natural resource management. It is important that appropriate funding sources are used and that are entered into the EPR-web to include clear justification of funds being requested so that: (1) natural resource funds are distributed wisely and (2) funding levels are not threatened by use of funds in ways that are inconsistent with funding program rules. Execution of this plan by the federal government is contingent on the availability of funds properly allocated to the plan in accordance with applicable law.

Once INRMP projects have been validated and entered into EPR-web, ERL Level 3 and 4 projects are typically programmed in for funding. ERL 1 and 2 projects are not usually funded through the EPR-web system, and alternate sources of funding should be sought for these projects. The primary sources for funding Navy natural resources programs are: 1) Operations and Maintenance, Navy (O&MN) Environmental Funds, Legacy Funds, Forestry Revenues, Agricultural Outleasing, Fish and Wildlife Fees, Recycling Funds, Strategic Environmental Research and Development Program (SERDP) Funds, and other Non-DoD Funds.

6.2.1 O&M Environmental Funds

Operations and Maintenance (O&MN) funds are the primary funding sources to support must-fund environmental compliance projects (i.e., Navy ERL 4 projects). In addition, the only valid uses of O&MN funds are for the initial procurement, construction or modification of a facility or project. O&MN funds are generally not allocated for ERL 1-3 projects. O&M Environmental Funds are expected to be the primary source of funding for NIOC Sugar Grove INRMP Environmental Compliance Projects.

6.2.2 DoD Legacy Funds

The Legacy Resource Management Program (LRMP) is a special congressionally mandated initiative, established in 1990, to fund military conservation projects. The program assists DoD in protecting and enhancing resources while supporting military readiness. A variety of conservation projects, such as regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, monitoring and predicting migratory patterns of birds and animals, and national partnerships and initiatives, such as National Public Lands Day can be funded by the LRMP. Pre-proposals for Legacy projects are submitted yearly using the Legacy Tracker web site at http://www.dodlegacy.org. Refer to the Legacy web site for further guidance on the proposal process and types of projects requested. LRMP funds should be a potential funding source for NIOC Sugar Grove INRMP Projects.

6.2.3 DoD Forestry Reserve Funds

Forestry funds are accumulated from the sale of timber products on DoD installations. A portion of the revenues generated is used to reimburse installations for forest management expenses. The excess revenue is divided, with 40 percent going to the state and 60 percent going to the DoD Forestry Reserve Account. Funds from the DoD Forestry Reserve Account are available to support natural resources projects including reforestation, disease and insect control, planning, and personnel training, and are a potential source of funding NIOC Sugar Grove INRMP Projects that are not classified as environmental compliance projects.

6.2.4 Agricultural Outlease Funds

Agricultural Outlease Funds are collected through the leasing of agricultural lands on many military installations. These funds are directed back into the natural resource program and

reallocated throughout the Navy by NAVFAC Headquarters. Agricultural Outlease Funds are the broadest use funds available exclusively to natural resource managers. These funds are available to all installations to offset the costs of preparing, revising and implementing projects specified in INRMPs.

Project proposal requests for agricultural outleasing funds are sent to the regions and installations each year. The NAVFAC Mid-Atlantic core reviews proposals and recommended projects are forwarded to NAVFAC Headquarters for final review and project selection. The amount of funding available through this program varies from year to year. However, this is one of the more consistent sources of funding for implementing NIOC Sugar Grove INRMP projects that aren't classified as environmental compliance projects.

6.2.5 Fish and Wildlife Fees

Fish and Wildlife fees are primarily collected as part of installation hunting, fishing or trapping program. These fees are deposited and used in accordance with the Sikes Act and DoD financial management regulations. The Sikes Act specifies that user fees collected for hunting, fishing or trapping shall be used only on the installation where they are collected, and be used exclusively for fish and wildlife conservation and management at the installation where collected. Fees collected as part of the NIOC Sugar Grove hunting and fishing programs should be a potential source of funding to support natural resource projects described in this INRMP.

6.2.6 Recycling Funds

Installations that have a Qualified Recycling Program (QRP) may use their proceeds for some types of natural resource projects. Any proceeds collected as part of the installation QRP must first be used to cover QRP costs, and then up to 50% of the net proceeds can be for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support, vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation's pollution-prevention plans. Remaining funds may be transferred to the non-appropriated MWR account for approved programs, or retained to cover anticipated future program costs. Funds generated from the recycling program at NIOC Sugar Grove should be considered as a potential source of funding to support natural resource project recommended in this INRMP.

