NAVAL SUBMARINE BASE NEW LONDON NEW LONDON COUNTY, CONNECTICUT



Prepared for:

Mid-Atlantic Division Naval Facilities Engineering Systems Command

April 2022

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NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT

Prepared for:

Mid-Atlantic Division Naval Facilities Engineering Systems Command

Prepared by:

WSP Global, Inc. and Environmental Assessment Services, LLC

April 2022

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PRELIMINARIES

Naval Submarine Base New London



#### INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Submarine Base New London Groton, Connecticut

2022 Plan

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1E. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service, the Connecticut Department of Energy and Environmental Protection, and the New York State Department of Environmental Conservation in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

**Approving Official's Signature:** 

<u>Kenneth M.</u> Curtin, Jr., Captain, USN Installation Commanding Officer Naval Submarine Base New London

09 AUG 2022 Date



Naval Submarine Base New London Groton, Connecticut

2022 Plan

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**Approving Official's Signature:** 

AUDREY MAYER Digitally signed by AUDREY MAYER Date: 2022.05.13 14:36:33 -04'00'

United States Fish and Wildlife Service

Date



## **Naval Submarine Base New London Groton**, Connecticut

2022 Plan

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1E. This document was prepared and reviewed in coordination with the Connecticut Department of Energy and Environmental Protection in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

**Approving Official's Signature:** 

Connecticut Department of Energy and Environmental

Protection

June 30, 2022 Date



#### Naval Submarine Base New London Groton, Connecticut

2022 Plan

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**Approving Official's Signature:** 

James F Farguhar III New York State Department of Environmental

New York State Department of Environmental Conservation

May 02, 2022 Date



### Naval Submarine Base New London Groton, Connecticut

2022 Plan

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1E. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service, the Connecticut Department of Energy and Environmental Protection, and the New York State Department of Environmental Conservation in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

#### **Approving Official's Signature:**

BROWN.MICHAEL Digitally signed by BROWN.MICHAEL.J.1228586613 Date: 2022.05.16 08:17:04 -04'00'	5/16/22
Installation Environmental Program Director	Date
Naval Submarine Base New London	
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Natural Resources Manager	Date
Naval Submarine Base New London	



### **Naval Submarine Base New London** Groton, Connecticut

2022 Plan

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1E. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration - National Marine Fisheries Service, the Connecticut Department of Energy and Environmental Protection, and the New York State Department of Environmental Conservation in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

### **Approving Official's Signature:**



Digitally signed by CARAWAN.WILBUR.E.1229602760

05/03/2022 Date

Natural Resources Manager Naval Facilities Engineering Command Mid-Atlantic Division

P-6



Naval Submarine Base New London

## 2022 Plan

Date of Annual Review/Update

Name and Title of Reviewer(s)

5<sup>th</sup> Year NAVFAC MIDLANT Review for Operation and Effect

\_\_\_\_\_

\_\_\_\_\_



# ANNUAL REVIEW TRACKING FORM

DATE	SECTION/ PAGE	COMMENT	REVIEWER

Submarine Base New London



# **EXECUTIVE SUMMARY**

This Integrated Natural Resources Management Plan (INRMP) has been prepared and will be implemented in accordance with the Sikes Act Improvement Act (Sikes Act) of 1997 and the Navy Environmental Readiness Program (Navy, 2021a). Section 101(a)(1)(B) of the Sikes Act requires the secretary of all military departments to "prepare and implement an INRMP for each military installation in the United States" that contains habitat that is suitable for conservation and management of natural ecosystems. This INRMP has been prepared for Naval Submarine Base New London (SUBASE NLON.<sup>1</sup> or installation), in accordance with, but not limited to, the following authorities, which were current at the time the INRMP was prepared. Revisions to the following authorities and guidance documents would replace the older version, and any necessary changes in the INRMP will be documented during the annual review or incorporated into the INRMP at the time it is updated:

- Department of Defense (DOD) Instruction 4715.03 (DOD, 2018a)
- U.S. Department of the Navy (Navy) Environmental Readiness Program Manual OPNAV M-5090.1 (, 2021a)
- Sikes Act of 1997 (*Sikes Act*, 1997)
- ➢ Navy INRMP Guidance (Navy, 2006)
- Endangered Species Act of 1973 (ESA) (Endangered Species Act, 1973)

In addition to these authorities, natural resources managers are encouraged to use geographic information systems as the basis for their INRMP (Navy, 2021a) and to incorporate the guidance and recommendations provided in *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers* (Benton et al., 2008).

The INRMP addresses future requirements and identifies projects that will be implemented over the duration of the INRMP. The INRMP will be reviewed annually in coordination with the U.S. Fish and Wildlife Service and the Connecticut Department of Energy and Environmental Protection (CT DEEP). The purpose of the annual review is to ensure that:

- 1) Information contained within the INRMP is current
- 2) Implementation and maintenance of conservation measures are on schedule
- 3) Funding for conservation and maintenance activities is included in the annual budget
- 4) Natural resources positions are identified that need to be, or are in the process of being, filled
- 5) All necessary coordination has taken place, and that upcoming projects and activities are identified and included; and

<sup>&</sup>lt;sup>1</sup> SUBASE NLON includes the installation, off-base housing, and the Admiral Fife Naval Recreation Area. It also includes the Saratoga Springs installation, Saratoga, NY (Area of Responsibility).



6) The INRMP contains any significant changes in the installation's military mission requirements or its natural resources.

The annual review provides an opportunity to incorporate changes in accepted environmental conservation practices and scientific advances associated with evaluation and implementation of natural resources management. If necessary, the annual review will include an update of the INRMP that includes an updated project list, documentation of significant changes in natural ecosystems, and updates to information contained in the INRMP appendices. However, the INRMP will be formally reviewed no less than every five years, per the requirements of Section 101(b)(2) of the Sikes Act. Forms to record periodic reviews are included at the beginning of this document, immediately following the Approving Officers' signature page. INRMP update forms will be used to compile proposed updates throughout the course of each year and will serve to provide an outline for revisions to be incorporated during the formal five-year review.

The INRMP is organized into the following chapters:

- Chapter 1 Overview. This chapter describes the INRMP's purpose, scope, goals and objectives, responsibilities, and authorities that are applicable to the INRMP and includes a brief discussion of management strategy and other plan integration.
- Chapter 2 Environmental Management Strategy and Mission Sustainability. This chapter discusses the integration of the military mission and natural resources management, consultation requirements, *National Environmental Protection Act of 1969* (NEPA) compliance, beneficial partnerships and collaborative resource planning, public access and outreach, encroachment, and the Connecticut Wildlife Action Plan (CT DEEP 2015).
- Chapter 3 Current Conditions. This chapter provides a general description of the installation including land areas, regional land uses, a brief history, and the military mission and operations of SUBASE NLON. The section also describes the existing physical and natural conditions of SUBASE NLON. A general site description is included in this section, along with information on, but not limited to, climate; geology; topography; soils; water resources, including surface waters, wetlands, and groundwater; and flora and fauna, including vegetative communities, invasive species, threatened and endangered species, species of concern, and habitats of special concern.
- Chapter 4 Natural Resources Program Overview. This chapter includes a discussion of natural resources management issues that are relevant to SUBASE NLON, a description of regulatory drivers for natural resources management on DOD installations, and specific recommendations for issues, as appropriate. The management measures and projects planned for implementation under this INRMP are also identified in this section.
- Chapter 5 Management Recommendations Summary. This chapter describes the natural resources management projects and how those projects meet the goals and objectives of this INRMP. It includes descriptions of each project, with corresponding potential collaborators.

Submarine Base New London



- Chapter 6 Implementation. This chapter outlines means for implementing this INRMP, including guidelines on supporting the sustainability of the military mission and the natural environment, natural resources consultation requirements, achieving no net loss, NEPA compliance, project development and classification, funding sources, commitment, and use of cooperative agreements.
- Chapter 7 References. This chapter includes a list of all references used in the development of the INRMP. A list of useful internet resources also is provided in this section.
- Appendix A List of Acronyms and Abbreviations. Appendix A defines all acronyms and abbreviations used in the INRMP.
- Appendix B Flora and Fauna Species List. Appendix B contains tables of all plant and animal species that have been confirmed to occur at SUBASE NLON through focused field surveys. This Appendix also includes a list of federal and state threatened and endangered species that have the possibility of being located on SUBASE NLON or Naval Support Activity (NSA) Saratoga Springs.
- Appendix C SUBASE NLON Natural Resources Project List. Appendix C contains the summary table for all funding-dependent natural resources projects recommended in the INRMP and includes the proposed implementation schedule, prime legal driver/initiative, class, Navy Environmental Readiness Level (ERL), cost estimate, and potential funding sources for each natural resources project.
- Appendix D NSA Saratoga Springs Integrated Natural Resources Component Management Plan. Appendix D contains a component plan for NSA Saratoga Springs. This plan includes current conditions and use of NSA Saratoga Springs as well as a natural resource program overview for this location.
- Appendix E Federal and State Mutual Agreement Letters. Appendix E contains copies of correspondence between the Navy, CT DEEP, New York State Department of Conservation (NYSDEC), National Oceanic and Atmospheric Administration (NOAA), and U.S. Fish and Wildlife Service (USFWS) to obtain agency concurrence with this INRMP.
- Appendix F Environmental Assessment (EA) and Finding of No Significant Impact (FONSI). Appendix F includes a copy of the EA prepared in 2003 as part of the NEPA compliance process, and the Finding of No Significant Impact (FONSI). There was a reevaluation and it was determined that the 2003 EA and FONSI are still applicable to this INRMP update and that the Navy's Categorical Exclusion #48 applies: *Revisions or updates to INRMPs that do not involve substantially new or different land use or natural resources management activities and for which an EA or EIS was previously prepared that does not require supplementation pursuant to 40 CFR 1502.9(c)(1).*
- Appendix G INRMP Benefits for Endangered Species, Critical Habitat, and Migratory Birds. Appendix G describes how this INRMP, as implemented, can benefit federal trust species (e.g., migratory birds) and other species that are proposed, or candidates for federal listing that do occur or may occur, on SUBASE NLON.



- Appendix H Memorandums of Understanding. Appendix H contains the Regional Stranding Investigation Assistance Plan, which is a memorandum of agreement between SUBASE NLON and NOAA Fisheries Service's Northeast Regional Office to assist NOAA Fisheries Service with investigations of uncommon marine mammal stranding events during major training exercises.
- Appendix I Educational Brochure Examples. Appendix I contains examples of educational material that SUBASE NLON can use for education, outreach, and training materials.
- Appendix J SUBASE NLON Forest/Tree Care and Replacement Guidance. Appendix J provides additional information and recommendations for SUBASE NLON management and maintenance of urban forests and tree care.

# This INRMP has been prepared to comply with the Office of the Under Secretary of Defense INRMP format (OUD, 2006).

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Naval Submarine Base New London



# **1.0 OVERVIEW**

## **1.1 PURPOSE AND AUTHORITY**

Military lands contain some of the most significant remaining large tracts of valuable natural resources in our nation. Due to this, Congress amended the Sikes Act Improvement Act (Sikes Act) of 1997 (16 United States Code [USC] 670a-670o) of 1960 to require the Department of Defense (DOD) to develop and implement Integrated Natural Resources Management Plans (INRMP) (Orndorff, 2020). This INRMP for Naval Submarine Base New London (SUBASE NLON) is an update to SUBASE NLON's 2016 INRMP, and was prepared to comply with the Sikes Act (Sikes Act, 1997), DOD Instruction (DODI) 4715.03 (DOD, 2018a), Code of Federal Regulations (CFR) Title 32, Part 190 - DOD Natural Resources Management Program (CFR, 2002), Chief of Naval Operations Instructions (OPNAVINST) 5090.1E: Environmental Readiness Program (Navy, 2019), and all other applicable federal and state laws, regulations, and guidance. These regulations require that the Secretary of Defense implement a program to provide for the conservation and rehabilitation of natural resources on military installations. The secretaries of each military department are authorized to carry out the program, consistent with the use of military installations, to ensure the preparedness of the U.S. Armed Forces. The Secretary of the U.S. Department of the Navy (Navy) implements and maintains a balanced and integrated natural resources management program for all Navy and U.S. Marine Corps installations.

The update of SUBASE NLON's INRMP has included a thorough review of the natural resources management programs in place at the installation, incorporated the most up-to-date information and data available, and taken into account the most recent guidance, including *Integrated Natural Resources Management Plan Guidance for Navy Installations: How to Prepare, Implement, and Revise Integrated Natural Resources Management Plans (INRMP)* (Navy, 2006); the DOD memorandum, *DOD Integrated Natural Resources Management Plan (INRMP) Template* (OUD, 2006); *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Management Plan (INRMP) Template* (Senton et al., 2008) and DOD Manual 4715.03: *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (DOD, 2018b).

To facilitate the Natural Resources Program (NRP), the secretary of each military department is directed to prepare and implement an INRMP for each military installation under the jurisdiction of the secretary. The INRMP must be prepared in cooperation with the U.S. Secretary of the Interior, acting through the director of the U.S. Fish and Wildlife Service (USFWS), and the head of the appropriate fish and wildlife agencies of the state in which the military installation is located. The Sikes Act acknowledges that the principal use of military installations is to ensure the preparedness of the U.S. Armed Forces. In accordance with the Sikes Act, the INRMP shall, to the extent appropriate and applicable, provide for the following:

- implementation of an ecosystem-based program that provides for conservation and rehabilitation of natural resources consistent with the military mission
- integration, consistency, and coordination of all natural resources management activities
- sustainable management of fish, plants, and wildlife through habitat enhancement, modification, and/or restoration, where necessary



- public access for use of natural resources within safety and military security considerations
- enforcement of applicable natural resources laws and regulations (*Sikes Act Improvement Act*, 1997)

Regulatory drivers that restrict the Navy's operations with respect to natural resources, and that have implications for the management of natural resources at SUBASE NLON, are listed in Chapter 4.0.

An INRMP guides the management of installation natural resources in order to ensure consistency with the installation's military mission, while protecting and enhancing natural resources for multiple use, sustainable yield, and biological integrity.

# **1.2 SCOPE**

An INRMP's scope comprises all lands, ranges, nearshore areas, and leased areas (1) owned by the U.S. and administered by the Navy; (2) used by the Navy via license, permit, or lease, for which the Navy has been assigned management responsibility; or (3) withdrawn from the public domain for use by the Navy, for which the Navy has been assigned management responsibility (Navy, 2006).

SUBASE NLON is composed of the main installation, 687 acres; Admiral Fife Naval Recreation Area (AFNRA), 36 acres; and multiple housing areas that total 634 acres. Please refer to Section 3.1 for additional details and maps of each of the areas defined in this INRMP. SUBASE NLON's main installation is located along the eastern shore of the Thames River in the towns of Groton and Ledyard, Connecticut (CT). AFNRA is located in Stonington, CT. The housing areas covered by this INRMP, located in Groton, CT, just west and south of the main installation, include: Trident Park, Polaris Park, Dolphin Garden, Conning Towers, and Nautilus Park. Figure 2-1 and Figure 2-2 show the location of these sites.

This INRMP update also covers the Naval Support Activity (NSA) Saratoga Springs. NSA Saratoga Springs spans 69 acres and is located in Saratoga Springs, New York (NY). Refer to Appendix D for additional information.

# 1.3 MILITARY MISSION AND SUSTAINABLE LAND USE

To protect and maintain natural resources while ensuring the continuation of the military mission, SUBASE NLON has implemented an ecosystem management approach for environmental stewardship that maximizes the use of suitable lands for the military mission while minimizing impacts on natural resources.

The SUBASE NLON mission is to provide the facilities, deliver the services, and create the environment for the Fleet, Fighter, and Family to deploy combat-ready submarines and their crews, and train a corps of professional submariners. Currently, natural resources management at SUBASE NLON does not significantly affect the military mission. As is discussed further under Section 6.2, the installation is achieving no net loss in the capability of military lands to support



the mission of the installation through the implementation of the INRMP. The effectiveness of this INRMP in preventing "net loss" will be evaluated annually.

The DOD's land management responsibilities include acting as a steward for hundreds of the nation's rarest species and most characteristic habitats without compromising the preparedness of the Armed Forces (Benton et al., 2008). To this end, the Navy takes a proactive approach toward integrating the military mission with concepts of sustainable land use. Efficient and effective land use planning and natural resources management supports military readiness and sustainability while also protecting and enhancing natural resources.

An INRMP outlines goals and objectives (Section 1.4) for use by the installation's Natural Resources Manager (NRM) to balance the management of natural resources that are unique to an installation with military mission requirements and other land use activities affecting those resources (DOD & USFWS, 2004). The Navy understands the role INRMPs play in identifying potential conflicts between an installation's mission and natural resources. INRMPs also identify actions necessary to maintain the availability of mission-essential properties and acreage. The SUBASE NLON NRM is responsible for ensuring the accomplishment of the military mission in a way that sustains and enhances the natural resources on the installation (Benton et al., 2008).

Although 30 percent of SUBASE NLON's installation, housing area, and AFNRA acreage is developed for mission activities and support functions (e.g., residential housing), its remaining natural resources provide practical ecosystem services. These natural resources include nearshore and coastal habitats, wetlands, and upland areas that provide critical ecosystem services such as: storm protection, flood and erosion control, and habitat corridors for biodiversity (refer to Section 3.4 for further discussion). The installation's natural resources also provide opportunities for outdoor recreation and aesthetic benefits that contribute to the installation's Morale Welfare and Recreation (MWR) Program.

## 1.4 INRMP VISION, MISSION, GOALS, AND OBJECTIVES

This INRMP is a long-term planning document that guides implementation of the NRP to help ensure consistency with the installation's military mission, while protecting and enhancing natural resources, to the extent practicable. SUBASE NLON NRP has established the following vision and mission for its program:

# **SUBASE NLON Natural Resources Program Vision Statement**

SUBASE NLON and Commander, Navy Region, Mid-Atlantic (CNRMA) is committed to environmental compliance with local, State, and Federal environmental laws, regulations, and policies. We acknowledge that environmental stewardship is essential to the safe, healthful, and compliant execution of our mission and the preservation and protection of our land, air, and water. We are committed to preventing pollution at its source whenever possible. To achieve our goals, we integrate sound environmental practices into all operations and business decisions.



# **SUBASE NLON Environmental Support Mission Statement**

The Environmental Division (ED) strives to provide high quality environmental support to SUBASE NLON and all its tenet commands; offer sound environmental management and technical support necessary for Navy and Marine Corps compliance with federal, state, and local regulations; and continually improve our relationship with base departments, tenant commands, regulators, and other stakeholders through focus on common operational goals, sharing of information regarding our products and services, and availability of a highly skilled environmental workforce.

In accordance with the Integrated Natural Resources Management Program, the Sikes Act, and OPNAV M-5090.1: *Environmental Readiness Program Manual*, each INRMP must provide the following, consistent with military operations at the applicable installation:

- management of fish and wildlife, land, and forest resources
- identification of fish- and wildlife-oriented recreational use activities and areas
- enhancement or modification of fish and wildlife habitat
- protection, enhancement, and restoration of wetlands, where necessary, for support of fish, wildlife, or plants
- integration of, and consistency among, the various activities conducted under the INRMP
- establishment of specific natural resources management goals and objectives, and timeframes for proposed actions
- sustainable use by the government of natural resources, to the extent that such use is consistent with the needs of fish and wildlife management and subject to installation safety and security requirements
- enforcement of natural resources laws and regulations
- no net loss in the capability of military lands to support the military mission of the installation
- annual review of this INRMP and its effects, and updated no less than every five years (*CFR*, 2002; *Sikes Act*, 1997; Navy, 2019)

For SUBASE NLON, the following goals and objectives have been defined to address INRMP regulatory requirements and the installation-specific needs of SUBASE NLON and its operations.

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Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.

*Objective 1.1 Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and nonpoint source pollution, and/or erosion and sedimentation.* 

*Objective 1.2* Enhance the function(s) and value(s) of aquatic ecosystems through the protection and restoration of wetlands and riparian areas.

*Objective 1.3* Avoid and protect wetlands in accordance with state regulations (at a minimum) and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.

# Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.

*Objective 2.1* Increase urban tree canopy, and conserve individual trees and groups of trees within the urban environment.

*Objective 2.2 Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.* 

*Objective 2.3* Enhance existing habitat for pollinators and encourage the use of pollinator plants in landscaping.

# Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.

*Objective 3.1 Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.* 

*Objective 3.2 Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species, as well as bats, to minimize "takes" of these species resulting from military readiness activities or base operations.* 

*Objective 3.3 Restore and enhance wildlife habitats.* 

*Objective 3.4 Monitor populations and herd health of select game species to adjust harvest limits, as needed.* 

*Objective 3.5 Maintain and enhance native species to promote community diversity, and eradicate or control and monitor noxious, invasive, and/or non-native plant and animal species.* 





### Goal 4. Provide sustainable natural-resources-related outdoor recreation opportunities.

*Objective 4.1 Manage SUBASE NLON's hunting program to allow for the maximum participation possible without compromising the military mission and to enable hunters to harvest the annual quotas recommended to maintain sustainable populations.* 

*Objective 4.2 Develop and promote additional opportunities/sites for passive outdoor recreation, including establishment of watchable wildlife areas and nature trails.* 

Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receives adequate training and resources and by promoting environmental awareness, education, and outreach among internal and external stakeholders.

*Objective 5.1 Provide adequate staffing, equipment, technology, and training for the NRP to ensure proper implementation of this INRMP.* 

*Objective 5.2 Implement training, education, outreach, and stewardship initiatives for ecosystem management.* 

*Objective 5.3 Provide opportunities for public access among regional stakeholders for environmental education and scientific research and study consistent with resource conservation, in coordination with SUBASE NLON's NRP.* 

Objective 5.4 Educate employees, tenants, housing residents, and contractors about natural resources issues and best management practices to protect the Thames River watershed and engage in regional conservation initiatives.

Goal 6. Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with resource and regulatory agencies, regional partnerships, nongovernmental organizations (NGO), universities, and the public, to sustain the military mission.

*Objective 6.1 Maintain interagency cooperation with the USFWS, Connecticut Department of Energy and Environmental Protection (CT DEEP), New York State Department of Environmental Conservation (NYSDEC), and New York Department of the State (for coastal issues in Long Island Sound).* 

*Objective 6.2 Develop partnerships with the National Oceanic and Atmospheric Administration* (*NOAA*) *Fisheries, DOD Partners in Flight (PIF), academic institutions, and other local agencies and organizations to implement wildlife monitoring and protection programs and habitat restoration projects.* 



Goal 7. Assess the potential impacts of climate change on natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.

*Objective 7.1 Monitor the findings of regional partnerships focused on regional or landscapescale assessment, monitoring, and adaptation of natural resources to climate change.* 

*Objective 7.2 Conduct a vulnerability assessment of how climate change may affect the natural resources of interest and develop and implement a climate adaptation plan.* 

*Objective 7.3 Implement natural resource management strategies and best management practices that provide conservation benefits to the ecosystem and are intended to address risks posed by climate change.* 

## 1.4.1 Related SUBASE NLON Natural Resource Policies

In addition to the authorities cited in Section 1.1, the SUBASE NLON INRMP process has reviewed and incorporated the natural resource policies and plans into their ED.

## SUBASE NLON Environmental Division

SUBASE NLON's ED offers environmental services to the installation and all of its tenant commands. This division provides this support while complying with federal and state environmental requirements.

The goals of the ED are as follows:

- Ensure environmental compliance by meeting or exceeding all applicable environmental legal requirements.
- Ensure use of processes that minimize adverse effects on the environment, including developing and improving operations and technologies to minimize waste, prevent pollution, and dispose of waste safely and responsibly.
- Practice conservation through recycling initiatives and recycled material purchasing.
- Strive to continuously improve environmental performance.
- Employ waste source reduction and other pollution prevention approaches, whenever applicable.
- Employ sustainable practices aimed at increasing energy efficiency and the use of renewable energy, acquisition of green products and electronic stewardship, sustainable buildings, toxics reductions, and water conservation.
- Annually review policies, instructions, and procedures and provide leadership to ensure that all Navy personnel develop and exhibit an environmental protection ethic (Moore, 2019).



# 1.5 **Responsible and Interested Parties**

Successfully implementing an INRMP requires the support of natural resources personnel, other installation staff, command personnel, and installation tenants. Table 1-1 discusses the responsibilities for INRMP implementation within the U.S. Navy and what external stakeholders are interested in the outcomes of the implementation of this INRMP. Additional external partnership and collaboration opportunities are discussed in Section 3.6.

Stakeholder	<b>Responsibilities and Interests</b>
I	nternal Stakeholders
Installation Commanding Officer (ICO)	Implementing and enforcing this INRMP; Managing installation operations, including the facilities and security directorates, and contingency operations.
Public Works Department (PWD)	Overall maintenance and control of the physical structures on the installation and PWD ED Director manages the NRP in conjunction with the NRM.
Natural Resources Manager (NRM)	Implementation of the NRP in conjunction with the PWD ED Director. The NRM is responsible for implementing this INRMP and the actions provided herein.
Environmental Division (ED)	Provides environmental services while complying with federal and state environmental requirements; manages and oversees numerous environmental programs to maintain compliance for all environmental media, including air quality, drinking water, hazardous waste, stormwater, above and below ground storage tanks, spills, wastewater, cultural resources, Environmental Restoration (ER), and NEPA/permitting.
Naval Branch Health Clinic (NBHC) Groton	Provides medical care to all eligible beneficiaries. NBHC Groton also works with the Connecticut Agricultural Experiment Station (CAES) to minimize mosquito breeding through applications of pesticides and setting of traps.
U.S. Navy GeoReadiness Program	Provides, builds, sustains, and advances Commander, Navy Installations Command (CNIC)/Naval Facility Engineering and System Command (NAVFAC) capabilities to support installation management missions. The program develops, maintains, and shares a comprehensive geographic information system (GIS) that includes data relating to installation infrastructure and environmental topics.

Table	1-1:	Internal	and	External	Stakeho	olders
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Stakeholder	Responsibilities and Interests
Interna	l Stakeholders (continued)
Morale Welfare and Recreation (MWR)	Manages installation community affairs, families, education, military personnel operations, non-appropriated funds, appropriated funds, recruitment and retention programs, and business operations for MWR activities. MWR has a primary role in all recreation programs and the maintenance and allocation of recreational spaces.
Directorate of Contracting	Performs contracting functions in accordance with the Federal Acquisition Regulation, Defense Federal Acquisition Regulation, Army Federal Acquisition Regulation, and NAVFAC regulations.
Other Installation and Tenant Organizations	Implementation requires assistance from, or coordination with, a variety of other installation organizations, tenants, and contract personnel. Among the approximately 70 tenants are the Commander Submarine Group 2, Naval Submarine School, Submarine Learning Center, Naval Branch Health Clinic, Naval Submarine Medical Research Laboratory, Naval Undersea Medical Institute, and the Navy Information Operations Detachment.
E	xternal Stakeholders
U.S. Fish and Wildlife Service (USFWS) (New England Field Office, Concord, New Hampshire [NH])	A signatory agency of installation INRMPs in accordance with the Sikes Act. In addition, the DOD and Navy consult formally and informally with the USFWS on TES, candidate species, wetland issues, and pursuant to applicable legislation including the ESA and the <i>Clean Water Act</i> (CWA).
National Oceanic and Atmospheric Administration (NOAA) Fisheries Northeast Regional Office, Protected Resources Division, Gloucester, Massachusetts (MA)	The DOD and Navy conduct <i>Endangered Species Act of 1973</i> (ESA), Section 7 consultation and coordination for TES and candidate species (for marine species and anadromous fish) in coordination with NOAA Fisheries.
State of Connecticut Department of Energy and Environmental Protection (CT DEEP)	A signatory agency for this INRMP. Oversees the management and use of the state's forests, parks, fisheries, and wildlife. CT DEEP has statewide responsibilities for assessing and restoring water quality and habitat; managing and regulating recreational boating, fishing, and hunting; and managing wetlands, wildlife, and state-listed rare, threatened, and endangered species. The DOD and Navy work with CT DEEP on issues related to state environmental laws, regulations, and environmental permits related to wildlife, wetlands, water withdrawal, discharges, stormwater, and water and sewage treatment.

Table 1-1: Inte	ernal and Exten	rnal Stakeholders



Stakeholder	Responsibilities and Interests	
External Stakeholders (continued)		
Connecticut Agricultural Experiment Station	Improves environmental quality, protects plants, and enhances human health (CAES, 2021). Their programs range from soil testing to invasive species surveys. SUBASE NLON has partnered with the CAES previously for mosquito surveillance (Schibell, 2013).	
New York State Department of Environmental Conservation (NYSDEC)	PWD staff stationed at SUBASE NLON, including the ED, support NSA Saratoga Springs in Saratoga Springs, NY. A signatory agency for this INRMP, NYSDEC has statewide responsibilities for recreational outdoor activities such as hunting, fishing, camping, and boating; management of terrestrial and aquatic species and habitat; water quality, including chemical and pollution control; and energy production and policy. The DOD and Navy work with NYSDEC on issues related to applicable state environmental laws, regulations, and environmental permits related to wildlife, wetlands, water withdrawal, discharges, stormwater, and water and sewage treatment.	
New York State Department of the State	The state's legal council and planning agency for New York. Issues within Long Island Sound affect both the NY and CT shorelines. SUBASE NLON engages with the New York State Department of the State on issues related to Long Island Sound.	
DOD Partners in Flight (PIF) (PIF Northeast Working Group)	Protects and conserves neotropical migratory birds and their habitat. Protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on their lands, consistent with military missions. PIF includes national working groups to deal with local and regional problems.	
DOD Partners in Amphibian and Reptile Conservation (PARC)	DOD PARC provides a network through which the DOD can work to avoid future mission restrictions while providing stewardship for threatened and endangered herpetofauna. DOD PARC focuses on habitat and species management; inventory, research, and monitoring; and education, outreach, and training. It provides a framework for the effective management of amphibians and reptiles by the military services and their installations. DOD PARC's primary responsibility is to ensure that the DOD has the operational and logistical flexibility necessary for testing and training exercises.	

# Table 1-1: Internal and External Stakeholders

Stakeholder	Responsibilities and Interests	
External Stakeholders (continued)		
North Atlantic Landscape Conservation Cooperative	Provides a partnership, through the USFWS, in which the private, state, tribal and federal conservation community works together to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate.	
North American Bird Conservation Initiative (NABCI)	NABCI is a forum of government agencies, private organizations, and bird initiatives helping partners meet their common bird conservation objectives.	

### Table 1-1: Internal and External Stakeholders

## **1.6 INRMP AND NATURAL RESOURCES AUTHORITY**

The Sikes Act is the driver behind the SUBASE NLON NRP and INRMP. According to the Sikes Act, the primary purposes of a military conservation program are conservation and rehabilitation of natural resources, sustainable multipurpose use of those resources, and public access to military lands, subject to safety requirements and military security. Moreover, the conservation program must be consistent with the mission-essential use of the installation and its lands. The Sikes Act requires the preparation of an INRMP to facilitate the conservation program (*Sikes Act*, 1997). The INRMP must be cooperatively developed with the USFWS, NOAA when applicable, and the state fish and wildlife agencies, which, for SUBASE NLON, are CT DEEP and NYSDEC for NSA Saratoga Springs. The resulting INRMP reflects the mutual agreement of all parties concerning conservation, protection, and management of natural resources on the installation.

The Sikes Act states that "the Secretary of each military department shall prepare and implement an INRMP for each military installation in the U.S. under the jurisdiction of the Secretary, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate" (*Sikes Act Improvement Act*, 1997). DODI 4715.03 describes procedures for integrated management of natural and cultural resources, including preparing an INRMP as required by the Sikes Act. DODI 4715.03 also states that "INRMPs shall be prepared, maintained, and implemented for all lands and waters under DOD control that have suitable habitat for conserving and managing natural resources" (DOD, 2018a). OPNAVINST 5090.1E, the Navy's Environmental Readiness Program, implements these provisions. This OPNAV instruction includes the requirements and procedures that shore activities should follow to ensure compliance with state and federal laws, regulations, and executive orders concerning use, management, and protection of natural resources (Navy, 2019).

## 1.7 NATURAL RESOURCES STEWARDSHIP AND COMPLIANCE DISCUSSION

Stewardship is the responsibility to inventory, manage, conserve, protect, and enhance the natural resources entrusted to one's care in a way that respects the intrinsic value of those resources and the needs of present and future generations. Installations are required to recognize and balance environmental stewardship with mission readiness in retaining control and use of



Navy land, sea, and air space for the purpose of maintaining the military mission. Conscious and active concern for the inherent value of natural resources must be given in all Navy plans, actions, and programs (Navy, 2019). Stewardship projects and programs enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership. Examples include education and public awareness projects, biological surveys or habitat protection for non-listed species, or management and execution of volunteer and partnership programs. Stewardship is an important component of the Navy's Environmental Readiness Program and, because stewardship projects can occur on an indefinite timescale, these projects are prioritized after compliance projects (Navy, 2019).

# 1.8 INRMP REVIEW AND REVISION PROCESS

This INRMP addresses future requirements and identifies projects to be implemented over the duration of the INRMP. INRMPs should contain the most up-to-date natural resources information, and updates and revisions may be necessary to maintain a proactive management plan. Natural resources managers are encouraged to use GIS to supplement their INRMP and to incorporate the guidance and recommendations contained in *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers* (Benton et al., 2008; Navy, 2019).

In accordance with the Integrated Natural Resources Management Program, the Sikes Act, and the Navy *Environmental Readiness Program Manual*, installations are required to perform an informal annual review to ensure that the INRMP information is current and to evaluate the effectiveness of their INRMP (*CFR*, 2002; *Sikes Act*, 1997; Navy, 2021). The Navy NRP completes an Annual Metrics Review, which includes performance evaluations for the following seven INRMP areas (OUD, 2006):

- Natural Resources Management
- Listed Species Critical Habitat
- Recreation Use and Access
- Sikes Act Cooperation
- Team Adequacy
- INRMP Implementation
- Support of Installation Mission

The annual INRMP review must be completed in cooperation with the appropriate USFWS and state fish and wildlife agency field-level offices. Collaboration with cooperating partners helps measure the success of the INRMP and identify issues associated with implementation of the INRMP (OASD, 2015).

The annual review is an opportunity to incorporate any changes in natural resources management based on new management policies or newly acquired resource information. If necessary, the annual review will include an update of the INRMP that includes an updated project list, documentation of significant changes to natural ecosystems, and updates to information contained in the INRMP appendices. A form is included in the Preliminaries section at the front of this INRMP for the NRM to document changes to the INRMP that will improve natural



resources management. Each entry in the update form should reference the INRMP section and page number that is being updated to facilitate quick cross-referencing.

Installations are not required to revise their INRMPs within a specified time interval; however, a formal review is required every five years in coordination with the USFWS and state partners (OASD, 2015). If the USFWS and state partners agree, the completed annual review forms may be used in lieu of a formal review. Minor revisions to the INRMP should be completed annually and documented to reduce the need for a costly and time-consuming revision following the formal five-year review. If results of the formal review determine that the existing INRMP is effective, the INRMP need not be revised. Any revisions to the authorities and guidance documents driving INRMP update requirements would be implemented, as appropriate, during the annual or formal review periods.

Formal reviews of this INRMP will occur every five years in coordination with the USFWS, NOAA Fisheries, CT DEEP, and NYSDEC (see Appendix D). The SUBASE NLON INRMP update formal review will verify that all environmental compliance projects have been budgeted for and implemented on schedule, all required natural resource positions are filled with trained staff or are in the process of being filled, projects and activities identified for the coming year are included in the INRMP, all required coordination has been conducted, and all significant changes to the installation's mission requirements or its natural resources have been identified.

INRMP modifications that are necessary are usually covered by the original Environmental Assessment (EA) prepared for the INRMP; however, INRMP modifications should be reviewed to determine if modifications to the INRMP are significant. If INRMP modifications are deemed not to be significant, updated actions will be covered by the original NEPA documentation and by the Navy's Categorical Exclusion #48: *Revisions or updates to INRMPs that do not involve substantially new or different land use or natural resources management activities and for which an EA or EIS was previously prepared that does not require supplementation pursuant to 40 CFR 1502.9(c)(1)*. Proposed INRMP updates that are not covered under the categorical exclusion will require additional NEPA documentation, usually at the EA level.

Activities that may constitute an INRMP revision include, but are not limited to, (1) a change in mission requirements or intensity of land use; (2) a significant change in natural resources baseline conditions; (3) a determination that the old INRMP has proven to be inadequate, was not able to be implemented, or that projects are ineffective in meeting natural resources management goals as evidenced from monitoring results; (4) natural resources management goals have changed, or the planning horizon of the previous INRMP has expired; or (5) Base Realignment and Closure (BRAC) actions have been put into effect. Any of these activities should be brought to the attention of the USFWS and the state game agency during the formal review process.

Compliance in terms of an INRMP refers to actions that must be taken to abide by the statutes and regulations applicable to natural resources. These are actions that an installation is legally mandated or obligated to take to meet current or recurring natural and cultural resources conservation management requirements and for which it *must* obtain funding. Examples of compliance actions include developing, updating, and revising INRMPs; conducting biological



surveys to determine population status of TES and/or species of special concern; and conducting wetland surveys for planning, monitoring, and/or permit applications. Compliance is essential, so these projects are of the utmost priority.

# 1.9 INRMP MANAGEMENT STRATEGY

DODI 4715.03 and OPNAV M-5090.1 state that the INRMP must incorporate the principles of ecosystem management as the basis for natural resources management on Navy lands. These principles include the following:

- a focus on multiple species conservation
- formation of partnerships to manage ecosystems across boundaries
- use of the best available scientific information and adaptive management techniques (DOD, 2018a; Navy, 2019).

In accordance with this policy, the Navy will strive to maintain healthy, contiguous ecosystems on its own lands. Where ecosystem boundaries extend onto adjoining lands, the Navy will strive to work cooperatively with neighboring landowners to manage these ecosystems.

## **1.10 OTHER PLAN INTEGRATION**

This INRMP is not intended to replace existing installation policy, operations protocols, or military management plans. Rather, this INRMP is meant to facilitate the integration and coordination of natural resources management actions with other plans and programs at the installation and, moreover, with SUBASE NLON missions.

The preparation and development of an INRMP must be coordinated with the development of other installation plans, planning processes, and NEPA documents, as required by DOD guidance (OUD, 2006). Some of these plans include installation master plans, range plans, training plans, Integrated Cultural Resource Management Plans, Integrated Pest Management (IPM) Plans, and installation restoration plans. All EAs going forward will reference this INRMP. Currently, SUBASE NLON does not have any range management plans in place that would need to be coordinated with natural resources management at the installation.

Existing SUBASE NLON plans have been reviewed to ensure consistency and integration with this INRMP (Table 1-2).

Plan	Year
Naval Submarine Base New London Integrated Natural Resources Management Plan	2016
Installation Development Plan, Naval Submarine Base New London	2017
Stormwater Pollution Prevention Plan	2020
Connecticut Wildlife Action Plan	2015
New York Wildlife Action Plan (For Appendix D)	2015

### **Table 1-2: Other Plan Integration**


# 2.0 ENVIRONMENTAL MANAGEMENT STRATEGY

# 2.1 ENCROACHMENT PARTNERING

The Navy defines encroachment as any action or condition that restricts or prohibits the attainment or sustainment of the Navy's statutory responsibilities to man, train, maintain, and equip a combat-ready force (Navy, 2021b). Environmental constraints are constraints to the military mission and operations at SUBASE NLON caused by natural resources and natural factors. Areas not designated as constraints are designated as continuing opportunities for military missions and encroachment partnering relative to environmental constraints.

Military Services can compete for funds for encroachment partnering through the Readiness and Environmental Integration (REPI) Program. Encroachment partnering opportunities include projects for which the installation partners with one or more entities to acquire real estate interests from private landowners to address encroachment challenge related to incompatible land use or preservation of ecologically related land off the installation. Title 10, USC 2684a authorizes the military departments to enter into agreements with the state or local governments, or private conservation organizations, to acquire real estate interests from willing sellers who own land located in the vicinity of military installations, or land that is ecologically related to it (DOD, OSD, n.d.).

Environmental constraints shown in Figure 2-1 include the following:

- Water Features
  - Limit land available for mission-related activities
- Wetlands
  - Limit land available for mission-related activities due to restoration and management
- 3 Feet of Sea Level Rise (SLR)
  - Limits future land availability for mission-related activities if the current models of SLR are realized; see Section 3.5 for more details
- 100-year and 500-year Flood Hazard Area
  - Limit land available for mission-related activities due to regulated development based on Federal Emergency Management Agency (FEMA) floodplain management, see Section 3.2.3.1 for more details
- CT DEEP Significant Natural Community/Rare Species Habitat
  - "Areas that represent known locations, both historic and extant, of state listed species or significant natural communities." The purpose of this dataset is to help agencies comply with the State Endangered Species Act and any work done within these areas, which need a state or local permit, will need to consult this database as part of the permitting process (CT DEEP & UCONN, n.d.)
- Hunting Area
  - Limit land available for mission-related activities
- Coastal Jurisdiction Line from Connecticut General Statute (CGS) 22a-93(5)
  - This boundary "[was] adopted on a town-by-town basis showing the extent of lands and coastal waters as defined by C.G.S. 22a-93(5) within Connecticut's coastal area (defined by CGS 22a-94[c])" (CT DEEP and UCONN, 1995)
- Steep Slopes (Slope  $\geq 15$  percent)

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- Limit land available for mission-related activities because development on steep slopes is often expensive and leads to soil degradation
- Limit land available for mission-related activities due to mitigation and maintenance of reoccurring erosion sites
- Increases the possibility of more reoccurring erosion sites to develop

Environmental constraints shown in Figure 2-2: Environmental Constraints and Opportunities of AFNRA include the following:

- Water Features
  - o Limit land available for mission-related activities
- Wetlands
  - o Limit land available for mission-related activities due to restoration and management
- 100-year and 500-year Flood Hazard Area
  - Limit land available for mission-related activities due to regulated development based on floodplain management, see Section 3.2.3.1 for more details
- 3 Feet of SLR
  - Limits future land availability for mission-related activities if the current models of SLR are realized; see Section 3.5 for more details
- Coastal Jurisdiction Line from CGS 22a-93(5)
  - This boundary "[was] adopted on a town-by-town basis showing the extent of lands and coastal waters as defined by CGS 22a-93(5) within Connecticut's coastal area (defined by CGS 22a-94[c])" (CT DEEP and UCONN, 1995)

There are also environmental constraints that do not have a spatial representation, such as climate change, or for which insufficient data are available to represent them on a map. For example, a nearshore survey conducted in 2014/2015 discovered the presence of the federally threatened Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), but the data are not sufficient at this time to depict the detection locations (Tetra Tech, Inc., 2016).

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# Figure 2-1: Environmental Constraints and Opportunities of SUBASE NLON and Housing Areas





Figure 2-2: Environmental Constraints and Opportunities of AFNRA



## 2.2 NATURAL RESOURCES CONSULTATION REQUIREMENTS

Section 7 of the ESA requires federal agencies to consult with the USFWS (inland fish and wildlife species) or NOAA Fisheries (marine species) when any proposed activity authorized, carried out, or conducted by that agency may affect a listed species or designated critical habitat (ESA, 1973). An informal consultation process is used for activities that may affect a listed species or designated habitat, while formal consultations are required for projects that are likely to adversely affect a listed species. As a result of a formal consultation, the USFWS or NOAA Fisheries will issue a concurrence letter or a Biological Opinion including actions that the federal agency must complete to conduct the proposed activity. If critical habitat has been included in the installation INRMP, the ESA allows the USFWS to preclude this habitat from the Biological Opinion. However, for the critical habitat to be excluded, the qualifying INRMP must address the maintenance and improvement of the primary constituent elements that are important to the species and must manage for the long-term conservation of the species. Neither Section 7 formal nor informal consultation is expected to be required for the natural resources management projects recommended in Chapter 5 of this INRMP.

The Atlantic sturgeon is the only documented federal or state TES known to occur at SUBASE NLON. Migratory bird and pollinator species use the natural habitats and open space for transient purposes (e.g., migratory shorebirds, neotropical songbirds, marine mammals, and sea turtles). In addition, bats are increasingly becoming species of concern. The northern long-eared bat (NLEB; *Myotis septentrionalis*) was listed as threatened in 2015 by the USFWS (USFWS, 2015). All SUBASE NLON locations are within the NLEB's population range (USFWS, 2019). In addition, the USFWS is currently reviewing the little brown bat (*Myotis lucifugus*) and tricolored bat (*Perimyotis subflavus*) for possible listing under the ESA. Bat acoustic surveys were conducted on SUBASE NLON at three locations in 2018 to determine species composition and bat activity levels of resident and migratory bat species (Tetra Tech, 2019). Seven of the nine species of bats known to occur in Connecticut were detected, including the little brown bat and tri-colored bat. The federally listed NLEB and Indiana bat (*M. sodalis*) were not detected.

Other TES species in the area, but currently not described as occurring on the installation, include the federally endangered roseate tern (*Sterna dougallii dougallii*), the federally threatened piping plover (*Charadrius melodus*) and rufa red knot (*Calidris canutus rufa*), the federally endangered sandplain gerardia (*Agalinis acuta*), and the federally threatened small whorled pogonia (*Isotria medeoloides*). In addition, the green turtle (*Chelonia mydas*), Kemp's ridley turtle (*Lepidochelys kempii*), leatherback turtle (*Dermochelys coriacea*), loggerhead turtle (*Caretta caretta*), and shortnose sturgeon (*Acipenser brevirostrum*) may be transient species in the Thames River (NOAA Fisheries, 2021a,b,c). As described in Chapter 5, SUBASE NLON will require additional surveys to determine if these species are located on the installation. If a species is listed at the federal level, appropriate USFWS consultation will need to occur, as detailed in Section 4.5.2.

## 2.3 NEPA COMPLIANCE

Decisions that affect future land or resource use that are associated with an INRMP require NEPA analysis. The NRM should refer to Secretary of the Navy Instruction (SECNAVINST) 5090.6B and Chapter 10 of OPNAV M-5090.1 for basic guidance on the preparation of NEPA



documents (OSN, 2018; Navy, 2021a). The Council on Environmental Quality's "National Environmental Policy Act Implementing Regulations" and "NEPA's Forty Most Asked Questions" provide further information (CEQ, 1981, 2021). The INRMP and associated NEPA documentation should be prepared as individual documents to ensure that the viability, integrity, and intent of each are maintained. The intent of the INRMP is to outline projects that would fulfill Navy compliance and stewardship obligations, while the intent of the NEPA documentation is to analyze the impacts of the natural resources management actions outlined in the INRMP.

No EA was prepared for this INRMP because there was a reevaluation of the 2003 EA and Finding of No Significant Impact (FONSI). The 2003 EA is still applicable for this INRMP update. In addition, the Navy's Categorical Exclusion #48 applies to this INRMP: *Revisions or updates to INRMPs that do not involve substantially new or different land use or natural resources management activities and for which an EA or EIS was previously prepared that does not require supplementation pursuant to 40 CFR 1502.9(c)(1)*. Therefore, further NEPA evaluation is not required.