6.2.7 Strategic Environmental Research and Development (SERDP) Funds

Strategic Environmental Research and Development Program (SERDP) is DoD's corporate environmental research and development (R&D) program, planned and executing in full partnership with the Department of Energy (DoE) and EPA, with participation by numerous other Federal and non-Federal organizations (Navy 2006). SERDP funds are allocated for environmental and conservation project through a competitive process. The focus of SERDP is on Cleanup, Compliance, Conservation, and Pollution Preventions technologies. Due to the competitive process involved with allocation of SERDP Funds, NIOC Sugar Grove is not expected to receive funds through this source.

6.2.8 Non-DoD Funds

Non-DoD Funds, such as those received from grant programs, are available to fund natural resources management projects, such as watershed management and restoration, habitat restoration, and wetland and riparian area restoration. Federally funded grant programs typically require non-Federal matching funds, however, installations can partner with other groups for preparing proposals for eligible projects. NIOC Sugar Grove should consider grant funding and partnerships as a potential funding source for INRMP natural resources projects.

6.3 Project Implementation Schedule

The basis for implementation of this INRMP is presented in the project implementation schedule. Routine duties that arise on a day-to-day basis for protection and management of natural resources, such as coordinating project-level requests for environmental planning (NEPA) support, or implementing integrated pest management practices are not included in this schedule. Rather, this schedule provides a list of specific-projects to be implemented during the life of this INRMP. In addition, the prime legal driver or initiative, budgeting priority class, Navy assessment level, cost estimate, and funding sources are provided for each project. The total funding requirement to implement project specific management actions in this INRMP for the 10-year plan period of 2010-2020 is $80,900, and does not include salary or other in-house expenses. Changes in prioritization of projects and changes in funding allocations may affect the schedule outlined in this INRMP (Table 6-1).

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Table 6-1. Project Implementation Schedule for NIOC Sugar Grove.

Project No.	Project Description	INRMP Section	Implementation Schedule (FY)	Prime Legal Driver/Initiative[1]	Class[2]	Navy Assessment Level[3]	Cost Estimate	Fund Sources[4]
	Main Base							
1	Implement engineering design solutions for the nine storm water and erosion control problem areas.	4.2.1 and 5.1	Complete [2003-04]	E, F	I	4		O&MN
2	Plant native grasses to revegetate the eroded access road between the wastewater treatment plant and the new base housing that was used during construction.	5.1	Complete [2003]	E, F	II	2		O&MN
3	Plant native container-grown trees to establish an urban forest on the slope between the new base housing and emergent wetland adjacent to the old polishing lagoon.	5.1	Complete [2003]	J	III	1		O&MN
4	Continue to develop a partnership with the USFS and the Potomac Highlands Cooperative Weed and Pest Management Area program to assist with invasive species removal and public awareness.	5.1	Ongoing	A, K	III	1		AO/FR/Non-DoD
5	Establish a riparian buffer as a demonstration project of the West Virginia State Management Program of the Department of Natural Resources, Division of Water Resources.	5.1	Complete [2003]	E, F	I	2		FR
6	Conduct an-onsite routine method wetland delineation (1987 USACE manual).	5.1	2012	A, E, G, H	I	4	$7,000	AO/FR
7	Conduct an installation-wide survey for invasive and exotic species.	4.7 and 5.1	Complete [2004]	L, M	I	2		AO
8	Coordinate with West Virginia Partners In Flight to celebrate International Migratory Bird Day and to obtain management information for migratory birds that may occur on the installation.	5.1	[2009, 2011]	C	III	1	$5,000	AO/LP
9	Contact the Project Wild state coordinator for the National Wildlife Federation to host a workshop for children that promotes natural resources conservation and environmental education.	5.1	[2010,2011]	C	III	1	$5,000	AO/LP
10	Install seating benches along the fitness/nature trail as focal points for viewing wildlife.	5.1	Complete [year]	C	III	1		AO/LP
11	Install and maintain bat roosting boxes.	5.1	Complete [2004]	C	III	1		LP
12	Install and maintain bluebird boxes.	5.1	Complete [2004]	C	III	1		LP
13	Conduct surveys for amphibian and reptile species.	5.1	2012	A, C	III	1	$3,500	AO/FR
14	Realignment of hiking trails and signage due to fencing installation.	4.8 and 5.1	2010	C	III	1	$1,400	AO/FR
15	MAPS surveys.	3.7.2	Complete [2007, 2008]	A, B, C	III	3		LP
16	Implement feral cat control measures.	4.6.1 and 5.1	Ongoing, as needed	L, O	II	2	$5,000	O&MN
17	Migrating birds breeding on DoD lands stable isotope study.	5.1	2010	A, B	III	1		LP