# **3.0 CURRENT CONDITIONS**

#### **3.1 INSTALLATION DESCRIPTION**

#### 3.1.1 General Location Description

SUBASE NLON is composed of a main installation, AFNRA, and five navy housing areas. SUBASE NLON's main installation is located on the eastern shore of the Thames River in the Towns of Ledyard and Groton, CT, along State Route 12. SUBASE NLON neighbors a major submarine construction yard operated by General Dynamics' Electric Boat. The five navy housing areas surround the main installation to the east and south in Groton, CT (URS ONYX, 2017). AFNRA is located in Stonington, CT, along U.S. Route 1. Figure 3-1 depicts the regional context of all SUBASE NLON site locations.

#### 3.1.1.1 Main Installation

SUBASE NLON's 687-acre main installation is approximately six miles north of Long Island Sound and includes 1.5 miles of shorefront on the Thames River. There are more than 200 major buildings on the main installation and 10 piers supporting 19 fast-attack submarines along the Thames River (SUBASE NLON, n.d.). Figure 3-2 depicts SUBASE NLON's main installation.

#### 3.1.1.2 Navy Housing Areas

SUBASE NLON has over 630 acres of housing areas for military personnel and their families. These housing areas include: Trident Park, Polaris Park, Nautilus Park, Dolphin Gardens, and Conning Towers. Figure 3-2 depicts the housing areas in reference to SUBASE NLON's main installation. The housing areas were transferred to the Navy's public-private venture partner in 2004.

#### 3.1.1.3 Admiral Fife Naval Recreation Area (AFNRA)

AFNRA is located in Stonington, CT, just north of Quanaduck Cove, which is a cove of Long Island Sound. AFNRA is a 36-acre park reserved for military personnel and their families, and it includes recreational areas that contain picnic tables, barbecue pits and grills, a volleyball court, horseshoe pits, and children's swings and sandboxes. There are also two parking lots, approximately four miles of trails with interpretive signage, and three buildings (SUBASE NLON, 2008). Figure 3-3 depicts AFNRA.





Figure 3-1: Regional Context of SUBASE NLON Locations





Figure 3-2: Installation Boundary of SUBASE NLON Main Installation and Housing Areas





Figure 3-3: Installation Boundary for AFNRA



#### 3.1.2 Regional Land Use

The limits of the city of Groton, CT, on the eastern shore of the Thames River, extend from just south of SUBASE NLON until the river's opening to Long Island Sound. The city of Groton is composed mostly of developed land with small areas of deciduous forest and woody wetlands.

The town of Ledyard, CT, on the eastern shore of the Thames River, is adjacent to the northern limits of SUBASE NLON. The town bounds the southern, eastern and northern limits of the Village of Gales Ferry, CT, prior to again extending to the shore of the Thames River northward to Poquetanuck Bay. Ledyard includes land areas of single and multi-family residential development with supporting community resources and moderate areas of deciduous forest and woody wetlands, The Foxwoods Resort Casino, owned and operated by the Mashantucket Pequot Tribe, is located in the northeastern section of the town, on the reservation owned by the tribe.

New London and Waterford, CT, are on the western shore of the Thames River. The I-95 Gold Star Memorial Bridge connects Groton to New London. New London is slightly more developed than Groton, with some deciduous forest and wetlands located outside of the city limits.

The land area adjacent to SUBASE NLON's main installation consists of housing and commercial areas, with some deciduous forest and small areas of wetlands. Residential development borders the installation to the north and extends northward into the Gales Ferry section of Ledyard. Property along Route 12, east of the base, consists of widely spaced private homes and woods. Farther south along Route 12 are mixed commercial and residential developments. Private residences and an automobile service station are located along the southern side of Crystal Lake Road. Housing for Navy personnel and families is located farther south of Crystal Lake Road.

AFNRA is located just north of Stonington, CT, approximately 13 miles east of Groton, and five miles from the Rhode Island border. The land adjacent to AFNRA consists of deciduous forest, pasture, wetlands, and grassland. Just across U.S. Route 1, development for Stonington begins. Stonington is located on Long Island Sound and has a harbor. The city itself is mostly developed with grasslands and wetlands located to its north.

Figure 3-4 and Figure 3-5 show the regional land cover near SUBASE NLON's main installation, housing areas, and AFNRA.

## 3.1.3 Historic and Pre-Military Land Use

SUBASE NLON is currently known as the "Home of the Submarine Force." The land now occupied by SUBASE NLON was previously used as a dock for inactive ships and a coaling station for the Atlantic Fleet after the State of Connecticut donated approximately 86 acres to the Department of the Navy. In 1872, this donated land was formally designated as a Navy Yard. The Navy Yard expanded in 1916, when the Navy declared SUBASE NLON to be the nation's first submarine base. The Naval Branch Health Clinic and Submarine School were key operations in the beginning years of SUBASE NLON. At the beginning of World War II, SUBASE NLON had accrued 112 acres, 86 buildings, and 11 piers. Following World War II, SUBASE NLON's increased importance and strategic location provoked large expansions.



SUBASE NLON built additional buildings and acquired adjacent land to total 497 acres and over 280 buildings (URS ONYX, 2017; SUBASE NLON, n.d.).

The next significant change to SUBASE NLON did not occur until 1968, when the Submarine School changed from an activity to a command and became the largest tenant on the installation. This allowed for more activities and personnel to be added to the installation (URS ONYX, 2017; SUBASE NLON, n.d.).





Figure 3-4: Regional Land Cover for SUBASE NLON Locations





Figure 3-5: Regional Land Cover for AFNRA



#### 3.1.4 Military Mission

SUBASE NLON is the Navy's first submarine base and is affectionately known as the "Home of the Submarine Force." The current mission for SUBASE NLON is "to ensure and enhance national security by providing the facilities, delivering the services, and creating the environment for the Fleet, Fighter, and Family to deploy combat-ready submarines and their crews and train professional submariners" (URS ONYX, 2017).

The installation is currently home to 19 nuclear fast-attack submarines; it supports more than 70 tenant commands and maintains support facilities for personnel and their dependents. In addition, there are 1,895 public-private venture family housing units associated with SUBASE NLON. SUBASE NLON supports a wide range of administrative, maintenance, operational, supply, research/development/acquisition/ testing/evaluation, and medical activities (URS ONYX, 2017; SUBASE NLON, 2008)

# 3.1.5 Natural Resources Necessary to Support SUBASE NLON's Mission

Natural resources within the installation complex, such as land areas, soils, hydrology, and vegetation, support the mission in practical ways (i.e., soil stabilization, decreasing stormwater runoff, and providing sites suitable for facilities). The Thames River, which connects to Long Island Sound, supports the deployment and porting of submarines and any other vessels.

## 3.1.6 Operations and Activities That May Affect Natural Resources

SUBASE NLON's ability to accomplish its mission requires operations to occur on the land, in the Thames River, and throughout the world's oceans. SUBASE NLON needs to ensure compliance with all legal environmental requirements and to work to minimize the environmental impact of its operations. Historic operations at SUBASE NLON resulted in contaminant releases to soil and groundwater as well as sediment in the Thames River. The first environmental investigation was conducted in 1979 to investigate potential releases to soil and groundwater. Based on the findings of a Preliminary Assessment, in 1990, SUBASE NLON was placed on the National Priorities List (NPL), a list of hazardous waste sites in the U.S. that warrant investigation and remedial action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Contaminated areas identified at SUBASE NLON included landfills, chemical storage sites, tank farms, and groundwater. Initially, 25 sites were identified; however, all the original sites have remedies in place or have been designated as "no further action required." Land use controls, Remedial Designs, Construction Completion Reports, and/or Remedial Action Completion Reports have been prepared for all 25 of the original sites. The recent identification of per- and polyfluoroalkyl substances (PFAS) at SUBASE NLON will delay the delisting process to remove SUBASE NLON from the NPL (SUBASE NLON, n.d.).

SUBASE NLON currently has 19 Stormwater Pollution Prevention Plan (SWPPP) regulated sites due to industrial activities. Of these sites, 12 support the primary activity, maintenance, and repair of submarines. Each of the 19 sites has a SWPPP-assigned individual to be present during all SWPPP-regulated activities (AH/BC Navy JV, LLC, 2021). The installation's proximity to Long Island Sound necessitates vigilance of natural resource protection so that SUBASE NLON's operations and activities do not negatively affect the Sound.



Impacts on natural resources from installation activities would be those associated with the following activities:

- operation, maintenance and repair of the marina, port, and submarines;
- large areas of impervious surfaces (increased surface runoff and degradation of stormwater runoff quality);
- landscaping (introduction of non-native plant species, degraded wildlife habitat, and use of pesticides and fertilizers);
- construction (erosion and increased permanent impervious surface area); and
- handling and storage of hazardous materials and oils.

Construction planned on SUBASE NLON for the next 25 years, as identified in the Installation Development Plan, will present environmental challenges such as minimizing impacts on forested areas, wetlands, environmental restoration sites, and surface waters, as well as preventing erosion along floodplains. See Figure 2-1 for the environmental constraints and opportunities on SUBASE NLON and the housing areas and Figure 2-2 for the environmental constraints and opportunities on AFNRA.

# **3.2 PHYSICAL ENVIRONMENT**

# 3.2.1 Geology and Topography

The geology of SUBASE NLON and the housing areas reflects the composition of the underlying bedrock basement. This bedrock includes pre-Silurian and pre-Pennsylvanian rock formations. The pre-Silurian Mamacoke formation is significant to the region's geology, comprising interlayered metamorphosed sedimentary dark gray biotite-quartz-feldspar gneisses with thin layers of amphibolite and quartzite. Other pre-Silurian rocks include materials of the Plainfield formation, represented by hornblende-biotite-quartz plagioclase gneiss with layers of quartzite and schist. (SUBASE NLON, 2008).

Structurally, bedrock beneath SUBASE NLON contains a series of folds, faults, synclines, and anticlines that formed the sites irregular topography. This resulted in significant topographic relief, with numerous bedrock outcroppings scattered across the site.

## 3.2.1.1 Main Installation

The elevation of the main installation of SUBASE NLON ranges from sea level at the Thames River to more than 234 feet above sea level at the highest point near the geographic center of the site. Particularly steep slopes along with rock outcroppings can be found near Rock Lake and in the northeastern part of the main installation (URS ONYX, 2017). See Figure 3-6 for the topography of SUBASE NLON.

# 3.2.1.2 Housing Areas

The elevation of the housing areas of SUBASE NLON depends on the housing area. Nautilus Park ranges from 30 feet above sea level to 170 feet above sea level. Polaris Park has the steepest range, ranging from 30 feet above sea level to 220 feet above sea level. Dolphin Gardens ranges from 130 feet above sea level to 220 feet above sea level, and Conning Towers ranges from 130



feet above sea level to 160 feet above sea level. See Figure 3-6 for the topography of the housing areas.



Figure 3-6: Topography of SUBASE NLON and Housing Areas



# 3.2.1.3 Admiral Fife Naval Recreation Area (AFNRA)

The underlying geology at AFNRA consists of interlayered gneiss of mixed composition, including plagioclase, quartz, biotite, and hornblende (SUBBASE NLON, 2008). The site's topography is varied, characterized by a predominately flat plain in the southern half with increasing topographical relief moving toward the northeastern corner of the property. The lowest elevations on-site are adjacent to Quanaduck Cove and are at sea level. The site's peak elevation is approximately 51 feet, found near the northeastern boundary of AFNRA. See Figure 3-7 for the topography of AFNRA.

## 3.2.2 Soils and Sediments

In 2015, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) conducted a soil survey for the State of Connecticut, including the main installation and housing areas. The most current soils data are available from the USDA, NRCS Web Soil Survey; for the State of Connecticut, the most current version is dated June 9, 2020 (NRCS, 2020). The area in which SUBASE NLON lies consists of soils of the uplands, terraces, and floodplain, all of which may be found within the SUBASE limits. The upland areas are characterized with soils varying from well drained to poorly drained, with slopes in many areas exceeding 15 percent and, in some areas, exceeding 30 percent. Poorly to very poorly drained soils generally characterize the terrace area. These soils have severe development limitations, and intensive drainage, grading, and fill measures are necessary to overcome the high water table. The floodplain soils vary from well drained to very poorly drained. Flood hazards limit the development potential of these areas. See Figure 3-10 and Figure 3-11 for the floodplains on SUBASE NLON and AFNRA (NRCS, 2015).

#### 3.2.2.1 Main Installation

The most prevalent soil type on SUBASE NLON's main installation is Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes, with a depth class of shallow and a drainage class of well drained. See Figure 3-8 and Table 3-1 for the soil composition of SUBASE NLON.





Figure 3-7: Topography of AFNRA





Figure 3-8: Soil Composition of SUBASE NLON and Housing Areas



Symbol	Soil Description	Area (acres)
15	Scarboro muck, 0 to 3 percent slopes	5.73
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	3.23
306	Udorthents-urban land complex	76.52
307	Urban Land	125.70
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	15.23
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	15.70
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	75.49
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	12.13
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	2.28
68C	Narragansett silt loam, 3 to 15 percent slopes, extremely stony	0.12
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	9.86
74C	Narragansett-Hollis complex, 3 to 15 percent slopes, very rocky	3.75
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	47.21
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	133.51
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	0.68
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	26.76
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	52.64
W	Water	6.01

#### Table 3-1: Soils Composition of SUBASE NLON Main Installation

Source: (NRCS, 2021).

#### 3.2.2.2 Housing Areas

The most prevalent soil type on SUBASE NLON's housing areas is Narragansett silt loam, 2 to 8 percent slopes. See Figure 3-8 and Table 3-2 for the soil composition of the housing areas.

Symbol	Soil Description	Area (acres)
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	3.57
13	Walpole sandy loam, 0 to 3 percent slopes	< 0.01
15	Scarboro muck, 0 to 3 percent slopes	57.16
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	50.51
18	Catden and Freetown soils, 0 to 2 percent slopes	1.18

**Table 3-2: Soils Composition of Housing Areas** 



Symbol	Soil Description	Area (acres)
29A	Agawam fine sandy loam, 0 to 3 percent slopes	9.56
306	Udorthents-urban land complex	10.07
38C	Hinckley loamy sand, 3 to 15 percent slopes	0.20
43B	Rainbow silt loam, 3 to 8 percent slopes	3.47
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	2.53
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	21.79
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	0.08
60D	Canton and Charlton soils, 15 to 25 percent slopes	2.91
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	32.60
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	25.88
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	0.20
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	13.76
66B	Narragansett silt loam, 2 to 8 percent slopes	176.39
67B	Narragansett silt loam, 3 to 8 percent slopes, very stony	2.58
68C	Narragansett silt loam, 3 to 15 percent slopes, extremely stony	89.26
703B	Haven silt loam, 3 to 8 percent slopes	0.27
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	7.66
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	5.68
74C	Narragansett-Hollis complex, 3 to 15 percent slopes, very rocky	62.64
82B	Broadbrook silt loam, 3 to 8 percent slopes	13.54
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	8.38
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	19.02
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	11.63

#### Table 3-2: Soils Composition of Housing Areas

Source: (NRCS, 2021).

#### 3.2.2.3 Admiral Fife Naval Recreation Area (AFNRA)

The soils of AFNRA consist of five major natural soil series: Merrimac fine sandy loam, Sutton fine sandy loam, Canton and Charlton soils, Hollis-Chatfield rock outcrop complex, and Paxton and Montauk fine sandy loams. Merrimac fine sandy loams onsite are gently sloping soils characterized by their substantial depth and drainage. These soils are often used for crops or urban development, although the drainage characteristics can limit the use of septic tank absorption fields. Sutton fine sandy loam is a gently sloping, deep, moderately well-drained soil. Although sometimes utilized for development, seasonal high water tables and stones can limit land disturbing applications, and most areas are in woodland or pasture. Canton and Charlton soils are moderately steep, deep, well drained soils. These soils are often forested due to the



slope, which limits residential development and roads. Hollis-Chatfield-Rock outcrop complexes are gently to strongly sloping soils that vary from shallow to moderate depth and are excessively drained. Shallow depth to bedrock, rockiness, and excessive drainage can limit the feasibility of development applications. Paxton and Montauk fine sandy loams cover most of AFNRA. These soils occur on moderate to steep slopes, have a high depth to bedrock, and are well drained. Most areas with this soil type are forested, as steep slopes limit development (NRCS, 2015). See Figure 3-9 and Table 3-3 for the soil composition of AFNRA.

Symbol	Soil Description	Area (acres)
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	3.56
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	0.27
60D	Canton and Charlton soils, 15 to 25 percent slopes	2.13
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	0.26
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	9.19
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	17.92
W	Water	5.09

#### Table 3-3: Soils at Admiral Fife Naval Recreation Area

Source: (NRCS, 2021)

#### 3.2.3 Hydrology

The tidally influenced Thames River is the main surface water feature at SUBASE NLON. The average tidal range at SUBASE NLON is 0.5 to 3.0 feet above mean sea level. The tidal currents follow ebb and flow of the river and are generally not strong (e.g., -0.5 to 0.5 knots). At SUBASE NLON, the velocity is normally about 1 knot at ebb and negligible at flood (SUBASE NLON, 2008). Mean water temperature is 10.5 degrees Celsius (°C) (50.9 degrees Fahrenheit [°F]) with a high of 19.5 °C (67.1 °F) in early spring to a low of 1.1 °C (34.0 °F) in early March. Salinity ranges from 31.3 to 31.5 parts per thousand with a low of 29.3 parts per thousand during spring rains (T. McKenzie, former Natural Resource Manager - Environmental Division SUBASE NLON, 2016, personal communication). The Thames River watershed is described in detail in Section 3.3.2.

Other surface waters on the main installation property include Rock Lake, North Lake, onsite wetlands, and several unnamed intermittent and perennial streams. These areas are further described in Section 3.3.4.1. The site's extensive storm drainage system, by which the main installation is divided into 35 SWPPP-regulated drainage basins, substantially influences its surface hydrology (AH/BC Navy JV, LLC, 2021). Drainage features at AFNRA, which include a second-order tributary of Silvias Brook, an artificial pond, and a tidal pond, are further described in Section 3.3.3.





Figure 3-9: Soil Composition of AFNRA



There are two basic aquifer types in Connecticut, those found in unconsolidated sediments and those in bedrock (CT DEEP, 1997, 2020a).

Unconsolidated sediment aquifers are identified further as stratified drift and till. In Groton, stratified drift covers most of the lowland and floodplain area where it overlies till and bedrock. These aquifers, which are composed of sand and gravel, are the most productive aquifer systems in the region, yielding up to 10 million gallons of water per day (CT DEEP, 2021a). Sedimentary rock aquifer systems underlay the entire Connecticut Coastal Slope region. Interbedded sedimentary rocks and volcanic basalt characterize these formations. Bedrock aquifers, including sedimentary rock systems, are a common and productive source of self-supplied groundwater in the region (CT DEEP, 2020a). Specific groundwater aquifer resources and yields in the Groton region are described in Section 3.3.3.2.

## 3.2.3.1 Floodplains

#### 3.2.3.1.1 Main Installation

The SUBASE NLON main installation property includes 38.45 acres of 100-year flood hazard area and 13.03 acres categorized as 500-year flood hazard area floodplains. These areas are largely adjacent to, and parallel to, the Thames River. These areas are depicted on Figure 3-10.

## 3.2.3.1.2 Housing Areas

There are 3.67 acres of 100-year flood hazard area and 66.80 acres of 500-year flood hazard area on the SUBASE NLON housing area properties. The entirety of the floodplains is located at Nautilus Park, extending from the properties western boundary with State Route 12 and covering much of the central half of the site, as depicted on Figure 3-10.

## 3.2.3.1.3 AFNRA

There are 19.45 acres of 100-year flood hazard areas located on the property. There are 9.25 acres of 500-year flood hazard area floodplains at AFNRA. These floodplains are associated with the Manor Inn Pond and Silvias Brook, extending from the property's eastern boundary across the center of the site and south along the western boundary of the site (see Figure 3-11). Another small floodplain is located just east of the southern tidal pond.

## **3.3 BIOTIC ENVIRONMENT**

#### 3.3.1 Ecoregion

SUBASE NLON falls within the U.S. Environmental Protection Agency's (USEPA) Northeastern Coastal Zone Ecoregion, specifically within the Long Island Sound Coastal Lowland subsection. An ecoregion is an area of general likeness in ecosystems and the type, quality, and quantity of environmental resources. This geographic identifier serves as a framework for research, management, and monitoring of ecosystems and is critical for structuring ecosystem management strategies across federal and state agencies and nongovernmental organizations (NGOs) (Griffith et al., 2009).





Figure 3-10: Floodplains of SUBASE NLON and Housing Areas





Figure 3-11: Floodplains of AFNRA

The Northeastern Coastal Zone comprises much of southern New England and the coast of New Hampshire and southern Maine, excluding Cape Cod. It is mainly characterized by irregular plains and plains with low to high hills. Predominant natural vegetation is Appalachian oak forests and northeastern oak-pine forests, with mostly mesic Inceptisol soils (Griffith et al., 2009). Current land use in the ecoregion is largely forests, woodlands, and urban and suburban development, as well as minor areas of pasture and cropland.

The Long Island Sound Coastal Lowland sub-ecoregion occurs along the coast in southern Connecticut and Rhode Island that borders the Long Island Sound and Block Island Sound. It is characterized by low-elevation rolling coastal plain, tidal marshes, estuaries, sandy dunes and beaches, and rocky headlands. Parts of this sub-ecoregion are highly urbanized, from New Haven westward in particular (Griffith et al., 2009).

# 3.3.2 Thames River Watershed

CT DEEP manages the State's water resources as five major watershed basins. SUBASE NLON is located within the Thames River Watershed Basin, which covers roughly the eastern third of Connecticut (CT DEEP, n.d.). The Thames River Watershed Basin comprises approximately 1,474 square miles in Connecticut, Massachusetts, and Rhode Island. The basin is 67 miles long and 38 miles wide at its maximum width (USACE New England, 2015).

SUBASE NLON is within the Thames River watershed sub-regional basin, which covers approximately 19,447 acres (1.48 square miles) in southeastern Connecticut. The sub-regional basin includes all or portions of the towns of New London, Groton, Waterford, Ledyard, Montville, Norwich, and Preston. The Thames River begins at the confluence of the Quinebaug and Yantic rivers, flows south, and outlets at the New London Harbor before reaching the Long Island Sound. The watershed is mostly developed along the Thames River, at the headwaters in Norwich in particular. Land use within the watershed is 44 percent urban, 35 percent forest land, 19 percent water, and 2 percent agricultural (CT DEEP, 2012).

A 1.09 mile-long tributary segment within the watershed, Flat Brook, was listed on the Connecticut 303(d) list of impaired waterbodies in 2008 due to elevated bacteria levels (*Escherichia coli*), but was delisted in 2014 (CT DEEP, 2014). Flat Brook was not listed on the Connecticut 303(d) list of impaired waterbodies in 2020 (CT DEEP, 2020b). Flat Brook outlets to the Thames River at Long Cove in Ledyard, just north of SUBASE NLON. Flat Brook is a Class A freshwater river (see Section 3.3.3.1); designated uses include potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply (CT DEEP, 2012).

The Thames River fish and wildlife populations and habitats are affected by industrial, commercial, and residential development along the river corridor. Direct losses of habitat, degradations in habitat quality and water quality, heavy metal contamination, sewage, stormwater and wastewater discharges, shoreline development, and dredging are all of concern in the river's aquatic environment (USFWS, 1991).