Table 6-1 (continued). Project Implementation Schedule for NIOC Sugar Grove.

Project No.	Project Description	INRMP Section	Implementation Schedule (FY)	Prime Legal Driver/Initiative[1]	Class[2]	Navy Assessment Level[3]	Cost Estimate	Fund Sources[4]
18	Continue to provide logistics for the Pendleton County, West Virginia chapter of the Wounded Warrior Program.	5.1	2010	A	III	1	$5,000	AO/FR/NoN-DoD
	Operations Area							
1	Develop moist soil management areas for storm water ponds.	5.2	Complete [2005]	A	III	1		AO/FR
2	Conduct deer browse survey.	4.6.2 and 5.2	Complete [2004, 07, 11]	A, C	III	1		AO/FR/NoN-DoD
3	Develop wildlife habitat in the Natural Resources Development Area.	4.5, 4.6.2 and 5.2	Complete [2004-05]	A	III	1		AO/NoN-DoD
4	MAPs surveys.	5.2	Complete [2007, 2008]	A, B	II	3		LP
5	Restore hiking trails.	5.2	Complete [2004-05]	C	III	1		AO/FR
6	Close unauthorized ATV trails.	5.2	Complete [2003]	C, M	III	1		AO/FR
7	Conduct an on-site routine method wetland delineation (1987 USACE manual).	5.2	2012	A, E, G, H	I	4	$7,000	AO/FR
8	Monitor and control invasive and exotic plant species.	5.2	Recurring annually	K, L	I	2	$6,000	AO/FR
9	Coordinate with WVDNR to construct a wildlife viewing platform overlooking the beaver pond.	4.8.1 and 5.2	2010	C	III	1	$3,000	LP
10	Update the threatened and endangered species data.	5.2	2010	A, D	I	4	$20,000	AO/FR
11	Continue SBRC survey and monitoring.	5.2	Recurring annually	A, D	I	4	$25,000	LP
12	Continue to develop a partnership with the USFS and the Potomac Highlands Cooperative Weed and Pest Management Area program to assist with invasive species removal and public awareness.	5.2	Ongoing	A, K	III	1		AO/FR/NoN-DoD

[1] Legal Drivers and Initiatives:

A OPNAVINST 5090.1C Ch. 24
B Migratory Bird Treaty Act of 1918
C Sikes Act of 1960, as amended
D Endangered Species Act of 1973, as amended
E Clean Water Act of 1972, as amended
F Soil and Water Conservation Act of 1977, as amended
G Executive Order 11990 (Protection of Wetlands)
H Executive Order 11988 (Floodplain Management)
I Executive Order 12962 (Recreational Fisheries)
J Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds
K Executive Order 13112 (Invasive Species)
L OPNAVINST 6250.4B, Pest Management
M Executive Order 11989 (Use of Off- Road Vehicles on the Public Lands)

N National Environmental Policy Act of 1969
O CNO Guidance on Feral Cats and Dogs

[2] Class 0: recurring administrative and management; Class I: current compliance; Class II: maintenance requirements; Class III: enhancement or actions beyond compliance

[3] Navy Environmental Readiness Level: Level 4=compliance requirement, Level 3=Navy proactive involvement, Level 2=Navy or DoD policy requirement, and Level 1=Navy environmental stewardship

[4] Funding Sources: O&MN=Operations and Maintenance Environmental Fund; LP=Legacy Program; FR=Forestry Revenues; AO=Agricultural Outleasing Funds; and Non-DoD=Non-DoD Funds

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http://wetlands.fws.gov/

The National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service produces information on the characteristics, extent, and status of the nation's wetlands and deepwater habitats. The National Wetlands Inventory Center (NWIC) information is used by federal; state; and local agencies; academic institutions; U.S. Congress; and the private sector. The NWIC has mapped 90 percent of the lower 48 states, and 34 percent of Alaska. About 44 percent of the lower 48 states and 13 percent of Alaska are digitized.

http://www.epa.gov/owow/wetlands/

This website by the U.S. Environmental Protection Agency provides comprehensive information on definitions of wetlands, status and trends, functions and values, watershed planning, and much more. Information is provided on laws, regulations, guidance, and scientific documents.

http://www.nwrc.usgs.gov/

The National Wetlands Research Center is a source and clearinghouse of science information about wetlands in the United States and the world for fellow agencies,

private entities, academia, and the public at large. Staff members obtain and provide this information by performing original scientific research and developing research results into literature and technological tools. They then disseminate that information through a variety of means.

http://www.wetlands.com

The Wetlands Regulation Center is presented by Environmental Technical Services Co. as a service to all persons interested in the laws, policies, and regulations concerning activities regulated under Sections 401 and 404 of the Clean Water Act in waters of the United States, including wetlands.

http://www.birdpop.org/maps.htm

The Monitoring Avian Productivity and Survivorship (MAPS) Program was created by The Institute for Bird Populations in 1989 to assess and monitor the vital rates and population dynamics of over 120 species of North American landbirds in order to provide critical conservation and management information on their populations. The MAPS Program utilizes constant-effort mist netting and banding at a continent-wide network of monitoring stations staffed by both professional biologists and highly trained volunteers.

https://www.dodlegacy.org/Legacy/intro/about.aspx

In 1990, Congress passed legislation establishing the Legacy Resource Management Program to provide financial assistance to DoD efforts to preserve the natural and cultural heritage. The program assists DoD in protecting and enhancing resources while supporting military readiness. A Legacy project may involve regional ecosystem management initiatives, habitat preservation efforts, archeological investigations, invasive species control, and/or monitoring and predicting migratory patterns of birds and animals. Three principles guide the Legacy program: stewardship, leadership, and partnership. Stewardship initiatives assist DoD in safeguarding its irreplaceable resources for future generations. By embracing a leadership role as part of the program, the DoD serves as a model for respectful use of natural and cultural resources. Through partnerships, the program strives to access the knowledge and talents of individuals outside of DoD. In order to support these principles, the Legacy Program emphasizes five areas:

1. Legacy incorporates an ecosystem approach that assists DoD in maintaining biological diversity and the sustainable use of land and water resources for mission and other uses.

2. The program also implements an interdisciplinary approach to resource stewardship that takes advantage of the similarities between DoD's natural and cultural resource plans. Often, the same person is responsible for managing both natural and cultural resource plans on an installation. Legacy strives to take advantage of this by sharing management methodologies and techniques across natural and cultural resource initiatives.

3. Legacy promotes understanding and appreciation for natural and cultural resources by encouraging greater awareness and involvement by both the military and the public.

4. Additionally, the program takes advantage of similar ecosystems by applying resource management initiatives in broad regional areas. Legacy supports projects such as the Sonoran Ecosystem Management Initiative, the Gulf Coast Plain Ecosystem Partnership, the Chesapeake Bay Program, and Partners In Flight.

5. Finally, Legacy pursues the identification of innovative new technologies that enable more efficient and effective management.

http://www.audubon.org/

Publishes *Audubon Magazine* for bird conservation throughout the world. Over 510 Local Chapters throughout the Americas publish newsletters, sponsor field trips and education programs, and do advocacy work at the state level, all on behalf of the environment.

http://www.partnersinflight.org/

Partners In Flight (PIF) was launched in 1990 in response to growing concerns about declines in the populations of many landbird species, and in order to emphasize the conservation of birds not covered by existing conservation initiatives. The initial focus was on neotropical migrants, species that breed in the Nearctic (North America) and winter in the Neotropics (Central and South America), but the focus has spread to include most landbirds and other species requiring terrestrial habitats. The central premise of PIF has been that the resources of public and private organizations in North and South America must be combined, coordinated, and increased in order to achieve success in conserving bird populations in this hemisphere. PIF is a cooperative effort involving partnerships among federal, state and local government agencies; philanthropic foundations; professional organizations; conservation groups; industry; the academic community; and private individuals.