## 3.3.3 Water Resources

Water resources consist of surface and groundwater resources. Surface water features include streams, lakes, rivers, reservoirs, wetlands, and estuaries. Groundwater includes subsurface hydrogeologic resources such as aquifers. Since surface water and groundwater are linked, effective land and water management requires an understanding of both water resource types and how they are linked in any setting. For example, pollution of surface water can cause degradation of groundwater quality, and vice versa. Existing surface waters on SUBASE NLON are described in Section 3.2.3.

# 3.3.3.1 Surface Water

Surface waters in Connecticut are classified according to *Connecticut Water Quality Standards and Classifications*, which was last revised and adopted by the state in 2013 in accordance with Section 303 of the Clean Water Act and CGS Section 22a-426 CT DEEP-designated classifications for inland surface water uses are as follows (CT DEEP, 2021b):

- Class AA: Designated uses include existing or proposed drinking water supply; fish and wildlife habitat; recreation use (may be restricted); and agricultural and industrial supply. Discharges in this classification are restricted to discharges from public or private drinking water treatment systems; dredging and dewatering; and emergency and clean water discharges.
- **Class A:** Designated uses include potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply; and other legitimate uses including navigation. Discharges in this classification are the same as for Class AA.
- **Class B:** Designated uses include recreational use; fish and wildlife habitat; agricultural and industrial supply; and other legitimate uses including navigation. Discharges in this classification are restricted to those listed in Class AA, as well as cooling waters, discharges from industrial and municipal wastewater treatment facilities (providing Best Available Treatment and Best Management Practices [BMPs] are applied), and other discharges subject to the provisions of CGS Section 22a-430.

CT DEEP-designated classifications for coastal and marine surface waters are as follows (CT DEEP, 2021b):

- **Class SA:** Designated uses include marine, fish, shellfish and wildlife habitat; shellfish harvesting for direct human consumption; recreation; and all other legitimate uses including navigation. Discharges in this classification are restricted to those listed under Class AA surface waters.
- **Class SB:** Designated uses include marine, fish, shellfish and wildlife habitat; shellfish harvesting for transfer to approved areas for purification prior to human consumption; recreation; industrial; and all other legitimate uses including navigation. Discharges in this classifications are restricted to those listed under Class B for surface waters.

# 3.3.3.1.1 Main Installation

As described in Section 3.2.3, surface water occurs on the main installation of SUBASE NLON in the form of small intermittent and perennial streams, freshwater wetlands, ponds, and lakes.



Surface waters on the main installation are classified as Class A surface waters. The Thames River is considered a Class SB surface water. Surface water that does not drain into the stormwater conveyance system drains into a 19.6-acre wetland (ER Site 2B). Surface water then drains into ER Site 3 through four 24-inch culverts that can be manipulated to change water height in the wetland into Stream 4 (daylighted), through an upper pond and into Stream 3 (daylighted). From Stream 3, surface water crosses under Triton Road via a culvert into Stream 5 (daylighted), which conveys surface water to storm drains at the northern end of the installation and discharges to the Thames River. Surface water also flows from an Overbank Disposal Area Pond in Site 3 into Stream 1 (daylighted and culverted) and is conveyed into the Thames River through the golf course via Stream 6 (channelized and daylighted; T. McKenzie, former Natural Resource Manager - Environmental Division SUBASE NLON, 2016, personal communication).

# 3.3.3.1.2 Housing Areas

The surface waters in the Polaris Park and Nautilus Park housing areas are Class AA surface waters. No surface waters in the other housing areas have been classified by the CT DEEP. The Beaverdam Brook Wetland, located in Nautilus Park, drains into the Groton Reservoir, which is classified as a AA surface water.

# 3.3.3.1.3 AFNRA

Major drainage features occur in the western portion of AFNRA. A second-order branch of Silvias Brook enters the property from the north and empties into Manor Inn Pond, an artificial impoundment behind an earthen dam through which the water falls into a channelized streambed. This channel directs the water into a tidal pond approximately 400 feet below the dam. A second tidal pond is located on the southern side of the property. Both of these tidal ponds were formed when the construction of U.S. Route 1 impinged naturally occurring prongs of the northern portion of Quanaduck Cove (SUBASE NLON, 2008). The surface waters on AFNRA are classified as Class A surface waters. Quanaduck Cove, into which the AFNRA surface water flows, is considered a Class SA surface water.

# 3.3.3.2 Groundwater

The amount of groundwater available at any particular point depends on the type of particular aquifer. The types of aquifers within the region are described above in Section 3.2.3. In the area around SUBASE NLON, stratified drift aquifers are capable of yielding an average of 85 gallons per minute to individual wells—far more freshwater than wells in till and bedrock aquifers (SUBASE NLON, 2008). In Groton, stratified drift covers most of the lowland and floodplain area where it overlies till and bedrock. A properly drilled well in bedrock can supply most of the lowland and floodplain area—at least three gallons per minute, with some cases exceeding 50 gallons per minute. Till yields are even less than bedrock and produce only a few hundred gallons per day on a yearly average (SUBASE NLON, 2008).

The aquifers in the SUBASE NLON area are vulnerable to saltwater intrusion, which renders the water unfit for human and vegetative consumption. In some cases, saltwater has intruded aquifers in the Groton area when wells have been over-pumped for extended periods of time (SUBASE NLON, 2008). Damage from intrusion is typically long-term or permanent. In addition, at the time this INRMP was prepared, groundwater cannot be used for human



consumption because established land use controls prohibit its use as a drinking water source due to potential or documented contamination. No drinking water wells exist on main installation, housing areas, or AFNRA. All SUBASE NLON facilities use public water supplied by the local townships (Groton for SUBASE NLON and housing areas, and Stonington for AFNRA).

Similar to the state surface water classifications, CT DEEP groundwater classifications are as follows (CT DEEP, 2014):

- **Class GAA:** Designated uses include existing or potential public supply of water suitable for drinking without treatment, and baseflow for hydraulically connected surface water bodies. Discharges are limited to treated domestic sewage, certain agricultural wastes, and certain water treatment wastewaters.
- Class GA: Designated uses include existing private and potential public or private supplies of water suitable for drinking without treatment, and baseflow for hydraulically connected surface water bodies. Discharges are restricted to those listed for GAA, as well as discharges from septage treatment facilities subject to stringent treatment and discharge requirements, and other wastes of natural origin that easily biodegrade and present no threat to groundwater.
- **Class GB:** Designated uses include industrial process water and cooling waters, and baseflow for hydraulically connected surface water bodies, and is presumed not suitable for human consumption without treatment. Discharges are restricted to Class A surface waters, and certain other biodegradable wastewaters subject to soil attenuation.
- **Class GC:** Designated uses include assimilation of discharge authorized by the commissioner pursuant to Section 22a-430 of the CGS. As an example, a lined landfill for disposal of ash residue from a resource recovery facility. The GC hydrogeology and hydrologic setting provide the best safeguard to adjacent resources. Discharges are restricted to potential discharges from certain waste facilities subject to specific permitting requirements.

Groundwater under SUBASE NLON's main installation is classified by the CT DEEP as GB. The area immediately surrounding SUBASE NLON Main Base is classified as GA. Groundwater in the towns of Groton and Ledyard are classified as GB, GA, and GAA. Groundwater under the SUBASE NLON housing areas is classified as both GA and GAA. The AFNRA groundwater is classified as GA by the CT DEEP (CT DEEP 2021c).

# 3.3.4 Aquatic Habitats 3.3.4.1 Wetlands

Wetlands are defined under the CWA as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USEPA, n.d.[a]). The USEPA categorizes four main types of wetlands (with several sub-types) (USEPA, n.d.[b]) as follows:

- marshes characterized by non-woody vegetation
  - o tidal coastal marshes



- non-tidal inland marshes includes wet meadows, prairie potholes, vernal pools, and playa lakes
- swamps dominated by woody vegetation
  - $\circ \quad forested-includes \ bottom land \ hardwoods$
  - $\circ \quad shrub-includes \ mangrove \ swamps$
- bogs freshwater wetlands, characterized by spongy peat deposits, acidic waters, and sphagnum moss (rainwater is the only water source)
- fens freshwater, peat-forming wetlands, covered largely by grasses, sedges, reeds, and wildflowers (groundwater-fed)

Wetlands provide habitat for thousands of aquatic and terrestrial plants and animals, as well as being important stops for migrating birds. They function as a means for flood control and storm damage reduction, protect and improve water quality naturally, and provide recreational and aesthetic value.

Relevant to SUBASE NLON, the CT DEEP classifies wetlands within the state as either "inland wetlands and watercourses" or "tidal wetlands." Inland wetlands are defined by soil type: poorly drained, very poorly drained, or alluvial and floodplain. Watercourses are defined broadly to describe rivers, streams, brooks, lakes, ponds, marshes, swamps, bogs, and other water bodies. They can be natural or artificial, vernal or intermittent, public or private (Connecticut General Statutes Chapter 440, Sec. 22a-38). Tidal wetlands are defined as areas that border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including areas currently or formerly connected to tidal waters, and those whose surface is at or below an elevation of 1 foot above local extreme high water (Connecticut General Statutes Chapter 440, Sec. 22a-29). The definition goes on to list 62 plant species that may grow or be capable of growing in tidal wetlands, such as saltmarsh grass (Spartina alterniflora), salt meadow grass (Spartina patens), and spike grass (Distichlis spicata). Tidal wetlands are typically found along the shore and estuaries of the Long Island Sound and can also occur further upstream along tidally influenced rivers, such as the Thames River. Tidal wetlands are not necessarily associated with saltwater; they can support brackish or freshwater vegetation.

Existing information on wetlands at SUBASE NLON are available from several sources, including wetland delineations conducted on the installation. There are a total of 101.89 acres of wetlands on the SUBASE NLON sites based on current USFWS National Wetland Inventory (NWI) mapping. The combined results summarizing the existing wetlands data are described below. Figure 3-12 and Figure 3-13 depict the wetlands found at SUBASE NLON, the housing areas, and AFNRA.





Figure 3-12: Wetlands and Surface Water for SUBASE NLON and Housing Areas





Figure 3-13: Wetlands and Surface Water for AFNRA



#### 3.3.4.1.1 Main Installation

The main installation has a total of 32.94 acres of wetlands, as described in Table 3-4 and as shown on current USFWS NWI mapping. The main freshwater wetland area is located in the central portion of the Main Base, and is known as "Site 2B." The adjacent Site 2B Downstream area was remediated between 1999 and 2000. Almost three acres of wetland of the Site 2B wetland were restored in 2013 by removing contaminated soils and sediments as part of a CERCLA remediation project. The Site 2B wetland was monitored for three years (2013–2016) under CERCLA to ensure that wetland restoration and enhancement performance standards were met. Since monitoring ceased in 2016, the Site 2B wetland has been colonized by invasive species, predominantly common reed (*Phragmites australis*). A multi-year effort was initiated in 2020 to control invasive species and restore native plant communities in the wetland.

Cowardin Code	Cowardin Wetland Type	Area (acre)
PFO1	Deciduous Forested Palustrine Wetlands	14.11
PSS1	Shrub/Scrub Palustrine Wetlands	1.7
Р	Includes All Other Non-Tidal Wetlands	17.13
	Total Acreage	32.94

#### Table 3-4: Wetlands at SUBASE NLON, Main Installation

Source: (SUBASE NLON, 2015).

#### 3.3.4.1.2 Housing Areas

A total of 67.32 acres of wetlands are located within the SUBASE NLON housing areas, as described in Table 3-5 and as shown on current USFWS NWI mapping. There are no wetlands in the Trident Park, Dolphin Gardens, and Conning Towers housing areas. The Polaris Park housing area has small wetlands along its eastern boundary and in the southeast corner of the property.

Cowardin Code	Cowardin Wetland Type	Area (acre)
E2	Intertidal Estuarine Wetlands	1.32
PEM1	Persistent Emergent Palustrine Wetlands	3.38
PFO1	Deciduous Forested Palustrine Wetlands	60.25
PFO4	Evergreen Forested Palustrine Wetlands	2.37
	Total Acreage	67.32

Table 3-5:	Wetlands at	SUBASE NL	ON, Housing	Areas
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Source: (SUBASE NLON, 2015).

Within Nautilus Park is the Beaverdam Brook Wetland, a wooded basin swamp with extensive tree and shrub cover. Beaverdam Brook Wetland spans 65.5 acres. The wetland is surrounded on the west, north, and east by relatively impermeable ground moraine (SUBASE NLON, 2008). An outlet to the south is composed of stratified drift, which is continuous with the stratified drift



surrounding the Groton Reservoir. The wetland itself is a remnant land feature from the latest glacial advance during the Pleistocene era. As the glaciers retreated, they deposited unsorted till on the land's surface and left behind large isolated blocks of ice. One such block of ice likely formed the basin of Beaverdam Brook Wetland. As the ice melted, the water flowed to the south through the unsorted ground moraine. Water flowing through the moraine sorted the particles of till, resulting in the stratified drift present today. Water still flows out of the wetland through Beaverdam Brook and eventually reaches Groton Reservoir (SUBASE NLON, 2008). Stormwater runoff is now channeled into the wetland via several stormwater ditches and outfalls. Natural stormwater and groundwater runoff have always been a component of the hydrology of Beaverdam Brook Wetland; however, the routing of these stormwater outfalls to the wetland has almost certainly increased the contribution of stormwater to the overall hydrology of the site (SUBASE NLON, 2008).

# 3.3.4.1.3 AFNRA

There are two tidal wetlands on AFNRA, totaling 1.63 acres, as described in Table 3-6 and as shown on current USFWS NWI mapping. One is located around the Manor Inn Pond dam and spillway, along the western side of the tidal pond at the base of the dam. The other wetland area is located along the second tidal pond at the eastern edge of the AFNRA property.

Cowardin Code	Cowardin Wetland Type	Area (acre)
E2EM1P	Estuarine and Marine Wetland	.45
PEM1E	Freshwater Emergent Wetland	.28
PFO1R	Freshwater Forested/Shrub Wetland	.90
	Total Acreage	1.63

TADIE 3-0. WEITAILUS AL SUDASE MEON, APMAR	Table 3-6	: Wetlands	at SUBASE	NLON,	AFNRA
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Source: (SUBASE NLON, 2015).

## 3.3.4.2 Nearshore

Nearshore areas include all submerged lands titled to the Navy and all other submerged lands that are adjacent to the installation that extend from the mean high water level offshore to the boundary of any secure areas controlled by the Navy. The SUBASE NLON piers are located within the nearshore habitat of the Thames River. A survey was completed in 2014 through 2015 to characterize the nearshore environment at SUBASE NLON, including benthic habitat, submerged aquatic vegetation (SAV), fish, TES, water quality, marine mammals, and intertidal areas (Tetra Tech, Inc., 2016).

Nearshore habitat provides a unique habitat for a variety of plants and animals, including aquatic plants, fish, and shellfish. Nearshore waters comprise habitat for 80 percent of the fish species in the U.S. (USEPA, 1998) and are also largely used for recreational purposes including boating, diving, swimming, surfing, and fishing. Recreational uses of the nearshore area are limited in the immediate vicinity of SUBASE NLON due to security measures in place and consist of boating operations managed by MWR.


The 2014–2015 field surveys found no evidence of SAV in the SUBASE NLON nearshore environment. The nearshore sediments of SUBASE NLON were primarily comprised of silt and clay, with some shell hash, and the benthic survey results indicated low biological diversity (Tetra Tech, Inc., 2016). Infaunal communities in the SUBASE NLON nearshore areas include primarily polychaetes (60 percent of all infaunal species observed), mollusks, arthropods, nematodes, nemertea, and olgochaeta. The 2016 survey observed 31 fish species, nine larval fish taxa, eight fish egg taxa, seven invertebrates, and no marine mammals. Results of telemetry array deployed recorded federally listed Atlantic sturgeon. Subsequent marine mammal surveys completed from 2017 to 2019 identified gray seals, harbor seals, and one unidentified seal in SUBASE NLON's nearshore environment (TetraTech, Inc., 2020). In addition, two seals identified by Mystic Aquarium staff as harp seals hauled out on MWR's docks located in the northern portion of SUBASE NLON for several days in March 2019 (Jane Urban, 2021, personal communication). Specific species observed at SUBASE NLON are listed in Section 3.3.6.

## 3.3.4.3 Deepwater Habitats

Deepwater habitats are classified as "permanently flooded lands lying below the deepwater boundary of wetlands" (Cowardin et al., 1979). Deepwater habitats include marine, estuarine, riverine, and lacustrine systems. In marine and estuarine systems, deepwater habitat begins at the extreme spring tide low water line; in riverine and lacustrine systems, deepwater habitat begins at water depths greater than two meters (6.6 feet) below mean low water, or deeper if vegetation is present beyond this depth. In deepwater habitats, the surface water is permanent and often deep, and water (not air) is the primary area where organisms live. The deepwater habitat is classified separately from wetlands because wetlands do not traditionally include deep, permanent water.

No Navy-owned deepwater habitats have been identified at SUBASE NLON.

## 3.3.5 Flora

A vegetation and wetlands mapping project was completed on SUBASE NLON in 2000, which determined the types of natural vegetative communities and flora present on the base. A full list of plant species found on SUBASE NLON is located in Appendix B.

## 3.3.5.1 Vegetative Communities

The delineation of vegetative cover types on SUBASE NLON was based on forest cover types for natural forested areas, as well as basic landscape descriptors for urban and residential areas and the dominant vegetative cover in natural non-forested areas. Table 3-7 lists the vegetative cover types delineated during a vegetation and wetlands mapping project in 2000. Natural vegetative cover on SUBASE NLON.

## 3.3.5.1.1 Main Installation

The largest vegetative cover type on SUBASE NLON is landscaped trees and shrubs, as much of the main installation is developed. The natural vegetative areas occur primarily at the eastern and northern areas of the main installation, where there are forested areas of oak, pine, and maple and a freshwater marsh.

	Vegetation	Area (acres)
	Landscaped Trees and Shrubs	378.17
Urban and	Mowed Lawns and Roadsides	90.11
Residential Vegetative Cover	Street Trees	4.45
Types	Urban Forest	46.07
	Total	521.68
	White Oak/Black Oak/Northern Red Oak	249.88
	Red Maple	69.80
	White Pine/Northern Red Oak/Red Maple	41.66
	Freshwater Marsh	17.97
	Gray Birch/Red Maple	9.11
	Yellow Poplar/White Oak/Northern Red Oak	8.74
Natural Vegetative	Rock Outcrop	5.94
51	Atlantic White Cedar	2.37
	Sandy Beach	1.24
	Sugar Maple	0.83
	Saltmarsh	0.83
	Eastern White Pine	0.60
	Eastern Hemlock	0.21
	Eastern Red Cedar	0.11
	Total	408.45

#### Table 3-7: Vegetation on SUBASE NLON\*

Note: \*The vegetation acreage is based on a vegetation and wetland mapping project completed in 2000 that surveyed the main installation, AFNRA, and the Beaverdam Brook wetland complex. Source: (SUBASE NLON, 2008).

SUBASE NLON is located within the central hardwoods or central hardwoods/hemlock vegetation zone of the eastern deciduous forest (SUBASE NLON, 2008). This forest zone is dominated by oaks (*Quercus* spp.) and a variety of associated hardwoods, including hickory (*Carya* spp.), black birch (*Betula lenta*), white ash (*Fraxinus Americana*), and red maple (*Acer rubrum*). Although hemlock (*Tsuga canadensis*) was historically an important component of the eastern deciduous forest, the accidental introduction of the Hemlock Woolly Adelgid insect (*Adelges tsugae*) to the East Coast in the 1950s has seriously affected hemlock populations and may cause the eventual extirpation of this species from southern New England (USDA, n.d.[a]). Emerald ash borer (*Agrilus planipennis*), an exotic beetle native to northeastern Asia that feeds on ash species, was documented on SUBASE NLON in 2019 and is negatively affecting the population of ash trees on base. In lower slope communities, the principal hardwoods may



include red maple, red oak, American beech (*Fagus grandifolia*), yellow birch (*Betula lutea*), and tulip-tree (*Liriodendron tulipifera*) (SUBASE NLON, 2008).

The soils of the oak-dominated forests, derived from glacial till, decomposing plant, and organic material, are generally acidic. Shrubs in the heath family (Ericaceae), which are tolerant of acidic conditions, dominate this vegetation zone, the most common of which are mountain laurel (*Kalmia latifolia*), huckleberry (*Gaylussacia baccata*), and highbush blueberry (*Vaccinium corymbosum*). Along stream margins and in other wet sites, sweet pepperbush (*Clethra alnifolia*) and spicebush (*Lindera benzoin*) are locally abundant. The herbaceous stratum in this forest is often sparse, due in part to the depth of the leaf litter, density of the canopy, and overbrowsing by deer. Canada mayflower (*Maianthemum canadensis*), Virginia creeper (*Parthenocissus quinquefolia*), wild sarsaparilla (*Aralia nudicaulis*), wood asters (*Aster* spp.), and poison ivy (*Toxicodendron radicans*) are common components of the ground flora (SUBASE NLON, 2008).

Vegetated rock outcrops on the main installation represent a distinct habitat type. Shallow soils and generally xeric conditions limit the types of species able to persist along these rocky ledges. Although oaks, hickory, black birch, and white ash form a nearly continuous canopy in and around these areas, the forest understory is a sparse layer of sapling red maple, sassafras (*Sassafras albidum*), and black cherry (*Prunus serotina*) (SUBASE NLON, 2008). Mountain laurel, huckleberry, low bush blueberry (*Vaccinium angustifolium*), Christmas fern (*Polystichum acrostichoides*), and assorted grasses grow in pockets of soil along these steep ridges and in areas exposed by wind-thrown trees. Virginia creeper, maple-leaved viburnum (*Viburnum acerifolium*), poison ivy, and greenbrier (*Smilax rotundifolia*) are among the few species able to grow in the dense leaf litter in this zone (SUBASE NLON, 2008).

The New Acquisition Area (acquired in 1990) north of the Perimeter Road on the main installation includes three distinct vegetation types: dry rocky ledges characterized by oaks and mountain laurel; a lower slope community consisting of mixed hardwoods and hemlock; and a red maple/sweet pepperbush dominated forested wetland. Plants of interest identified in this area are a large (37-inch-diameter at breast height [dbh]) white pine (*Pinus strobus*) and great laurel (*Rhododendron maximum*). Many of the hemlock trees in the upland area along State Route 12 have been severely damaged by the woolly adelgid (SUBASE NLON, 2008).

## 3.3.5.1.2 Admiral Fife Naval Recreation Area (AFNRA)

Forested areas of AFNRA are dominated by oaks and hickory and intermixed with black birch, American beech, red maple, and white pine (SUBASE NLON, 2008). The forest understory consists primarily of sassafras, black birch, and black cherry saplings and shrubs such as arrowwood viburnum (*Viburnum recognitum*) and highbush blueberry. The herbaceous layer is fairly sparse, including Canada mayflower, ground pine (*Lycopodium tristachyum*), Virginia creeper, wood asters, and poison ivy. In depressions and other wet areas of the forest, sweet pepperbush and spicebush often exist along with skunk cabbage (*Symplocarpus foetidus*) and jewelweed (*Impatiens capensis*). In the swampy headwaters associated with the freshwater pond, hydrophytic shrubs such as buttonbush (*Cephalanthus occidentalis*), elderberry (*Sambucus canadensis*), swamp rose (*Rosa palustris*), smooth alder (*Alnus rugosa*), and red osier dogwood (*Cornus stolonifera*) are common along with black willow (*Salix nigra*) and black gum (*Nyssa*)



*sylvatica*). Herbs identified in and around the pond include arrowhead (*Sagittaria latifolia*), jewelweed, false nettle (*Boehmeria cylindrica*), water hemlock (*Cicuta maculata*), and white water lily (*Nymphaea odorata*) (SUBASE NLON, 2008).

The two tidal wetlands on AFNRA contain typical salt marsh vegetation, except for the presence of common reed (*Phragmites australis*) in the western intertidal marsh. A belt of saltmarsh cordgrass lines the intertidal zone, and the high marsh is dominated by saltmeadow cordgrass interspersed with blackgrass (*Juncus gerardii*) and salt marsh herbs such as sea lavender (*Limonium nashii*) and seaside goldenrod (*Solidago sempervirens*). Hummocks on the high marsh are dominated by switchgrass (*Panicum virgatum*), marsh elder (*Iva frutescens*), and groundsel tree (*Baccharis halimifolia*) (SUBASE NLON, 2008).

## 3.3.5.1.3 Housing Areas

The Trident Park housing area, which is just across State Route 12 from the main installation, has similar vegetative cover as the main installation. Since it is a developed housing area, much of the vegetation is urban forest or mowed lawn/roadside. Trident Park also has some forested areas consisting of white oak, black oak, and northern red oak, and a small forested area with yellow poplar, white oak, and northern red oak.

Flora within the Dolphin Gardens and Conning Towers housing areas are unknown, but it would be expected to be similar to the vegetation found within Polaris Park and Trident Park.

Polaris Park consists predominately of landscaped trees and shrubs, developed land, urban forest, and White Oka/Black Oak/Northern Red Oak. Dominant tree species include white pine, red oak, white oak, and maple.

The Beaverdam Brook Wetland area in Nautilus Park is a palustrine scrub/scrub wetland and is dominated by red maple and poison sumac (*Rhus vernix*) in the tree stratum and sweet pepperbush, spicebush, highbush blueberry, elderberry (*Sambucus canadensis*), and swamp azalea in the shrub stratum (SUBASE NLON, 2008).

There is a two-acre Atlantic white cedar (*Chamaecyparis thyoides*) stand in the eastern portion of the Beaverdam Brook Wetland. The 2000 Vegetation and Wetlands Mapping Report found a dense shrub layer, nearly impenetrable in some areas, dominated by sweet pepperbush, highbush blueberry, swamp azalea (*Rhododendron viscosum*), and greenbrier. Atlantic white cedar reproduction was evident on several hummocks despite the nearly continuous tree canopy (SUBASE NLON, 2008).

A red maple-dominated forest is present on the southern portion of the wetland (SUBASE NLON, 2008). The construction of two sewer lines (since partially revegetated by common reed) through the center of the swamp appears to have altered the system's hydrology, however, and the northwestern section of the swamp is now an extremely wet area characterized by hummocky topography and standing water up to 24 inches deep. The mature red maple component of this area is slowly dying off and a scrub/shrub community is taking its place (SUBASE NLON, 2008). Among the hummocks in the wetland are skunk cabbage, tussock sedge (*Carex stricta*), jewelweed, soft rush (*Juncus effusus*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda*)



*regalis*), cinnamon fern (*Osmunda cinnamomea*), and marsh fern (*Thelypteris palustris*). In the immediate vicinity of disturbances such as the sewer line rights-of-way, common reed has outcompeted native vegetation and now occupies dense, nearly monotypic stands. Rock ledges extend down into the wetland in the northeast portion near the Navy's former Shepherd of the Sea Chapel, which has since been sold to a private owner. These ledges are dominated by climax upland forest species. White oak (*Quercus alba*), northern red oak (*Quercus rubra*), scarlet oak (*Quercus coccinia*), and black oak dominates the tree stratum, while mountain laurel dominates the shrub stratum. There is a smaller component of flowering dogwood (*Cornus florida*), hickory, ash, and maple scattered within this area (SUBASE NLON, 2008).

## 3.3.5.2 Invasive Species

There are nine invasive plant species identified at SUBASE NLON: common reed, Asian bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), honeysuckle (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*), autumn olive (*Eleagnus umbellata*), purple loosestrife (*Lythrum salicaria*), mile-a-minute (M-A-M) (*Persicaria perfoliata*), and Japanese knotweed (*Polygonum cuspidatum*). Of these nine invasive plant species, three are of primary concern—common reed, M-A-M, and Asiatic bittersweet, as these aggressive invaders rapidly outcompete native vegetation (SUBASE NLON, 2008).

The species and locations of the non-native invasive flora identified on SUBASE NLON are detailed in Figure 3-14 and Table 3-8.

1		ř.	
Common Name	Latin Name	Growth Form	<b>Location Observed</b>
Asian bittersweet	Celastrus orbiculatus	Vine	All
Autumn olive	Elaeagnus umbellata	Woody plant	All
Common reed	Phragmites australis	Grasslike plant	All
Honeysuckle	Lonicera spp.	Woody plant	AFNRA
Japanese barberry	Berberis thunbergii	Woody plant	AFNRA
Japanese knotweed	Polygonum cuspidatum	Herbaceous plant	AFNRA
Mile-A-Minute	Persicaria perfoliata	Herbaceous plant	Main Installation – Site 2B
Multiflora rose	Rosa multiflora	Woody plant	AFNRA
Purple loosestrife	Lythrum salicaria	Herbaceous plant	Main Installation – Site 2B

Table 3-8: Invasive Flora at SUBASE NLON

Source: (SUBASE NLON, 2008).





Figure 3-14: Invasive Species of SUBASE NLON



Descriptions of the exotic/invasive species present on SUBASE NLON are presented in the following paragraphs.

Asian bittersweet (Celastrus orbiculatus) is an invasive vine that is often collected for its attractive berries and used for wreaths and floral arrangements. This plant is identified by its round leaves with axillary flower, and yellow and red capsule fruit clusters. This vine colonizes edges, where it grows rapidly up shrubs or trees and shades out native vegetation. Asian bittersweet can be distinguished from the declining native American bittersweet, whose flowers and fruit grow in singular, terminal panicle that are about as long as the leaves. Species confirmation should be sought prior to commencing any removal methods because the non-native species may be confused with American bittersweet, which is in decline. Asian bittersweet is a primary species of concern at SUBASE NLON.



Source: National Park Service.



Source: National Park Service.

Autumn olive (*Eleagnus umbellata*) is a nitrogen-fixing shrub that was introduced from East Asia for ornamental purposes but is now widely considered invasive. Autumn olive has red, berry-like drupes, leaves that are distinctly silver underneath, and can grow to 12 feet in height. Its nitrogen-fixing abilities allow it to thrive in poor soils. Autumn olive is widespread and scattered on SUBASE NLON and generally does not dominate the vegetation. On AFNRA, however, a portion of the upland habitat on the east side is dominated by a mix of invasive species, including autumn olive.

**Common reed** (*Phragmites australis*) is a tall, perennial wetland grass that grows to 13 feet in height and spreads primarily by rhizome sprouts, allowing it to form pure, dense stands. It can also spread to new areas by seed or rhizome fragments. Common reed quickly displaces other desirable plant species, limiting diversity in the wetland community and providing little food or shelter for wildlife. Once established, common reed is very difficult to eradicate. Common reed is common in a variety of wet habitats such as drainage ditches, freshwater wetlands, and marshes. Common reed dominates the



Source: USFWS.

vegetative cover of the Site 2B wetland on the main installation. On AFNRA, common reed is



taking over the fringing marsh of the western tidal pond. Common reed has out-competed native vegetation and taken over utility rights-of-way in the housing areas, such as the sewer crossing lines between the Beaverdam Brook Wetland and Nautilus Park.



Source: National Park Service.

**Honeysuckle** (*Lonicera* **spp.**) are upright, deciduous shrubs ranging from 6 to 15 feet in height. Leaves are short-stalked, egg-shaped, and 1 to 2.5 inches in length. Flowers are fragrant and tubular, varying in color from white to pink or crimson. Exotic honeysuckles can be

easily confused with native bush honeysuckles, so proper identification is necessary. Honeysuckles form a dense shrub layer that crowds and shades native plant species, and rapidly invades and overtakes a site.



Source: National Park Service.

Exotic bush honeysuckles fruit abundantly and are highly attractive to birds, which widely disseminate seeds. The shrubs also spread through vegetative sprouting in established populations. Honeysuckle is widespread and scattered on SUBASE NLON and generally does not dominate the vegetation. On AFNRA, however, a portion of the

upland habitat on the east side is dominated by a mix of invasive species, including honeysuckle.

**Japanese barberry** (*Berberis thunbergii*) is a shrub that grows to 2 to 6 feet in height and has numerous short thorns and arching stems. This dense shrub can be identified by small bright red berries that hang from the leaf stalks and persist through winter. Japanese barberry was introduced and has become invasive since escaping from cultivation. It is a common invasive of natural habitats including canopy forests and open woodlands. Japanese barberry is widespread and scattered on SUBASE NLON, and generally does not dominate the vegetation. On AFNRA, however, a portion of the upland habitat on the east side is dominated by a mix of invasive species, including Japanese barberry.



Source: USFWS.

## Japanese knotweed (Polygonum cuspidatum),

also known as Mexican or Japanese bamboo, is an herbaceous perennial in the buckwheat family that can grow between 3 and 9.5 feet in height. The stout, round, hollow stems and formations of dense clumps resemble that of bamboo. It has extensive rhizomes that reach 45 to 60 feet in length and readily give rise to new plants. Japanese knotweed is commonly found in moist, open habitats along riverbanks, islands, wetlands, and drainage ditches along roadways, hillsides, and disturbed areas. Japanese knotweed is widespread and scattered on

SUBASE NLON, and generally does not dominate the vegetation. On AFNRA, however, a



portion of the upland habitat on the east side is dominated by a mix of invasive species, including Japanese knotweed.

**Mile-a-minute (M-A-M) (***Persicaria perfoliata***)** is a flowering plant in the buckwheat family. It is a trailing vine with barbed reddish stems and triangular leaves. The leaves also contain barbs on the underside of the blades. M-A-M is found on SUBASE NLON's main installation at wetland Site 2B. Attempts to control M-A-M on SUBASE NLON through the release of weevils (*Curculionidae*) in 2016 have not been successful, as M-A-M continues to thrive at SUBASE NLON.



Source: USFWS.



Source: USFWS.

**Multiflora rose** (*Rosa multiflora*) is a perennial shrub with thorny, long, arching stems. It has alternate, compound leaves with seven or nine leaflets, and forms large clusters of fragrant white or pink flowers. It can reproduce from seed or by rooting at the tip of arching stems. Multiflora rose is an aggressive invader of open land and is particularly successful on forest edges and hedgerows. The shrub will often create impenetrable thickets that crowd out other vegetation and can become dominant in a forest understory. Multiflora rose has become naturalized throughout much of the U.S. and continues to be

spread with the help of birds. It is widespread and scattered on SUBASE NLON, and generally does not dominate the vegetation. On AFNRA, however, a portion of the upland habitat on the east side is dominated by a mix of invasive species, including multiflora rose.



Source: USFWS.

**Purple Loosestrife** (*Lythrum salicaria*) is an herbaceous perennial plant that can grow 1 to 2 meters tall, forming clonal colonies 1.5 meters or more in width with numerous erect stems growing from a single woody root mass. The stems are reddish-purple or red to purple and square in cross-section. The leaves are lanceolate, 3 to 10 centimeters long and 5 to 15 millimeters broad, downy and sessile, and arranged opposite or in whorls of three. Purple loosestrife is native to Europe and Asia but it can be found in every U.S. state except Florida. Purple loosestrife is found around Site 2B wetland on SUBASE NLON's main installation.

The invasive species that dominate the upland habitat in certain areas of AFNRA (multiflora rose, Asiatic shrub honeysuckles, Japanese barberry,

autumn olive, and Japanese knotweed) are covering historic sites on AFNRA. SUBASE NLON has decided that the vegetation should remain to deter artifact hunters from disturbing the site (SUBASE NLON, 2008).

#### 3.3.6 Fauna

Fauna on SUBASE NLON has been identified primarily by observation, and no formal surveys have been done for mammals. Surveys for birds were completed in 2014 and herpetofauna survey were conducted in 2003 and 2019. Fish were also surveyed during the 2016 nearshore habitat field survey (Tetra Tech, Inc., 2016). Fauna on SUBASE NLON is typical of



southeastern Connecticut. A comprehensive list of the fauna that occur at the installation is provided in Appendix B. Information on the protected species that occur at SUBASE NLON is presented in Section 3.3.7.

## 3.3.6.1 Mammals

Mammals on SUBASE NLON are characteristic of southeastern Connecticut. The most common mammal occurring on-base is white-tailed deer (Odocoileus virginianus), which are quite abundant. Deer are primarily observed in the thickets and woodlots on the central and northern portions of the main installation. Other mammals commonly observed on SUBASE NLON include woodchucks (Marmota monax), chipmunks (Tamias striatus), striped skunk (Mephitis mephitis), and gray squirrels (Sciurus carolinensis). Coyote (Canis latrans) has also been observed at SUBASE NLON (J. Urban, 2021, personal communication). Black bear (Ursus americanus) was first sighted on SUBASE NLON in 2008 (SUBASE NLON, 2008). There was a second sighting of a black bear in 2011 (T. McKenzie, former Natural Resource Manager -Environmental Division SUBASE NLON, 2016, personal communication). Other common mammals occurring on SUBASE NLON are crepuscular or nocturnal and are not observed as often, including red fox (Vulpes vulpes), gray fox (Urocvon cinereoargenteus), opossum (Didelphis virginiana), raccoon (Procyon lotor), muskrat (Ondatra zibethicus), flying squirrel (Glaucomys sabrinus), long- and short-tailed weasels (Mustela frenata and Mustela ermine), and eastern cottontail (Sylvilagus floridanus). There is evidence of past use of the main installation Site 2B wetland by beavers (*Castor canadensis*), but no beavers occupy the site at present (SUBASE NLON, 2008). Muskrat have also been observed in the Site 2B wetland area (T. McKenzie, former Natural Resource Manager - Environmental Division SUBASE NLON, 2016, personal communication).

No small mammal trapping efforts have been undertaken at SUBASE NLON, but the habitats found on the installation are similar to those elsewhere in southeastern Connecticut, so it would be expected that the small mammals on SUBASE NLON would be similar to those found on surrounding lands. Some of the more common small mammals of southern Connecticut are the white-footed mouse (*Peromyscus leucopus*), meadow jumping mouse (*Zapus hudsonius*), meadow vole (*Microtus pennsylvanicus*), red-backed vole (*Myodes* sp.), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and eastern mole (*Scalopus aquaticus*) (SUBASE NLON, 2008). A list of the mammals that could occur on SUBASE NLON is included in Appendix B.

## 3.3.6.1.1 Bats

Depending on the species, bats typically utilize different structures for roosting, such as rock formations, caves, human-made structures, and dead and dying trees with cavities and loose bark (Harvey et al., 2011). Many bat species use riparian corridors, ponds, and wetlands as feeding habitats due to the higher nocturnal insect densities within these areas (Hill & Smith, 1984). Linkages between roosting and foraging habitats represent pathways of continual or regular bat activity throughout much of the year.

Acoustic bat surveys were conducted at SUBASE NLON from May through December 2018. The baseline survey evaluated the species composition and activity levels of resident and



migratory bat species. Three acoustic detectors were deployed at areas identified as having potential for high bat activity: one at the Main Base, one in a wetland portion of the Nautilus Park housing area, and one at AFNRA. The survey documented bat activity from May through December at all three locations, with the highest activity rates observed in July and August. Seven of the nine species of bats known to occur in Connecticut were detected: the big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), little brown bat (*Myotis lucifugus*), eastern small-footed bat (*M. leibeii*), hoary bat (*Lasiurus cinereus*), and tri-colored bat. Each of the seven species were detected at all three locations. All of the bat species detected, with the exception of the big brown bat, are state listed as either endangered or species of special concern. The NLEB and Indiana bat (*M. sodalis*) were not detected (Tetra Tech, Inc. 2019).

Eastern red bats and big brown bats were the most recorded species identified. Big brown bats are one of the most common bats in Connecticut, but eastern red bats are less common and seldom seen. Migratory tree bats (hoary bats, silver-haired bats, and eastern red bats) accounted for over 40 percent of all recorded activity. Recorded bat activity was highest at the AFNRA and lowest in the wetland portion of the Nautilus Park housing area. (Tetra Tech, Inc. 2019). To follow up on these findings, additional acoustic monitoring with emergence counts is planned to obtain supplemental data on the species present at SUBASE and AFNRA. Acoustic bat survey results will be shared with CT DEEP to add to the knowledge on the status and distribution of these State-listed species.

The NLEB (federally threatened), little brown bat, tri-colored bat, Indiana bat (federally endangered), big brown bat, eastern small-footed bat, and gray bat (federally endangered) (*Myotis grisescens*) have been affected by white nose syndrome (WNS) (whitenosesyndrom.org, n.d.). WNS is already wide-spread and has a rapid spread rate; therefore, *Myotis* species are becoming a species of concern across the country. Refer to Section 3.3.7 for more information on the NLEB's status, and to Section 4.4.1.3 for a discussion of WNS.

## 3.3.6.1.2 Marine Mammals

No marine mammals were observed at SUBASE NLON during the 2016 nearshore survey (Tetra Tech, Inc., 2016). However, shipboard surveys of the Thames River near SUBASE NLON from 2017 through 2019 documented the harbor seal (*Phoca vitulina*) and gray seal (*Halichoerus grypus*). Incidental observations of harbor seals were also made in 2019. In March and April 2019, two harp seals (*Pagophilus groenlandicus*) were sighted repeatedly at the Navy recreational marina pier (Thames River View Marina) operated by MWR (Tetra Tech, Inc., 2020). Previous records of marine mammals in the Thames River included a gray seal in 1998 (SUBASE NLON, 2008), and a harbor seal spotted near SUBASE NLON piers in 2000 (SUBASE NLON, 2008). Additional sightings of two seals have been reported since 2011.

## 3.3.6.2 Birds

SUBASE NLON provides diverse habitat for bird species; its forested areas and wetlands provide foraging, resting, and breeding habitat for many species of birds. The Thames River, especially in fringing marshes and coves and along its shores, offers foraging and resting habitat for many species of wading birds and waterfowl. The interior emergent and scrub/shrub wetlands



on SUBASE NLON attract waterfowl, wading birds, and a large number of passerine species, and the hardwood and mixed hardwood forests are used by neo-tropical migratory species (SUBASE NLON, 2008).

A coordinated bird monitoring study was conducted at SUBASE NLON in 2014, which established a list of avian species on the installation (Tetra Tech, Inc., 2014). SUBASE NLON provides diverse habitat and open space for a range of avian species, including several migratory as well as resident populations that provide important ecological service (Tetra Tech, Inc., 2014). The survey compiled a list of 213 species with the potential to occur on SUBASE NLON and documented observations of 107 species (Appendix B). Passeriformes (perching birds) represented the most species observed on SUBASE NLON (69 distinct species), with the second-most-represented species being Accipitriformes (hawks, kites, eagles, and allies) (Tetra Tech, Inc., 2014). SUBASE NLON is located along the coast of the Atlantic flyway, making it a potential stopover or feeding habitat for migrating birds. Seven sensitive bird species were observed during the monitoring study, which are shown in Table 3-9 (Tetra Tech, Inc., 2014).

Common Name	Scientific Name	Status
Great egret	Ardea alba	ST
Broad-winged hawk	Buteo platypterus	SSC
Snowy egret	Egretta thula	ST
American kestrel	Falco sparverius	SSC
Bald eagle	Haliaeetus leucocephalus	BAGEPA; ST
Northern parula	Setophaga americana	SSC
Brown thrasher	Toxostoma rufum	SSC

Table 3-9: Sensitive Bird Species Observed at SUBASE NLON

Source: (Tetra Tech, Inc., 2014; CT DEEP, 2015) BAGEPA=Protected under the Bald and Golden Eagle Protection Act

SE=State Endangered

SSC=State Special Concern

ST=State Threatened

## 3.3.6.2.1 Migratory Birds

Chief examples among the migratory bird species observed on SUBASE NLON in 2014 during the avian survey are the bald eagle, blue-winged warbler (*Vermivora pinus*), Canada warbler (*Wilsonia canadensis*), prairie warbler (*Setophaga discolor*), snowy egret (*Egretta thula*), and wood thrush (*Hylocichla mustelina*). Of the 1,026 bird species protected by the Migratory Bird Treaty Act of 1918 (MBTA), 99 have been documented at SUBASE NLON and are listed in Table 3-10.



Common Name	Scientific Name
Accipitriformes (Hawks, Kites, Eagles, and Allies)	
Cooper's hawk	Accipiter cooperii
Red-tailed hawk	Buteo jamaicensis
Red-shouldered hawk	Buteo lineatus
Broad-winged hawk	Buteo platypterus
Turkey vulture	Cathartes aura
Black vulture	Coragyps atratus
Bald eagle	Haliaeetus leucocephalus
Osprey	Pandion haliaetus
Anseriformes (Ducks, Geese, and Swans)	·
Wood duck	Aix sponsa
Mallard	Anas platyrhynchos
Lesser scaup	Aythya affinis
Canada goose	Branta canadensis
Mute swan	Cygnus olor
Hooded merganser	Lophodytes cucullatus
Red-breasted merganser	Mergus serrator
Charadriiformes (Plovers, Sandpipers, and Allies)	
Killdeer	Charadrius vociferus
Herring gull	Larus argentatus
Ring-billed gull	Larus delawarensis
Great Black-backed gull	Larus marinus
Laughing gull	Leucophaeus atricilla
Greater yellowlegs	Tringa melanoleuca
Columbiformes (Pigeons and Doves)	
Mourning dove	Zenaida macroura
Coraciiformes (Kingfishers and Allies)	
Belted kingfisher	Megaceryle alcyon
Gaviiformes (Loons)	
Common loon	Gavia immer
Passerformes (Perching Birds)	
Red-winged blackbird	Agelaius phoeniceus
Tufted titmouse	Baeolophus bicolor
Cedar waxwing	Bombycilla cedrorum
Canada warbler	Cardellina canadensis

# Table 3-10: Migratory Birds Observed on SUBASE NLON



Common Name	Scientific Name
Wilson's warbler	Cardellina pusilla
Northern cardinal	Cardinalis
House finch	Carpodacus mexicanus
Veery	Catharus fuscescens
Hermit thrush	Catharus guttatus
Swainson's thrush	Catharus ustulatus
Eastern wood-pewee	Contopus virens
American crow	Corvus brachyrhynchos
Common raven	Corvus corax
Fish crow	Corvus ossifragus
Blue jay	Cyanocitta cristata
Gray catbird	Dumetella carolinensis
Common yellowthroat	Geothlypis trichas
House finch	Haemorhous mexicanus
Barn swallow	Hirundo rustica
Wood thrush	Hylocichla mustelina
Baltimore oriole	Icterus galbula
Dark-eyed junco	Junco hyemalis
Swamp sparrow	Melospiza georgiana
Song sparrow	Melospiza melodia
Northern mockingbird	Mimus polyglottos
Black-and-white warbler	Mniotilta varia
Brown-headed cowbird	Molothrus ater
Great Crested Flycatcher	Myiarchus crinitus
Indigo bunting	Passerina cyanea
Eastern towhee	Pipilo erythrophthalmus
Scarlet tanager	Piranga olivacea
Black-capped chickadee	Poecile atricapillus
Blue-gray gnatcatcher	Polioptila caerulea
Common grackle	Quiscalus quiscula
Ruby-crowned kinglet	Regulus calendula
Golden-crowned kinglet	Regulus satrapa
Eastern phoebe	Sayornis phoebe
Ovenbird	Seiurus aurocapilla
Northern parula	Setophaga americana

# Table 3-10: Migratory Birds Observed on SUBASE NLON



Common Name	Scientific Name
Hooded warbler	Setophaga citrina
Yellow-rumped warbler	Setophaga coronata
Prairie warbler	Setophaga discolor
Palm warbler	Setophaga palmarum
Yellow warbler	Setophaga petechia
Pine warbler	Setophaga pinus
American redstart	Setophaga ruticilla
Blackpoll warbler	Setophaga striata
Black-throated green warbler	Setophaga virens
Eastern bluebird	Sialia sialis
White-breasted nuthatch	Sitta carolinensis
American goldfinch	Spinus tristis
Chipping sparrow	Spizella passerina
Northern rough-winged swallow	Stelgidopteryx serripennis
European starling	Sturnus vulgaris
Tree swallow	Tachycineta bicolor
Carolina wren	Thryothorus ludovicianus
House wren	Troglodytes aedon
American robin	Turdus migratorius
Eastern kingbird	Tyrannus tyrannus
Blue-winged warbler	Vermivora cyanoptera
Warbling vireo	Vireo gilvus
White-eyed vireo	Vireo griseus
Red-eyed vireo	Vireo olivaceus
Blue-headed vireo	Vireo solitarius
White-throated sparrow	Zonotrichia albicollis
Pelicaniformes (Pelicans, Herons, Ibises, and Allie	s)
Great egret	Ardea alba
Great blue heron	Ardea herodias
Snowy egret	Egretta thula
Piciformes (Woodpeckers)	
Northern flicker	Colaptes auratus
Red-bellied woodpecker	Melanerpes carolinus
Downy woodpecker	Picoides pubescens
Hairy woodpecker	Picoides villosus

# Table 3-10: Migratory Birds Observed on SUBASE NLON



Scientific Name
phyrapicus varius
ubo virginianus
rs, and Allies)
halacrocorax auritus
o u s h

Table 3-10: Migratory Birds Observed on SUBASE NLON

Source: (Tetra Tech, Inc., 2014)

## 3.3.6.2.2 Canada Goose Control Efforts

In 2019 SUBASE NLON contracted with the USDA, Animal and Plant Health Inspection Service, Wildlife Services to control populations of resident Canada geese (*Branta canadensis*) on the installation. Their work includes nest destruction, egg oiling/addling, and using lethal means to remove adult geese from SUBASE NLON. Population control efforts started in spring 2019 and continued through 2021. Future work will depend on the availability of funding and the status of Canada goose populations on SUBASE NLON.