http://www.wvdnr.gov/wildlife/endangered.shtm

The West Virginia Division of Natural Resources (WVDNR) provides a list of species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service and are protected under the Endangered Species Act. To obtain a list of state rare plants, vertebrates, and invertebrates contact the WVDNR, Natural Heritage Program, P.O. Box 67, Elkins, West Virginia 26241 (304) 637-0245 or visit this site.

http://endangered.fws.gov/consultations/

Section 7 of the Endangered Species Act directs all federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the service, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of federal lands as well as other federal actions that may affect listed species, such as federal approval of private activities through the issuance of federal permits, licenses, or other actions.

http://www.wvdnr.gov/

The WVDNR home page provides information on hunting and fishing regulations, descriptions of wildlife resources and programs, parks and forests, law enforcement, and much more.

http://www.wvdnr.gov/wildlife/wdpintro.shtm

The West Virginia Division of Natural Resources' Nongame Wildlife and Natural Heritage Program (NWNHP) has developed the West Virginia Wild Yards Program to recognize the efforts of backyard wildlife landscapers. Approved properties will be entered into the West Virginia Wild Yards Registry maintained by the NWNHP. The property owner will receive a certificate and a sign that can be placed within the backyard habitat to let everyone know that the area is part of a statewide network of West Virginia Wild Yards.

http://www.afpmb.org/

The Armed Forces Pest Management Board (AFPMB) recommends policy, provides guidance, and coordinates the exchange of information on all matters related to pest management throughout the (DoD). The AFPMB's mission is to ensure that environmentally sound and effective programs are present to prevent pests and disease vectors from adversely affecting DoD operations.

http://www.invasivespecies.gov/main_nav/mn_NISC_ManagementPlan.html

The National Invasive Species Management Plan was developed by the National Invasive Species Council (NISC) to provide guidance on development of a national strategy to reduce the influx of invasive plants into the United States, to control or eradicate those species that are already a problem, and to restore degraded lands. This plan was recently updated for 2008-2012 and is available at this location: http://www.invasivespecies.gov/home_documents/2008-2012%20National%20Invasive%20Species%20Management%20Plan.pdf

https://www.denix.osd.mil/portal/page/portal/content/environment/NR/conservation/INRMP/INRMPHB.PDF

Resources for INRMP Implementation, A Handbook for the DoD Natural Resources Manger was developed under the guidance of the Office of the Deputy Under Secretary of Defense for Environmental Security. The handbook was developed to provide guidance on preparation of Integrated Natural Resources Management Plans (INRMPs). INRMPs are the means by which the Department of Defense (DoD) is fulfilling its responsibility as a steward of public lands while maintaining full support of the military mission. The plans are mandated under the Sikes Act as amended by the Sikes Act Improvement Act (SAIA) of 1997.1 The Sikes Act requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on lands used for military mission activities. INRMPs are used to implement this program.

http://www.dtic.mil/whs/directives/corres/pdf/471503p.pdf

DoD Instruction 4715.3 contains instructions for implementing policies and for integrated management of natural and cultural resources on military installations.

http://www.epa.gov/OWOW/wetlands/regs/eo12962.html

Executive Order 12962 works to increase opportunities for recreational fishing opportunities throughout the United States, creates the National Recreational Fisheries

Coordination Council, and encourages the Coordination Council to work with other agencies to develop Recreational Fishery Resources Conservation Plans.

http://ecos.fws.gov/servlet/TESSWebpageUsaLists?state=WV

This site is updated daily and lists federally listed threatened and endangered species for the entire state of West Virginia.

http://www.doi.gov/greening/buildings/landscaping.pdf

Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practice on Federal Landscape Grounds. This document announces guidance developed by the interagency workgroup under the direction of the Federal Environmental Executive to assist federal agencies in the implementation of environmentally and economically beneficial landscape practices. This guidance is in response to the requirements of the executive memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds.

http://www.nps.gov/plants/pubs/chesapeake/

Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed. "Conservation landscaping" refers to landscaping with specific goals of reducing pollution and improving the local environment. In the Chesapeake Bay watershed (the land that drains to the Bay and its many tributaries), this style of landscaping is sometimes called "BayScaping," or beneficial landscaping.