## 3.3.6.2.3 Osprey Alternative Nesting Site Development Efforts

In prior years, osprey (*Pandion haliaetus*) have regularly constructed nests on cranes positioned on SUBASE NLON's lower waterfront along the Thames River. The presence of active osprey nests which directly affect mission support infrastructure is a significant operational concern. In the interest of proactively avoiding operational conflicts as well as further sustaining and enhancing the health of the resident wildlife species population, at least two nesting platforms will be added away from SUBASE NLON's industrialized waterfront.

## 3.3.6.3 Herpetofauna

Reptiles and amphibians on SUBASE NLON also are likely to be representative of the region. A list of all potential herpetofauna on the installation is located in Appendix B. Confirmed herpetofauna on SUBASE NLON are listed in Table 3-11, as well as the location on SUBASE NLON where they were observed.

Common Name	Scientific Name	Location
American toad	Anaxyrus americanus	MI
Gray treefrog	Hyla versicolor	MI
American bullfrog	Lithobates catesbeianus	MI, AFNRA
Green frog	Lithobates clamitans	MI, AFNRA, BBW
Pickerel frog	Lithobates palustris	MI
Wood frog	Lithobates sylvaticus	MI
Spring peeper	Pseudacris crucifer	MI, AFNRA
Spotted salamander	Ambystoma maculatum	MI, BBW

Table 3-11: Reptiles and Amphibians Observed on SUBASE NLON



Common Name	Scientific Name	Location
Four-toed salamander	Hemidactylium scutatum	AFNRA, BBW
Eastern red-backed salamander	Plethodon cinereus	MI, AFNRA, BBW
Ring-necked snake	Diadophis punctatus	MI
Eastern ratsnake	Elaphe (Pantherophis) obsoleta (alleganiensis)	MI
Eastern ribbonsnake	Thamnophis sauritus	MI
Common gartersnake	Thamnophis sirtalis	MI, AFNRA, BBW
Snapping turtle	Chelydra serpentina	MI, AFNRA
Painted turtle	Chrysemys picta	MI, AFNRA

#### Table 3-11: Reptiles and Amphibians Observed on SUBASE NLON

Source: SUBASE NLON, 2003). AFNRA=Admiral Fife Naval Recreation Area BBW=Beaverdam Brook Wetland

MI=Main Installation

There are no lizard species known to inhabit southeastern Connecticut (SUBASE NLON, 2008). There have been several reports of northern copperheads (*Agkistrodon contortrix mokasen*) at SUBASE NLON, but the species has not been directly observed by the NRM and may have been mistaken for the more common eastern milksnake (*Lampropeltis triangulum triangulum*) (SUBASE NLON, 2008).

#### 3.3.6.4 Fish

A 2016 survey of the nearshore waters of SUBASE NLON observed 31 adult/juvenile fish species, nine larval fish taxa, and eight fish egg taxa (Tetra Tech, Inc., 2016). The most common species observed included scup (*Stenotomus chrysops*), Atlantic silverside (*Menidia menidia*), Atlantic herring (*Clupea harengus*), bay anchovy (*Anchoa mitchilli*), butterfish (*Peprilus triacanthus*), and Atlantic moonfish (*Selene setapinnis*). The fish observed during the survey showed seasonal variation, with no fish species caught during all four survey seasons. The lowest diversity in species was during the winter surveys and highest diversity of species occurred during the summer (Tetra Tech, Inc., 2016).

One Atlantic sturgeon was observed during the nearshore surveys conducted at SUBASE NLON (Tetra Tech, Inc., 2016). The sturgeon was detected using acoustic telemetry as it moved through the estuary for spawning or foraging.

Other species that were observed that are common in Connecticut inshore waters and tributaries include bluefish (*Pomatomus saltatrix*), winter flounder (*Pseudopleuronectes americanus*), summer flounder (*Paralichthys dentatus*), alewife (*Alosa pseudoharengus*), black seabass (*Centropristis striata*), and spotted hake (*Urophycis regia*). A full list of the fish that were observed in SUBASE NLON's nearshore waters is included in Appendix B.

Several species observed during the nearshore survey have designated Essential Fish Habitat (EFH) within the area surveyed off SUBASE NLON. EFH is designated to protect and conserve



Summer

*dentatus*)

flounder (Paralichthys

the waters and substrate necessary to fish, mollusks, and crustaceans for spawning, breeding, feeding, or growth to maturity. The New England Fishery Management Council identifies and defines the EFH for their managed species. When there is EFH in any project area, consultation between the lead federal action agency and NOAA Fisheries may be required as part of any permitting process. The list of these fish species with applicable life stages is shown in Table 3-12.

Species Common Name ( <i>Scientific Name</i> )	Eggs	Larvae	Juveniles	Adults	Spawning Adults	Life Stage Found at SUBASE NLON in 2014/2015
Atlantic butterfish ( <i>Peprilus</i> <i>triacanthus</i> )	M,S	M,S	M,S	M,S		Adult
Atlantic herring ( <i>Clupea</i> <i>harengus</i> )			M,S	M,S		Larvae, Juvenile
Atlantic mackerel (Scomber scombrus)	M,S	M,S	M,S	M,S		Not found
Black sea bass ( <i>Centropristis</i> striata)			M,S			Adult
Bluefish (Pomatomus saltatrix)			M,S	M,S		Juvenile
Little skate ( <i>Leucoraja erinacea</i> )			S	S		Not found
Longfin inshore squid (Doryteuthis pealeii)	S		S	S		Adult
Pollock ( <i>Pollachius</i> virens)			S	S		Not found
Red hake (Urophycis chuss)			M,S	M,S		Not found
Sand tiger shark (Carcharias taurus)		M,S	M,S			Not found
Scup (Stenotomus chrysops)	M,S	M,S	M,S	M,S		Adult
Smooth dogfish <sup>1</sup> (Mustelus canis)		N/A	N/A	N/A		Not found

Table 3-12: Essential Fish Habitat Designations at SUBASE NLON

M,S

M,S

Adult



Species Common Name ( <i>Scientific Name</i> )	Eggs	Larvae	Juveniles	Adults	Spawning Adults	Life Stage Found at SUBASE NLON in 2014/2015
Windowpane flounder (Scophthalmus aquosus)	M,S	M,S	M,S	M,S		Adult
Winter flounder ( <i>Pseudopleuronectes</i> <i>americanus</i> )	M,S	M,S	M,S	M,S		Egg, Post-larvae, Adult
Winter skate ( <i>Leucoraja ocellata</i> )			S	S		Not found

Table 3-12.	Essential I	Fish Hahi	itat Design	ations at	SUBASE	NLON
1 abic 3-12.	Essential I	1511 11au	itat Design	auons at	SUDASE	<b>III</b> OII

Sources: (NOAA Fisheries, Office of Habitat Conservation, 2021; NOAA Fisheries, 1998a,b,c,d, 2011a,b,c; NMFS: Office of Sustainable Fisheries, 2017; NEFMC & NMFS, 2017; Tetra Tech, Inc., 2016).

<sup>1</sup> All life stages are combined in the EFH designation due to insufficient information. Salinity is not provided in the EFH description. F = The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0 < salinity < 0.5 parts per thousand).

M = The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary.

(0.5 < salinity < 25.0 parts per thousand).

N/A = not applicable

S = The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0 parts per thousand).

X = The EFH designation for this species occurs throughout this bay or estuary.

#### 3.3.6.5 Invertebrates

Seven invertebrate species were observed during the nearshore water survey completed in 2016: shrimp (species undetermined), blue crab (*Callinectes sapidus*), mud crab (*Xanthidae* spp.), spider crab (*Libinia emarginata*), hermit crab (*Pagurus pollicaris*), Jonah crab (*Cancer borealis*), and longfin squid (*Doryteuthis pealeii*) (Tetra Tech, Inc., 2016).

No terrestrial invertebrate surveys have been conducted on SUBASE NLON. However, an invertebrate survey project is proposed to address relevant INRMP goals and objectives.

#### 3.3.7 Rare, Threatened, and Endangered Species

One federally-listed endangered species has been observed on SUBASE NLON—the Atlantic sturgeon (Tetra Tech, Inc., 2016). Table 3-13 lists all of the federally listed threatened and endangered species that have the potential to occur in New London County, Connecticut, and which thus could be observed in the future on the installation or adjacent offshore waters. State listed threatened and endangered species and state species of concern that have the potential to occur in New London County are listed in Appendix B.

Atlantic sturgeon occur in marine and estuarine waters along the Atlantic coast from Labrador, Canada, to Cape Canaveral, Florida. Atlantic sturgeon are grouped into several distinct population segments (DPS), including the Gulf of Maine, New York Bight, Chesapeake Bay, South Atlantic, and Carolina DPS. Atlantic sturgeon are present in the waters of Long Island Sound and its adjacent bays and rivers. Adult and sub-adult Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic, Carolina, and Gulf of Maine DPS could all potentially occur in the Thames River and/or along the coast adjacent to AFNRA. All of the



DPSs are federally endangered except for the Gulf of Maine DPS, which is threatened. The main threat to the continued existence of Atlantic sturgeon is bycatch from fisheries and loss of spawning habitat (NOAA Fisheries, n.d.). NOAA Fisheries designated critical habitat for the Atlantic sturgeon in 2017. For the New York Bight DPS in Connecticut, the critical habitat includes the Connecticut River from the Holyoke Dam downstream to where the main stem river discharges at its mouth into Long Island Sound, and the Housatonic River from the Derby Dam downstream to where the main stem discharges at its mouth into Long Island Sound (NMFS, 2017). There is no critical habitat designated for the Atlantic sturgeon in the Thames River.

One Atlantic sturgeon was observed during the nearshore surveys conducted at SUBASE NLON (Tetra Tech, Inc., 2016). The sturgeon was detected using acoustic telemetry as it moved through the estuary for spawning or foraging. NOAA Fisheries indicates that subadult and adult Atlantic sturgeon could occur in the Thames River up to the Yantic Dam in the Yantic River and up to the Greenville Dam in the Shetucket River (NOAA Fisheries, 2021a,d). Since the observation of the Atlantic sturgeon, the Navy and sturgeon researchers have been discussing the potential for additional targeted surveys aimed at better understanding how this species may utilize the nearshore habitat of SUBASE NLON.



## Table 3-13: Federally Listed Threatened and Endangered Species Occurring in New London County, Connecticut

Common Name	Scientific Name	Status
Mammals		
Northern long-eared bat	Myotis septentrionalis	FT, SE
Birds		2
Piping plover	Charadrius melodus	FT, ST
Red knot	Calidris canutus ssp. rufa	FT
Roseate tern	Sterna dougallii	FE, SE
Reptiles and Amphibians		
Sea turtle, Kemp's Ridley	Lepidochelys kempii	FE, SE
Sea turtle, Leatherback	Dermochelys coriacea	FE, SE
Sea turtle, Loggerhead (Northwest Atlantic Ocean DPS)	Caretta caretta	FT, ST
Sea turtle, Green (North Atlantic DPS)	Chelonia mydas	FT, ST
Fish		
Sturgeon, Atlantic (New York Bight, Chesapeake Bay, South Atlantic, and Carolina DPS)	Acipenser oxyrinchus oxyrinchus	FE, SE
Sturgeon, Atlantic (Gulf of Maine DPS)	Acipenser oxyrinchus oxyrinchus	FT, SE
Sturgeon, Shortnose	Acipenser brevirostrum	FE, SE
Plants	-	
Sandplain gerardia	Agalinis acuta	FE, SE
Small whorled pogonia	Isotria medeoloides	FT, SE
Insects		
Monarch Butterfly	Danaus plexippus	FC

Sources: (CT DEEP, 2021d; NOAA, 2021b; USFWS, 2021a).

DPS = Distinct Population Segment

FT = Federally Threatened SE = State Endangered

FC = Federal Candidate

FE = Federally Endangered ST = State Threatened

The shortnose sturgeon (Acipenser brevirostrum), a federally listed endangered anadromous fish, is found in the nearby Connecticut River and in the waters of Long Island Sound. The shortnose sturgeon has not been documented in the Thames River or in the coast adjacent to AFNRA (SUBASE NLON, 2008). However, NOAA Fisheries assumes that adults could be present anywhere in the Thames River from April 1 to November 30 up to the Greenville Dam, which is reflected on the NOAA Fisheries ESA Mapper (NOAA Fisheries, 2021a,c). This assumption is based on documented occurrences of the Atlantic sturgeon in the Thames River. The last formal collecting effort directed at sturgeons in the Thames River occurred in the late 1970s; the effort failed to collect any shortnose sturgeons and only collected a single Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). Since no commercial finfishing is currently occurring in the Thames (it



does support commercial lobster or bivalve fisheries), no supplementary incidental capture information is available for the shortnose sturgeon (SUBASE NLON, 2008). Normal activities at SUBASE NLON should have little to no effect on migration of this species up the Thames River. Major dredging projects, pier modifications, or other activities with the potential to significantly affect river flow or water quality require authorization under Section 7 of the ESA.

As shown in Table 3-13 there are four species of sea turtles listed as threatened or endangered under the ESA that occur in the Thames River: loggerhead, green, Kemp's ridley, and leatherback. These species also occur in the waters and coastal areas of Long Island Sound typically from May 1 to November 30, with the highest concentrations present from June through October. Listed adult turtles may be seasonally present to forage in Long Island Sound, the tidal reach of the Thames River adjacent to SUBASE NLON, and along coastal areas near AFNRA.

The Monarch Butterfly, a federal candidate species, has been observed on SUBASE NLON. The DOD is in the early stages of working with the USFWS on a species action plan (SAP) for pollinators which will be focused on the Monarch Butterfly.

Areas of SUBASE NLON meet the roosting habitat preferences of the federally endangered NLEB. The NLEB uses habitat similar to that preferred by the Indiana bat for summer roosts, though they tend to be less selective in terms of the diameter of roost trees, more variable in the height of the roost above the ground, and generally tend to select roost locations with more canopy cover (Lacki et al., 2009; Timpone et al., 2010). Although potential habitat for the federally endangered Indiana bat is present on the SUBASE, the species has not been documented in the county and is not known to occur (CT DEEP, 2021d). The NLEB is similar to other *Myotis* species, most notably the little brown bat, which occurs on SUBASE NLON. These species are best distinguished from one another through in-hand inspection by trained biologists (for which mist netting is required to capture specimens); it may be possible to differentiate between their vocalizations by manual (qualitative) analysis of recorded acoustic data (USFWS, 2014). Acoustic bat surveys conducted at SUBASE NLON in 2018 did not detect the presence of NLEB or Indiana bat, although seven other species of bat, including the little brown bat, were detected (Tetra Tech, Inc. 2019).

Three state-listed endangered species—the little brown bat, eastern small-footed bat, and tricolored bat—have been documented on SUBASE NLON. Three state-listed species of special concern—the silver-haired bat, eastern red bat, and hoary bat—have been documented on SUBASE NLON. The state-listed species of special concern eastern ribbonsnake (*Thamnophis sauritus*) was identified on Main Base during 2019 herpetofauna surveys. State-listed bird species observed at SUBASE NLON are provided in Table 3-9.

The state-threatened peregrine falcon (*Falco peregrinus*) is known to occasionally pass through southern Connecticut during migration and may be occasional transients in the area of SUBASE NLON. Two additional state-listed species of special concern have the potential to occur on SUBASE NLON: blueback herring (*Alosa aestivalis*) and eastern box turtle (*Terrapene carolina carolina*). No surveys have observed these species, and further surveys are recommended to confirm the presence or absence of these species (SUBASE NLON, 2008).



No threatened or endangered plant species have been confirmed at SUBASE NLON. The most recent survey effort was conducted in 2015 in coordination with invasive species control work at the main installation, AFNRA, and Beaverdam Brook (T. McKenzie, former Natural Resource Manager - Environmental Division SUBASE NLON, 2016, personal communication). A 1996 baseline survey focused on flora and suitable habitat for rare fauna. Early summer efforts primarily focused on the small whorled pogonia (*Isotria medeoloides*), a federally listed orchid that occurs in New London County. No plants were found, and potentially suitable habitat for this species is limited on the installation. Despite the presence of hardwood stands, which often characterize the orchid's habitat, these areas are dominated by rocky outcrops with shallow, xeric soils that generally lack the moisture to support small whorled pogonia populations. There are, however, limited areas of the installation with hardwood stands and acidic, mesic soils that could support the orchid. Potential habitat for a number of state-listed plants is present on the main installation and AFNRA, but no state-listed plants were observed during mid-summer surveys in 1997. White-tailed deer have browsed so heavily on the herbaceous and shrubby plants of the installation that only a few uncommon plant species were observed (SUBASE NLON, 2008).

The Connecticut Natural Diversity Database (NDDB) has previously indicated that a state threatened species, the lesser sand-spurry (*Spergularia canadensis*)—also known as the Canada sand-spurry—was recorded at AFNRA in 1980. A location map and site description for these occurrences was provided by CNDD on May 7, 1997, which clearly shows that the plant was not found on AFNRA property, but was found across U.S. Route 1 on private property (SUBASE NLON, 2008). The lesser sand-spurry is listed by the State of Connecticut as threatened; however, it is not listed federally. In 1993, the CT DEEP conducted a survey of the site where the plant was observed in 1980 in an attempt to relocate it, but the search was unsuccessful. Attempts to relocate this plant in 1996 during preparation of the 2008 Naval Submarine Base New London INRMP were also unsuccessful (SUBASE NLON, 2008). The lesser sand-spurry is an annual that normally colonizes disturbed marsh sites. Little suitable habitat appears to be available within the two tidal pond areas at AFNRA. Erosion can expose substrate suitable for germination of this species at any time; however, erosion does not represent a significant problem at AFNRA and this reduces the likelihood of such an occurrence. The CT DEEP has suggested surveying for this species during July through September.

According to CT DEEP, golden alexanders (*Zizia aptera*), a state endangered species, were historically found in Beaverdam Brook Wetland. However, it has not been surveyed for; suggested months for surveying are June and July (SUBASE NLON, 2008).

## 3.4 ECOSYSTEM SERVICES

An ecosystem is an ecological unit of living organisms, abiotic factors, and their interactions, which are found in a similar environment and influenced by similar processes like fire or flooding (NatureServe, 2008). Ecosystem services are the collective direct and indirect benefits that humans derive from ecological processes and the resultant resources occurring in ecosystems. These include "provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life" (DOD, 2018a). For example, wetlands play a major role in water purification and flood control; forests and coastal wetlands play a major role in carbon sequestration; and bees, butterflies, and



moths pollinate many plants to enable their reproduction, including agricultural crops. Ecosystem services also provide potential economic value and thus present an opportunity to reduce installation costs in grey (or built) infrastructure for things such as stormwater management, drinking water filtration, and storm-surge buffering.

In recognition of the importance of ecosystem services, DODI 4715.03 requires that all DOD natural resources conservation program activities include consideration of ecosystem services to foster their long-term ecological integrity and sustainability (DOD, 2018a). Stewardship of ecological resources (e.g., wetlands, forests, and aquatic resources) on DOD lands through an ecosystem-based management approach protects the ecosystem services associated with these resources.

Conserving, enhancing, and further incorporating ecosystem services into the planning vision of SUBASE NLON and the surrounding region will provide lasting benefits, including support of SUBASE NLON's current and future sustainability and the ability to prevent, or at least minimize, the impacts of encroachment. Furthermore, leveraging ecosystem credits or assets such as wetlands, carbon sequestration, or biodiversity, can provide the flexibility to meet new and changing mission requirements, as well as create natural buffers against development and other encroachment. SUBASE NLON ecosystems services are summarized in Table 3-14.

This INRMP describes several projects in Section 5.1, which directly support the sustainability and restoration of ecosystem services at SUBASE NLON.

Ecological Resources	Ecosystem Services	Military Benefits	Regional Benefits
Nearshore and coastal habitats: Intertidal and shallow tidal waters, beaches, and maritime shrublands	Storm protection Erosion control Biodiversity (e.g., habitat for marine mammals and migratory birds) Habitat corridor Recreation	Buffers installation from storm surges and flooding, thus reducing risk to infrastructure Reduces costs for hardened shoreline protection infrastructure Waterfront recreational opportunities for personnel quality of life	Supports regional biodiversity by protecting habitats for wildlife, pollinators, marine mammals, fish, and shellfish Supports Long Island Sound fish and shellfish industries Provides open space in an otherwise developed landscape
Wetlands and riparian habitats: emergent marshes, shrub swamp	Storm protection Flood control Water retention and purification	Buffers installation from storm surges and flooding, thus reducing risk to infrastructure	Supports regional biodiversity by protecting habitats for wildlife, pollinators, fish, and shellfish

# Table 3-14: Key Ecosystem Services Provided by the Ecological Resources of SUBASE NLON



Ecological Resources	Ecosystem Services	Military Benefits	<b>Regional Benefits</b>
	Absorbs and cleans pollution from stormwater Erosion control Maintains hydrologic cycle Carbon sequestration Biodiversity Habitat corridor Climate regulation	Reduces costs for hardened shoreline protection infrastructure Reduces stormwater management and flood control costs Reduces water treatment costs Reduces pollution prevention costs	Supports Long Island Sound fish and shellfish industries Provides open space in an otherwise developed landscape
Upland habitats: old fields, northern hardwood forests, mixed oak/white pine forests	Absorbs and cleans pollution from stormwater Carbon sequestration Oxygen production Biodiversity Habitat corridor Climate regulation Recreation	Reduces stormwater management costs Reduces water treatment costs Reduces pollution prevention costs Provides lands for hunting deer at the tank farms	Supports regional biodiversity by protecting habitats for wildlife and pollinators Provides open space in an otherwise developed landscape

# Table 3-14: Key Ecosystem Services Provided by the Ecological Resources of SUBASE NLON

## 3.5 CLIMATE

Climate change "refers to any significant change in climate (such as temperature, precipitation, or wind) lasting for decades or longer" (Melillo et al., 2014). According to the U.S. Global Change Research Program, warming of the climate is both "unequivocal" in its occurrence and primarily human-induced (Melillo et al., 2014). Climate change is already affecting U.S. water and land resources and biodiversity, and these effects are expected to be even greater in the next few decades and beyond. Across the U.S., there is clear scientific evidence that the sea level is rising, Atlantic Coast hurricane intensities are increasing, average temperatures are rising, and precipitation is occurring more frequently during heavy, single-day events (USEPA, 2021). These primary effects of climate change (i.e., sea level rise, extreme weather events, and temperature and precipitation changes) are causing impacts on natural resources such as shifts in species' ranges and distributions, changes in phenology, and variations in ecological processes such as drought, fire, and flood (DOD, 2018a).

DODI 4715.03 requires climate change to be addressed in INRMPs to help mitigate potential impacts of climate change on the installation's natural resources. Climate change information for SUBASE NLON and Connecticut is summarized below; a project for a climate change vulnerability assessment and adaptation strategy is described in Chapter 5.



## 3.5.1 Historical and Current Climate Trends

Connecticut's climate historically has been influenced by the interaction between the prevailing westerly winds and the warm moist maritime air from the Caribbean Sea. The seasons have been defined as four distinct seasons throughout the year, with wide daily and seasonal temperature ranges. Precipitation is equally distributed throughout the year with the possibility of extreme weather events (hurricanes, droughts, ice storms, and blizzards) to occur occasionally (CT DEP and Terwilliger, 2005).

The following climate-driven changes have been documented in Connecticut:

*Storms and Flooding*: Currently Groton, Connecticut, receives 50 inches of rain per year (U.S. Climate Data, 2021). Heavy rainfall events have increased 240 percent in the Connecticut River Basin over the past 60 years (Terwilliger 2015). Tropical cyclones in the North Atlantic have increased in intensity (URI Climate Change Collaborative, 2011). Damaging flood and storm events have increased more than 70 percent from 1958 to 2010 in the northeast U.S. (NYSDEC, 2015).

*Sea Level Rise*: A sea level rise of up to 1.5 feet has already been reported in some regions of the northeast U.S. (Terwilliger, 2015).

*Ocean acidification*: The oceans continue to absorb approximately one-third of the atmospheric carbon dioxide, which has resulted in the lowering of global sea water pH. Estimates show the average pH of seawater has declined from 8.19 to 8.05, a 30 percent increase in ocean acidity (Connecticut Department of Energy & Environmental Protection, 2020c). Long Island Sound is a key east coast estuary for marine life, especially shellfish. Ocean acidification can potentially impact shellfish because in more acidic waters shellfish are unable to obtain calcium from the water to develop their shells (CT DEEP, 2020c).

*Air Temperature Extremes*: Weather station observations since 1895 reveal that annual average temperature in Connecticut is currently near 50°F and has already increased from 47°F at the start of the 20th century. Winter temperatures averaged near 26°F at that time and are now almost 30°F. The warmest 10 years on record in Connecticut have occurred since 1990, with half of these since 2010, underscoring a statewide warming of 2.2°F since 1895 (CDEEP & UCONN, 2019).

*Vector-borne Diseases*: Connecticut has the majority of occurrences of Lyme disease in the U.S. There are no definitive conclusions on how climate change has affected the spread of Lyme disease via tick activity. However, there are ongoing studies researching tick activity with regard to climate. Another concern is illness from swimming in local waters; it has been documented that a one-inch rain event increases the risk of contracting a stomach illness (Terwilliger, 2015).

West Nile virus and eastern equine encephalitis (EEE) are diseases spread by the bite of an infected mosquito. West Nile virus is the leading cause of mosquito-borne illness across the U.S. West Nile virus is rare in Connecticut, with an average of eight cases per year (range: 0 to 23) reported since 2000 (CT Public Health, 2020a). EEE is rare in the U.S., averaging seven cases per year. However, approximately one-third of people who become sick from the virus die. Between 2003 and 2018, one case of EEE was reported in Connecticut (CT Public Health,



2020b). Other mosquito-borne illnesses are also reported in Connecticut by people contracting the illnesses while traveling to other regions. These illnesses include dengue, malaria, yellow fever, and Zika virus.

### 3.5.2 Future Climate Change Trends

In regard to the current climate trends in the previous section, following are predictions for how climate change will continue to affect Connecticut's overall weather patterns (Terwilliger, 2015):

*Storms and Flooding*: The average annual precipitation is predicted to increase in Connecticut by 7 to 17 percent, and soil moisture content (percent saturation) will decrease by 1 to 2 percent. A lower percent saturation will increase the risks of flooding after a rainfall event.

*Sea Level Rise*: The most recent estimates conclude that the sea level may rise anywhere between 0.5 meters and 2.0 meters within the next 100 years, depending on the scenario (to see how a 2.0-meter rise would constrain SUBASE NLON, refer to Figure 2-1). In addition to the increase in storms and flooding mentioned above, storm surge will add to current sea level rise trends, possibly causing more damage to habitat and infrastructure. The CT DEEP, USEPA Long Island Sound Study, and the New England Interstate Water Pollution Control Commission applied the "sea level affecting marshes models" (SLAMM) to Connecticut's coastline and concluded that 50 to 90 percent of high marsh or irregularly flooded marsh will be lost within the next 100 years.

*Air Temperature Extremes*: The annual mean temperature in Connecticut is expected to rise by  $5^{\circ}F$  by mid-century and  $8^{\circ}F$  by late-century. Seasonal average temperatures for all regions in the state are also expected to increase, with the greatest increase occurring in summer (June through August,  $+6^{\circ}F$ ) by mid-century and fall (September through November,  $+10^{\circ}F$ ) by late century (Anji et al., 2019). In addition to the average annual air temperature, the number of extreme heat days (> 90°F) will increase 100 to 200 percent, depending on the emission scenario. The annual number of freeze days (< 32°F) will decrease by 20 to 30 percent (Terwilliger, 2015).

*Vector-borne Diseases*: It is predicted that an increase in precipitation and flooding will cause an increase in waterborne diseases in residents through swimming or by coming in contact with contaminated water some other way (Terwilliger, 2015). Higher global temperatures could enhance the transmission of mosquito-borne illnesses and extend the geographic ranges of those illnesses (Rocklöv and Dubrow, 2020).

## 3.5.3 Ecological Impacts of Climate Change

Overall ecological impacts on Connecticut due to climate change include impacts on species, habitats, ecosystems, and ecological processes.

Long Island Sound: In Long Island Sound, changes are predicted to affect physical features (water temperature or pH), habitat (flooding of coastal marshes), or species abundance, distribution, and diversity. For example it has been recently recorded that a manatee (*Trichechus* spp.), which are normally a southern Atlantic ranging species, was spotted in Long Island Sound. Numerous tropical fish species such as parrot fish (*Scaridae* spp.), lookdown (*Selene vomer*), and an ocean sunfish (*Mola mola*) (Pagach & Barrett, 2010) have also been observed. Also, in 2015, a trio of young beluga whales (*Delphinapterus leucas*) was spotted in Long Island Sound during



the summer, when beluga whales regularly span a range from the northern Atlantic to the Arctic (Long Island Press, 2015).

*Fisheries and Shellfish*: Regionally, it has been predicted that, with increased warming, the distribution of American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), Atlantic mackerel (*Scomber scombrus*), American plaice (*Hippoglossoides platessoides*), American lobster (*Homarus americanus*), and winter flounder (*Pseudopleuronectes americanus*) will shift to the north. Blue crab (*Callinectes sapidus*), Atlantic menhaden (*Brevoortia tyrannus*), and striped bass (*Morone saxatilis*), typically more southern along the Atlantic Coast in their distribution, may increase in the Northeast. If sea level rise results in less acreage of saltwater marshes, productivity of fish and shellfish species will decline due to reduced nursery and foraging habitats. With increasing ocean acidification, less dissolved carbon may be available for shellfish to utilize in shell production; however, the impacts of acidification may be dissimilar among species (Heffner et al., 2012; RI CRMC, 2010).

*Wildlife Species*: Research on climate change's impacts on bats is in its early stages, but changing climates may cause bat species, such as the little brown bat, to shift their distribution northward (Parham, 2011). Birds, bats, and pollinators may experience asynchronous phenology with their prey and forage-base species (e.g., spring arrival for some migratory bird species may occur earlier than the emergence of their prey insects (Heffner et al., 2012; RI CRMC, 2010).

*Invasive Species*: Temperature and precipitation changes are projected to stress native species, leaving them more vulnerable to competition from invasive species. Warming temperatures may result in more southern invasive species expanding northward, likely causing invasive species management to be a continuing challenge for the region. Similarly, native species from historically warmer adjacent regions are likely to expand ranges into areas there were previously climate-prohibitive with warming temperatures.

*Diseases*: Vector-borne diseases, such as those carried by ticks and mosquitoes, may increase while diseases common to fish, shellfish, and marine plants in southern waters will move northward.

#### 3.5.4 Implications for Natural Resource Management

Adaptation strategies for SUBASE NLON can focus on promoting climate change resiliency to enable natural resources sustainability. Adaptation strategies can include the following types, as examples:

*Decrease Stressors*: Decrease other stressors that negatively affect at-risk species, priority habitats, and the Long Island Sound. Example stressors include invasive species, disease vectors, polluted runoff, and future development of remaining natural areas and open space.

*Restore Habitat*: Continue to restore priority habitats and ecosystems including habitat for at-risk species. Undertake restoration, creation, and enhancement of wetlands and other natural habitats that are most threatened by climate change. Stabilize stream banks and restore riparian forest habitats to decrease sediment and nutrient loads into Long Island Sound.



*Education and Outreach*: Educate SUBASE NLON personnel on the threat climate change poses to natural resources and resulting impacts on property, structures, and infrastructure.

A climate change vulnerability assessment project, as described in Chapter 5, for SUBASE NLON will provide a detailed analysis of installation natural resources that are at-risk from climate change. This vulnerability assessment can then be used to devise installation-specific climate adaptation strategies.

## 3.6 PARTNERSHIPS AND COLLABORATION

Effective communication among natural resource personnel is vital for ensuring that management efforts are implemented as planned under the INRMP. An ecosystem approach to natural resources management requires managers to look beyond site boundaries to non-DOD partners. Many agencies, organizations, and other institutions can assist in implementing an INRMP; thus, local and regional partnerships should be encouraged. Both DOD and Navy policy call for installations to pursue partnerships to facilitate the implementation of the natural resources initiatives presented in this INRMP. Installations can enter into cooperative agreements with other federal agencies, states, local governments, NGOs, and individuals for a variety of reasons such as biological inventories, monitoring, research, minor construction and maintenance, public outreach and education, natural resources program support, or conservation law enforcement. Navy installations are encouraged to use partnerships and volunteers to complete projects under the direction and supervision of Navy NRMs when such relationships could assist by improving efficiency and/or cost-effectiveness or could serve to build partnerships. The use of volunteers must be in accordance with DODI 1100.21, Voluntary Services in the Department of Defense (DOD, 2019a). Table 3-15 discusses potential agencies and organizations that could provide support with INRMP implementation.

Partner	Support They Can Provide
	DOD/Navy
Chief of Naval Operations Energy and Environmental Readiness Division [CNO (N45)]	Navy's principal leader and overall program manager for Natural Resources matters. The CNO (N45) works to ensure that there are sufficient resources to establish a NRP that is consistent with legislative requirements and DOD policy. The CNO also provides policy needed to establish a sufficient NRP. The CNO (N45) coordinates Navy NRPs with relevant federal agencies, military services, and environmental organizations (Navy, 2019).
Commander, Navy Region Mid-Atlantic (CNRMA)	Regional command for all Navy installations and facilities along the eastern seaboard from Maine to North Carolina and west to Indiana and Illinois, except for installations in the Washington, D.C., area. The regional commander promotes and coordinates INRMP implementation with the appropriate Budget Services Office and Engineering Field Division. CNRMA works to educate Navy employees about how to reduce environmental impacts and helps foster communication throughout the various levels of Navy

<b>Table 3-15: Potential Partnerships for</b>	<b>INRMP Implementation</b>
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Partner	Support They Can Provide
	organization about environmental commitments and performance (Navy, 2021a). CNRMA also serves as a resource for SUBASE NLON for guidance on how to comply with new and existing environmental legislation, regulations, and guidelines (Navy, 2019).
U.S. Coast Guard (USCG)	The USCG is committed to protecting the public, the environment, and U.S. economic interests in the nation's ports and waterways, along the coast, on international waters, or in any maritime region, as required, to support national security. The Marine Environmental Protection Program's work includes efforts to prevent the introduction of invasive species into the marine environment, stop ocean dumping, and prevent oil and chemical spills. The USCG also acts as the "Federal On-Scene Coordinator" for oil and hazardous substance incidents in coastal areas.
Commander, Naval Facilities Engineering and Systems Command (NAVFAC CO)	The NAVFAC CO serves as the Navy Natural Resources Technical Program Manager. As such, he or she must ensure proper stewardship of Navy natural resources and compliance with corresponding laws and regulations. The NAVFAC CO may assist SUBASE NLON in implementing this INRMP by planning Navy-wide Natural Resources Conferences; evaluating new methods, policies, technologies, and procedures for natural resources management; and providing technical guidance for developing cooperative agreements to implement natural resource plans (Navy, 2021a).
DOD Legacy Resource Management Program	The DOD Legacy Resources Management Program was created by Congress to fund natural and cultural resources management projects that may otherwise go unfunded. The Legacy Program seeks projects that further conservation goals while also supporting military mission sustainment. Legacy funds may be requested annually in accordance with instructions provided by the Office of the Deputy Under Secretary of Defense for Installations and Environment and the Office of the Deputy Assistant Secretary of Navy, Environment.
Strategic Environmental Research and Development Program (SERDP)	The SERDP is an environmental research program that is planned and executed through a partnership between the DOD, the Department of Energy, and USEPA. SERDP funds research that pursues solutions to the DOD's environmental challenges. One of the SERDP focus areas is Resource Conservation and Climate Change, which has a particular interest in understanding ecological systems on DOD lands, assessing the impact of training on protected species, and understanding ecological impacts of climate change, among other things. Research funded by the SERDP program may be of interest to SUBASE NLON and NSA Saratoga Springs



Partner	Support They Can Provide	
	(Appendix D). In addition, SUBASE NLON potentially could serve as a host for SERDP-funded investigations.	
DOD Partners in Flight (PIF)	It is DOD policy to promote and support the PIF initiative, which protects and conserves neotropical migratory birds and their habitat. The DOD and its Services support PIF by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on their lands, consistent with military missions. PIF includes national working groups to deal with local and regional problems. SUBASE NLON can coordinate with, and seek assistance from, the PIF Northeast Working Group to manage particular migratory bird species on the installation.	
DOD Partners in Amphibian and Reptile Conservation (PARC)	DOD PARC provides a network through which the DOD can work to avoid future mission restrictions while providing stewardship for threatened and endangered herpetofauna. DOD PARC focuses on habitat and species management; inventory, research, and monitoring; and education, outreach, and training. It provides a framework for the effective management of amphibians and reptiles by the military Services and their installations. DOD PARC's primary responsibility is to ensure that the DOD has the operational and logistical flexibility necessary for testing and training exercises.	
Other Federal Agencies and Programs		
U.S. Fish and Wildlife Service (USFWS)	The mission of the USFWS is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The USFWS implements key conservation statutes, including the ESA, MBTA, and the Sikes Act. Naval installations must consult with the USFWS when preparing INRMPs. The USFWS office with responsibility for SUBASE NLON and NSA Saratoga is the New England Field Office located in Concord, New Hampshire. The USFWS operates 21 coastal programs throughout the U.S., including the Southern New England–New York Bight Coastal Program, which is located in Charlestown, Rhode Island. These USFWS offices may provide technical expertise and assistance in implementing this INRMP.	
National Oceanic and Atmospheric Administration (NOAA)	The mission of NOAA is to understand and predict changes in climate, weather, ocean, and coasts; share that knowledge and information with others; and conserve and manage coastal and marine ecosystems and resources. The agency holds key leadership roles in shaping international ocean, fisheries, climate, space, and weather policies. NOAA can provide technical assistance to support SUBASE NLON in	



Partner	Support They Can Provide
	understanding coastal interactions and the effects of climate change.
U.S. Environmental Protection Agency (USEPA)	The USEPA leads the nation's environmental science, research, education, and assessment efforts. The agency's mission is to protect human health and the environment through a variety of activities, such as regulating water and air pollution and overseeing cleanup of contaminant spills. Its activities include developing and enforcing environmental regulations; providing financial assistance to state environmental programs, nonprofits, and educational institutions; performing environmental research at laboratories located nationwide; sponsoring voluntary partnerships and programs; and providing environmental education.
U.S. Army Corps of Engineers (USACE)	The mission of the USACE is to deliver public and military engineering services, partner in peace and war to maintain U.S. security, energize the economy, and reduce risks from disasters. The New England District of the USACE is responsible for work in Connecticut, while the New York District oversees work in New York. The USACE conducts environmental remediation; flood damage control; natural resource management; streambank and shoreline protection; and navigation maintenance and improvements, including dredging and disaster assistance. The USACE can provide engineering and construction support to SUBASE NLON and can also serve as a technical advisor for environmental restoration and other projects. In addition, SUBASE NLON has the option to gain access to USACE organizations, such as the Waterways Experiment Station and the Construction Engineering Research Laboratory, for technical assistance and support for natural resources projects.
USDA, Natural Resources Conservation Service (NRCS)	The NRCS assists in the protection and conservation of soil resources throughout the United States and could help SUBASE NLON manage and conserve its soils.
U.S. Geological Survey (USGS)	The USGS is a multidisciplinary organization that provides scientific information on biology, geography, geology, geospatial information, and water to minimize damage from natural disasters and manage the nation's water, biological, energy, and mineral resources. The USGS could assist SUBASE NLON by helping design biological, water quality, and hydrologic surveys and by facilitating the integration of SUBASE NLON data into national or regional databases. For example, the USGS has an invasive species program that provides methodologies and information to manage and prevent species invasions. The USGS also houses the National Climate Change and Wildlife Science Center, whose



Partner	Support They Can Provide	
	mission is to provide NRMs with the scientific tools and information they need to address the impacts of climate change on fish and wildlife, and their habitats. As part of this mission, the center offers a series of webinars geared toward NRMs related to climate and wildlife.	
U.S. Department of Agriculture (USDA)	The USDA's mission is to provide leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on sound public policy, the best available science, and efficient management. The USDA Agricultural Research Service Foreign Plant Disease and Weed Science Research Unit could provide technical assistance to SUBASE NLON with invasive species management and eradication. The Natural Resources Conservation Service (NRCS) serves as the USDA's conservation agency, assists in the protection and conservation of soil resources throughout the U.S., and could help SUBASE NLON manage and conserve its soils. The Animal and Plant Health Inspection Service (APHIS) is the USDA's lead agency for collaboration with other agencies to protect U.S. agriculture from invasive pests and diseases. APHIS provides support to SUBASE NLON in the management of the existing non-migratory Canada goose population.	
State Agencies		
CT DEEP	CT DEEP works to preserve the quality of Connecticut's environment, maintain the health and safety of Connecticut residents, and protect the natural systems upon which life depends. The Sikes Act requires that installations consult with the state fish and wildlife agency when preparing an INRMP. For SUBASE NLON, the appropriate state agency is the CT DEEP. CT DEEP can support SUBASE NLON's INRMP implementation through the programs established under the Wildlife Management and Land & Water Resources Divisions.	
Connecticut Agricultural Experiment Station (CAES)	The CAES's mission includes improving environmental quality, protecting plants, and enhancing human health (CAES, 2021). Its programs range from soil testing to invasive species surveys. SUBASE NLON has partnered with the CAES in the past for mosquito surveillance (Schibell, 2013).	
New York State Department of Environmental Conservation (NYSDEC)	NYSDEC's mission is to conserve, improve and protect New York's natural resources and environment and to prevent, abate, and control water, land, and air pollution to enhance the health, safety, and welfare of the people of the state and their overall economic and social well being.	

Partner	Support They Can Provide
	NYSDEC provides support to NSA Saratoga Springs in Saratoga Springs, NY, for applicable state environmental laws, regulations, and environmental permits related to wildlife, wetlands, water withdrawal, discharges, stormwater, and water and sewage treatment.
Regi	onal and Local Agencies
Thames River Basin Partnership	The Thames River Basin Partnership is a voluntary, cooperative effort to share resources and develop a regional approach to resource protection that grew out of locally led workshops held by the region's Soil and Water Conservation Districts. Its mission is to protect the region's agricultural and natural areas that are being threatened by land use changes.
Save the Sound	The mission of Save the Sound is to protect and improve the land, air, and water of Connecticut and Long Island Sound. Save the Sound works with Connecticut and New York to fight climate change, save endangered lands, protect the Sound and its rivers, and work with nature to restore ecosystems. SUBASE NLON is only 6 miles north of Long Island Sound.
Co	lleges and Universities
University of Connecticut (UCONN) Connecticut College (Conn College) Yale University Connecticut State University system (Southern) University of Rhode Island	The UCONN, including the UCONN Avery Point Campus, as well as Yale University, Conn College, and University of Rhode Island (URI), are all located in proximity to SUBASE NLON. Each of these universities hosts robust environmental and engineering research programs and could potentially offer technical assistance in natural resources management activities. The Connecticut Sea Grant is hosted through UCONN and the Rhode Island Sea Grant is housed within the URI School of Oceanography. Both are part of the National Sea Grant College Program within NOAA, and they support research and education related to coastal ecosystems. UCONN Avery Point hosts numerous marine sciences programs, and URI is the host for the North Atlantic Cooperative Ecosystem Studies Unit, which is a partnership among federal agencies (including the DOD) and northeastern universities that provide research, technical assistance, and education with respect to the North Atlantic Coast. There may be opportunities for university researchers to conduct investigations on, or near, SUBASE NLON, which could help shed light on the condition of the installation's natural resources. This potentially could be funded through the DOD's SERDP, which funds research to solve the DOD's environmental challenges.



	<b>Table 3-15:</b>	Potential	Partnership	s for	<b>INRMP</b>	Implementation
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Partner	Support They Can Provide
Nongoveri	nmental Organizations (NGO)
The Nature Conservancy Audubon Society Connecticut Association of Conservation and Inland Wetland Commissions Connecticut Association of Conservation Districts Connecticut Botanical Society	There are many NGOs operating in the vicinity of SUBASE NLON that are dedicated to conserving natural resources in Connecticut, some of which are listed here. NGOs potentially can provide technical expertise, as well as funding and volunteers, to carry out management and restoration activities.

## **3.7 PUBLIC ACCESS AND OUTREACH**

## 3.7.1 Public Access and Outdoor Recreation

Although provision of public access is addressed in the Sikes Act, security concerns in the aftermath of 11 September 2001 ("September 11th") have greatly restricted public access on DOD facilities. Access to SUBASE NLON outdoor recreation facilities is restricted to authorized personnel, which includes active duty military personnel and their dependents, DOD civilian employees at SUBASE NLON and their dependents, active duty reservists at SUBASE NLON and their dependents, DOD contract support employees at SUBASE NLON, and retired military personnel. Outdoor recreation opportunities available include boating, swimming, recreational fishing, and bow-hunting. Recreational opportunities are described in more detail in Section 4.9. Access requests for natural-resources-related events taking place at a SUBASE NLON facility are coordinated through the SUBASE NLON NRM.