Conservation landscaping provides habitat for local and migratory animals, conserves native plants and improves water quality. Landowners also benefit as this type of landscaping reduces the time and expense of mowing, watering, fertilizing and treating lawn and garden areas, and offers greater visual interest than lawn. Beneficial landscaping can also be used to address areas with problems such as erosion, poor soils, steep slopes, or poor drainage.

One of the simplest ways to begin is by replacing lawn areas with locally native trees, shrubs and perennial plants. The structure, leaves, flowers, seeds, berries and other fruits of these plants provide food and shelter for a variety of birds and other wildlife. The roots of these larger plants are also deeper than that of typical lawn grass, and so they are better at holding soil and capturing rainwater.

treesaregood.com

This is an educational website that provides quality tree care information that strives to help the mission of the International Society of Arborist to educate the public about the importance and value of proper tree care for the general public.

http://www.urbanforestrysouth.org/resources/library/assessing-pruning-wound-damage/view?searchterm=None

Assessing Pruning Wound Damage. The act of pruning is a stressful and stunting process for a tree. Pruning is also a point of liability risk to the pruner. Wounds open the tree to colonization by a myriad of organisms, to environmental problems, and to structural integrity losses from setting of defensive boundaries. Mechanical injury is the single worst form of damage with which a tree must biologically deal.

Pruning, following standards and best management practices, and abusive cutting and trimming, all generate wounds of various sizes and depths. The potential risks to the health and structure of the tree from any given wound are dependent upon individual genetics, species, site, season, wound history, sanitation, method of wounding, and characters of the wound. For example, a properly pruned branch with a wound area having tight, unmarred bark and an intact branch collar would be relatively good. By comparison, a similarly sized wound between branch bases (inter-nodal cut) made with a saw that tears the bark and a sawyer that nicks remaining bark areas would be relatively bad.

To better understand and minimize damage to trees during pruning, an assessment system was developed. This system is based upon long-term tree functions and reactions to wounding. In this assessment system it is assumed that proper standard pruning practices will be followed. Within standard pruning practices, heartwood and decay column exposure will be used to estimate damage to the health and structure of the tree now, and into the future. The basic tenets of this system are: 1) fewer wounds are better; 2) shallower wounds (fewer annual rings crossed) are better; 3) smaller wounds are better; 4) less heartwood crossed (limited defensive reactions and no living cells for sense or supply) is better; and, 5) fewer tree-set defensive boundaries crossed are better (than other types of wounds).

http://www.arborday.org/

The Arbor Day Foundation website contains information on hardiness zones, trees (buying, planting, identification, guides, tree care tips, tree resources, etc.), and educational programs (for children, cities and towns, and forest replanting programs).

http://www.sercc.com/

The Southeast Regional Climate Center (SERCC), one of six regional climate centers in the United States, was established in March 1989. The SERCC is housed at the University of North Carolina at Chapel Hill. The SERCC program was created in response to an assessment that identified various user needs for regional climate services in the Southeast. Overall direction of the Regional Climate Center Program is provided by the National Climatic Data Center and the National Environmental Satellite, Data, and Information Service (NESDIS) of the National Oceanographic and Atmospheric Administration (NOAA). The SERCC serves Alabama, Florida, Georgia, North Carolina, South Carolina, Virginia, Puerto Rico and the U.S. Virgin Islands. The mission of the SERCC is to provide timely, high quality, and pertinent climate data and information to public and private users in the region.

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Appendix A
Regulatory Coordination

Enclosure 1
U.S. Fish and Wildlife Service

Enclosure 2
West Virginia Department of Natural Resources

Enclosure 3
Navy Information Operations Command Sugar Grove Hunting Instructions

Appendix B
Fauna and Flora

Enclosure 1
Mammals

Enclosure 2
Birds

Enclosure 3
Herpetofauna

Enclosure 4
Fish

Enclosure 5
Plants

Appendix C
Navy Information Operations Command Sugar Grove Survey Reports

Enclosure 1
Navy Information Operations Command Sugar Grove 2003 Invasive Species Survey

Enclosure 2
Navy Information Operations Command Sugar Grove 2009 Bat Survey

Appendix D
Environmental Assessment