## 3.7.2 Public Outreach and Environmental Education

The Public Affairs Office is responsible for publicizing SUBASE NLON stewardship activities within the local community. Outreach vehicles include newsletters, TV channels, and the SUBASE NLON websites. Outreach to the public outside of the local community is accomplished via partnering on natural resources projects both inside and outside the installation boundary (e.g., SAV monitoring) and making natural resources information available to interested agencies (i.e., USFWS and CT DEEP). Outreach is also accomplished through demonstration projects involving volunteer groups and dissemination of information brochures about natural resources. Although public access to the installation is restricted for national security reasons, the NRM participates in public outreach events, when feasible.

This INRMP includes projects for additional public outreach events and activities, including continuing Earth Day and other volunteer-oriented events (e.g., National Public Lands Day), to support habitat enhancement and restoration projects. The installation will consider partnering with the installation tenants, agencies and NGOs, Boy Scouts and Girl Scouts, and nearby schools to accomplish these projects. Refer to Chapter 5, *Project Descriptions,* for more details.

## **3.8** STATE WILDLIFE ACTION PLAN AND USFWS CONSERVATION STRATEGY

Congress created a State Wildlife Grants (SWG) program in 2000 to fund actions and programs that benefit wildlife and their habitats in order to conserve declining species before they become threatened or endangered. Priority is placed on projects that benefit species of greatest conservation need (GCN). To be eligible for funding under the SWG program, a state must develop a Wildlife Action Plan (WAP). WAPs present an assessment of the health of wildlife and habitats within a state, identifies the problems they face, and outlines conservation actions.

In the August 2006 memorandum that provided the DOD's official INRMP template, the DOD identified the incorporation of WAPs into INRMPs, and vice versa, as a critical element of the environmental management strategy and mission sustainability. During the development of its WAP, the State of Connecticut solicited input from multiple federal, state, and local partners. The DOD is listed as one of the federal partners.

Connecticut's first WAP was approved by the USFWS in 2006, and the subsequent revised WAP was approved by the USFWS in 2015 (CT DEEP, 2016a). Connecticut's WAP establishes a framework for proactively conserving fish and wildlife, including their habitats, and the current WAP covers the decade spanning from 2015 through 2025. The WAP outlines the species of GCN in Connecticut, and their key habitats, problems, research needs, and conservation actions, as well as how the CT DEEP will monitor the effectiveness of the plan, coordinate with conservation partners, and foster public participation in wildlife conservation efforts (Terwilliger, 2015). Actions that are directly relevant to SUBASE NLON address the following:

- Conduct surveys of declining GCN species.
- Investigate the effects of climate change on GCN species.
- Manage and restore habitats for native pollinators. Specifically, identify and map areas where migration stopover habitats for native pollinator species can be established or restored.
- Determine the extent and importance of seasonal use of the estuary and Long Island Sound by sturgeon populations.
- Conserve and increase New England cottontails and their habitats.
- Implement wetland restoration and enhancement projects that benefit GCN species.

State WAPs are intended to address emerging issues in coordination with the USFWS Regional Offices, rather than just through a formal revision and review process. Engaging partners in WAP revisions (such as the DOD) can be an important step in promoting future support in state WAP projects and initiatives. In addition, aligning various conservation planning platforms within the state or region (for example, with the INRMP as mentioned above, or with USFWS Landscape Conservation Cooperatives [LCCs]) can create occasions to share information, coordinate actions and initiatives, and to conserve habitats. SUBASE NLON is located within the North Atlantic LCC, which guides conservation actions in the North Atlantic Region.


# 4.0 NATURAL RESOURCES PROGRAM OVERVIEW

This section provides detailed information on the primary natural resources management program elements identified for SUBASE NLON. Specific projects and actions have been developed that will assist the installation in meeting the established goals and objectives.

# 4.1 WATER RESOURCES MANAGEMENT

Water resources support diverse functions important to both natural ecosystems and human natural resource needs. Many federal, state, and local laws have been enacted to protect water resources and their various important functions, including, but not limited to, the following:

- Executive Order (EO) 11988, Floodplain Management
- EO 11990, Protection of Wetlands
- NOAA Coastal Zone Management Program Development and Approval Regulations (15 CFR 923)
- Federal Consistency with Approved Coastal Management Programs, (15 CFR 930)
- Sections 303 and 404 of the Clean Water Act
- Rivers and Harbors Act (Section 10 Regulatory Program) (33 CFR 320-330)
- Connecticut Coastal Management Act, Connecticut General Statutes Sec. 22a-90 et seq
- Connecticut Tidal Wetlands Act, Connecticut General Statutes Sec. 22a-28 et seq
- Connecticut Harbor Management Act, Connecticut General Statutes Sec. 22a-113k et seq

The following sections describe the direct and indirect management of water resources at SUBASE NLON and provide management actions that address the specific set of issues that occur at the installation.

# 4.1.1 Surface Water

The term "surface waters" encompasses the rivers, streams, lakes, estuaries, and oceans in a region. Surface waters and runoff from the main installation flow into the Thames River, Beaverdam Brook wetland drains into the Groton Reservoir, and AFNRA surface water contributes to Quanaduck Cove and, ultimately, Stonington Harbor. Stormwater runoff and component sediments, nutrients, and contaminants can adversely affect the water quality and biological capacity of water bodies. The implementation of BMPs at SUBASE NLON can help minimize or reverse any negative impacts associated with runoff from the installation and associated properties.

The CT DEEP enforces Connecticut's Water Quality Standards to preserve and enhance the quality of the state's surface waters as it pertains to the protection of wildlife, fish and shellfish harvesting; recreation; public water needs; and agricultural, industrial, and other purposes (*CT Water Quality Standards*, 2015). These water quality standards include a number of physical and biological criteria with defined acceptable limits to ensure the support of these resource needs, including the following:

- aesthetics
- dissolved oxygen
- sludge deposits

#### **CHAPTER 4.0 – NATURAL RESOURCES PROGRAM OVERVIEW**



Naval Submarine Base New London

- color
- suspended solids
- sediment deposits
- secchi disk transparency (turbidity)
- indicator bacteria
- taste and odor
- pH
- allowable temperature increase
- chemical constituents
- nutrients (phosphorous and nitrogen)
- sodium
- biological condition

The CT DEEP maintains Connecticut's water quality data for applicable surface waters, which are used to determine levels of impairment and management strategies. Impaired waters may require a total maximum daily load (TMDL) determination. Three impaired water bodies are adjacent to SUBASE NLON properties, as described in Table 4-1 (USEPA, 2020).

Site Name	Waterbody ID	Designated Use Impairments	Cause of Impairment	State TMDL Status
LIS EB Inner - Thames River (middle), Ledyard	CT-E1_015-SB	Aquatic life, recreation, shellfish harvesting	degraded aquatic life, oxygen depletion, bacteria and other microbes (pathogens)	TMDL needed
Flat Brook (Ledyard)- 01	CT3000-08_01	recreation	Escherichia Coli (E. coli)	TMDL completed 2012
LIS EB Inner - Inner Stonington Harbor, Stonington	CT-E1_005	shellfish harvesting	fecal coliform	TMDL completed 2013

Table 4-1: USEPA Impaired Waters (303d) Adjacent to SUBASE NLON

Source: (USEPA, 2020; CT DEEP, 2020d).

Connecticut completed a Statewide Bacteria TMDL covering 176 impaired segments listed on the 2010 Impaired Waters (303[d]) List for bacterial impairments to recreational or shellfish harvesting uses. This TMDL, which the USEPA approved in September 2012, has detailed subregional appendices, some of which the USEPA approved in September 2013 as final TMDLs. Included among these is the September 2013 appendix for Estuary 12: Stonington, which includes impaired segment CT-E1\_005, or Quanaduck Cove (CT DEEP, 2020d). The approval of this appendix reclassified segment CT-E1\_005 from USEPA Category 5 (needing



TMDL) to USEPA Category 4A, indicating that the TMDL is complete. The TMDL for Flat Brook was also included in the Statewide Bacteria TMDL and was approved in 2012.

The section of the Thames River that serves as the primary receiving water for SUBASE NLON and its stormwater conveyance system is designated as impaired for degraded aquatic life, oxygen depletion, fecal coliform, and enterococcus bacteria. Although the CT DEEP has not yet established TMDLs for these indicator pollutants, SUBASE NLON is required to conduct annual monitoring for them per Section 303(d) requirements. If these pollutants are found to be in excess of regulatory water quality standards, the installation will undertake further investigative actions and corrective actions as described in the SWPPP (AH/BC Navy JV, LLC, 2021).

SUBASE NLON implements erosion and sediment control, stormwater pollution prevention, stormwater management, and hazardous waste management programs described below to protect surface waters in the vicinity and associated wetlands from degradation.

## 4.1.1.1 Stormwater Management

A variety of land uses including agriculture, forestry, land use conversion, and existing impermeable or semi-permeable land covers can contribute nonpoint source (NPS) pollution into local water bodies. During storm events, stormwater runoff moving across the land can accumulate and transport a variety of contaminants and sediment. Common NPS pollutants include nutrients, sediments, pesticides, petrochemicals, and a variety of toxic chemicals. Land uses and land management activities that remove or reduce the vegetation from an area increase the susceptibility of soils to erosion. Land uses with impervious or semi-pervious land cover can increase stormwater runoff volumes and velocities, contributing to increased erosion of streambanks receiving these stormwater flows. Stormwater transport of eroded soils can lead to excessive sedimentation in receiving waterways, often adversely affecting aquatic species and habitats. Sediments can also be contaminated with other pollutants (e.g., pesticides), resulting in contamination of the habitats in which they are deposited.

Much of the stormwater originating on the SUBASE NLON main installation flows westerly through the installation's stormwater conveyance system into the Thames River. The system is designed to direct and collect stormwater according to stormwater engineering BMPs, including the minimization of overland flow volumes and velocities. Proper placement of drainage structures helps reduce erosion and flooding potential (AH/BC Navy JV, LLC, 2021).

Stormwater management at SUBASE NLON is permitted/monitored under a State of Connecticut permit, *General Permit for the Discharge of Stormwater Associated with Industrial Activity*, issued by the CT DEEP. The latest version of the permit was reissued in October 2021 (CT DEEP, 2021e). The General Permit (GP) covers all point source stormwater discharges (i.e., stormwater outfalls) associated with specified industrial activities at the installation. It further requires SUBASE NLON to periodically assess stormwater quality and reduce or eliminate pollutant discharge through proactive management activities. To this end, SUBASE NLON maintains the SWPPP, last updated in January 2021 (AH/BC Navy JV, LLC., 2021). The ED Stormwater Program Manager, not the NRM, oversees implementation of the SWPPP at SUBASE NLON.



There are 28 stormwater outfalls at SUBASE NLON that discharge runoff from SWPPPregulated areas to the Thames River or its tributaries. These outfalls must continue to be monitored according to GP requirements. The GP does allow benchmark, or representative, monitoring locations when two or more outfalls are found to be substantially similar based on effluent or physical site characteristics. Of the 28 outfalls on the site, SUBASE NLON monitors eight as benchmark outfalls. Semiannual monitoring results are used to determine if modifications or new control measures are required to meet permit benchmarks. They are further used to assess the adequacy of the permit conditions when it comes time for permit renewal (AH/BC Navy JV, LLC, 2021). In 2017 CT DEEP issued a new GP, *General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems* (MS4 GP) (CT DEEP, 2016b). This permit extends MS4 GP coverage to institutions such as universities and federal facilities that are located in urbanized areas, including SUBASE NLON. In addition to the industrial general permit, SUBASENLON must comply with the MS4 GP requirements and the associated Stormwater Management Plan (AH/BC Navy JV, LLC, 2021).

# 4.1.1.2 Soil Erosion and Sediment Control

Erosion and sediment control is an important natural resource management consideration at SUBASE NLON. SUBASE NLON implements erosion and sediment control (E&SC) measures for ground disturbing activities in accordance with Section 5(c)(2)(I) of the *General Permit for the Discharge of Stormwater Associated with Industrial Activity* (CT DEEP, 2021e). The GP further stipulates that the installation adhere to E&SC requirements outlined in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control and the *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities* (CT Council on Soil and Water Conservation, 2002; CT DEEP, 2020e). The installation further adheres to the 2004 Connecticut Stormwater Quality Manual when designing post-construction stormwater management measures to reduce erosion and sedimentation resulting from new impervious surface construction (CT DEP, 2004). Compliance with these requirements is monitored by the ED Stormwater Program Manager.

A 2008 survey of SUBASE NLON and its outlying properties identified 14 specific sites where erosion problems exist. These sites only occurred on the Main Base. Erosion control projects have been implemented to reduce erosion and sedimentation at these sites. These measures include the installation of E&SC BMPs, such as slope stabilization measures, re-vegetation, and swale construction.

The following additional E&SC management actions are recommended:

• Conduct erosion surveys and implement control projects across the installation to improve stormwater drainage system. Recommendations for development of soil erosion and sediment control plans should be followed according to the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (CT Council on Soil and Water Conservation, 2002).



#### 4.1.2 Wetlands

Pursuant to Section 404 of the CWA, the military is responsible for identifying and locating jurisdictional waters of the U.S. that may be affected by installation activities, including jurisdictional wetlands (USEPA, n.d.[a]). New development, water conveyance infrastructure, and grading or fill activities have the potential to adversely affect wetlands. Certain actions expected to have a minimal adverse impact on jurisdictional waters may qualify for a GP by the USACE New England District. The GP Program was designed to streamline the Section 404 permitting process, and includes 'maintenance activities' such as repairing, rehabilitating, or replacing existing structures or removing accumulated fill or debris around existing structures. Aquatic habitat restoration, establishment, or enhancement projects may also qualify under a GP.

State review of actions in federal jurisdictional wetlands is afforded under Section 401 of the CWA. Section 401 provides states a tool to help protect the water quality of these waters in their borders. A federal agency may not issue a permit to conduct any activity that may result in a discharge to waters of the U.S. unless a Section 401 water quality certification is issued, or certification is waived.

When USACE Civil Works projects or their associated lands may be used or altered by another party, these actions are subject to the approval of the USACE. This requirement is established in Section 14 of the River and Harbors Act of 1899 (RHA) and codified as 33 USC 408 (Section 408). Section 408 provides that the USACE may grant permission to alter a Civil Works project upon reaching a determination that the alteration proposed will not be injurious to the public interest and will not impact the usefulness of the Civil Works project.

Wetland maps included in Section 3.3.4.1 are for illustrative and planning purposes. Any qualifying ground-disturbing activities that are reasonably expected to affect any jurisdictional waters or wetlands would require consultation in the form of the following:

- a federal consistency review with the CT DEEP for coastal wetlands within the designated coastal zones to ensure consistency with *Connecticut Coastal Management Act* (CCMA) requirements (*Connecticut General Statutes*, 1972);
- a Section 408 review and permission through the USACE for projects that alter or occupy USACE Civil Works projects or their associated lands;
- a Section 401 Water Quality Certification with the CT DEEP permit; and
- a RHA Section 10 and/or a CWA Section 10/404 permit with the USACE.

The following wetlands management projects are recommended for SUBASE NLON:

- Conduct a base-wide wetland inventory to support resource accounting, management, and future projects planning across SU BASE NLON. The inventory should include delineation and jurisdictional determination of wetlands and additional regulated aquatic resources to provide refreshed clarity of resource locations and quantities.
- Evaluate the condition of wetlands, and prioritize areas in need of wetlands restoration. The condition of wetlands will be evaluated to identify habitat areas that are in need of restoration. The condition of wetlands will be assessed based on criteria such as



presence/density of invasive species, hydrologic function, human-made materials (e.g., culverts), pollution, and loss of acreage.

- Develop a Wetlands Restoration Plan. The Wetland Restoration Plan document will outline various conservation measures, mitigation techniques, and restoration activities that will enhance wetland health and function across SUBASE NLON.
- Wetland Restoration Plan Implementation. Restoration of wetlands will follow the Wetland Restoration Plan and will result in a multitude of ecological benefits, including water quality improvement, habitat for native flora and fauna, sequestration of carbon, and absorption of floodwaters. Wetlands in need of restoration will be identified by the findings of the jurisdictional wetlands delineation and the wetlands condition assessment. The SUBASE NLON wetlands capture stormwater runoff from developed lands. Establishing native vegetation within installation wetlands will improve existing wetland functions and prevent establishment of invasive species (e.g., *Phragmites*).

# 4.1.3 Floodplain Management

Floodplains receive protection through EO 11988, Floodplain Management, which directs federal agencies to reduce the risk of flood loss by not constructing in floodplains and to restore and preserve the natural and beneficial values served by floodplains (Carter, 1977). Properly managed floodplains provide several important functions, including the ability to detain floodwaters, trap sediment, remove excess nutrient loads, and filter a variety of chemical contaminants.

Figure 3-10 and Figure 3-11 show the FEMA-designated floodplain areas at the main installation, housing areas, and AFNRA. There are fairly extensive areas of 100-year and 500-year flood hazard areas, or areas that have a 0.1 and 0.2 percent (respectively) annual likelihood of inundation based on historical flood records. These moderate flood hazard areas may factor into siting decisions but are not subject to specific requirements under EO 11988. Flood zones on the installation may change with climate change, in particular with sea level rise and a superimposed storm surge from extreme storms. As flood zones expand and shift landward, areas that are currently determined to have a low-to-moderate flood risk may be subject to flood-related regulations and siting requirements in the future.

# 4.2 COASTAL AND MARINE MANAGEMENT

The coastal areas of SUBASE NLON are subject to regulation under the federal *Coastal Zone Management Act of 1972* (CZMA) and Sections 22a-90 to 22a-111 of the General Statutes of Connecticut, collectively referred to as the CCMA. The CZMA authorizes coastal states to identify coastal zone areas and develop coastal management plans, subject to federal approval. The CZMA mandates that states delineate a coastal zone area that encompasses the state's most important coastal resources.

The CCMA defines the state's coastal area as comprising 36 coastal area towns and six towns bordering the Connecticut River. Within these towns, the extent of the state's regulatory authority includes the farthest inland area of the following areas: (1) within the one-hundred-year-frequency coastal flood zone; (2) within 1,000 feet of the mean high water mark of coastal waters, or (3) within 1,000 feet of the inland boundary of tidal wetlands. Development within



these areas is regulated locally through municipal land use planning and zoning boards pursuant to the policies of the CCMA (*Connecticut General Statutes*, 1972).

Although the CZMA expressly excludes federal lands from the state coastal zone, federal activities on these properties are subject to "federal consistency" requirements per Section 307 of the CZMA. Under this requirement, federal actions that could have "reasonably foreseeable" effects on the state coastal zone or component natural resources must be consistent with the enforceable policies of the CCMA. To see the CCMA jurisdictional line, and where it overlaps SUBASE NLON, the housing areas, and AFNRA see Figure 3-12 and Figure 3-13.

# 4.3 VEGETATION MANAGEMENT

Vegetation management is an important component of natural resources management at SUBASE NLON. Developed areas including administrative buildings, industrial areas, residential areas, and recreational areas require landscaping and routine vegetation maintenance to maintain a neat appearance and reduce safety issues arising from overgrown vegetation.

#### 4.3.1 Landscaping and Grounds Maintenance

In addition to benefiting safety and enhancing the visual appeal of the installation, the installation's grounds maintenance program can be integrated with the natural resources program objectives to benefit natural resources, primarily by implementing beneficial landscaping concepts and providing wildlife habitat. An integrated vegetation management approach can encourage the establishment of certain vegetation communities that is beneficial to migratory birds and pollinators (e.g., bees and butterflies) but can also discourage deer grazing (e.g., planting milkweed helps butterflies but deer do not like members of the milkweed family). Beneficial landscaping, such as planting native species to reduce water and nutrient demands, and increased use of shade trees and protective vegetation, are encouraged.

Guidance for grounds maintenance practices on Navy properties is provided in DODI 4715.03 (Department of Defense, 2018a), the President's Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (FR, 1995), and EO 13148 "Greening the Government Through Leadership in Environmental Management" (Clinton, 2000). DODI 4715.03 states that each installation shall, to the extent practicable, use regionally native plants for landscaping and other beneficial techniques (Department of Defense, 2018a).

SUBASE NLON maintains its grounds through mechanical and chemical means. Mechanical means include trimming, mowing, and pulling plants; chemical means include the use of herbicides (including Roundup Pro, 4-Speed XT, and Drive, among others) and fertilizers. Vegetation maintenance takes place routinely along sidewalks, roads, fence lines, and fire hydrants, in order to preserve visibility and access. Most of these areas are maintained by the public works department. Turf areas, ornamental plant beds, and low-impact development (LID) treatment systems are also maintained regularly.

Opportunities exist to provide natural resource benefits, or minimize detrimental impacts, through landscaping and grounds maintenance activities. To fully address how to integrate natural resource objectives into these activities, an Installation Conservation Design Plan can be



developed to outline BMPs and also to pinpoint where habitat enhancement for wildlife and pollinators can occur on the installation.

Landscaping at SUBASE NLON should apply standard tree and shrub maintenance and care practices, and should aim to prevent any unnecessary damage to landscaping from construction activities or grounds maintenance activities. The American National Standards Institute (ANSI) standard practices for tree, shrub, and other woody plant management (ANSI A300 [Part 1]-20017) should be used to guide landscaping and grounds maintenance on SUBASE NLON (ANSI, 2017a). Another ANSI guide, Z133.1-2017, provides guidance on trimming, repairing, maintaining, and removing trees, and cutting brush (ANSI, 2017b). Both ANSI guides can be ordered through the International Society of Arboriculture (ISA), which has its own tree pruning guidelines, which incorporate the ANSI standards and provide more detailed instructions on pruning methods.

# 4.3.1.1 Beneficial Landscaping

The concept of beneficial landscaping emphasizes

- using regionally native plants;
- using construction practices that minimize adverse effects on the natural habitat;
- preventing pollution by reducing fertilizers and pesticides, using IPM techniques, recycling green waste, and minimizing runoff; and
- practicing soil and water conservation (USEPA, n.d.[c]).

The use of regionally native plant species, rather than non-native species, is generally better because it reduces the need for intensive maintenance and the use of fertilizers and pesticides. Native plant species are also less likely to become invasive pests than non-native species, and native plants serve as better sources of food and cover for native wildlife.

Given its location on the Thames River, SUBASE NLON exercises caution when applying herbicides and fertilizers that may wash into the river. In using herbicides, maintenance crews use those with a lower rate of application, when possible, and/or use spot treatments to minimize the amount of herbicide being used. Maintenance contractors are liable for any non-target effects of the herbicides they use, which may result in cleanup, replanting, or reseeding. Planning around seasonal variations in weather can help to reduce chemical runoff from fertilizers. Fertilizing fields during the rainy spring season increases the likelihood that excess fertilizer will be washed into the Thames River. For this reason, fall is a preferable time for this kind of maintenance. Reducing vegetation maintenance reduces pollution from fertilizers and pesticides, cuts emissions from gas-powered machinery, and allows for a greater abundance of plant life.

# 4.3.1.2 Urban Forestry

Urban forestry provides an opportunity to incorporate trees that provide valuable ecosystem services into urban and suburban fabrics. Urban forests can include urban parks, street trees, landscaped boulevards, gardens, river and coastal promenades, greenways, river corridors, wetlands, nature preserves, shelter belts of trees, and working trees at former industrial sites.



These areas filter air and water, control storm water, conserve energy, and provide animal habitat and shade (USFS, n.d.).

Consistency within the urban forestry practices has historically been difficult at SUBASE NLON, within the housing areas in particular, but also on the main installation. Grounds maintenance and other construction activities frequently damage trees or shrubs. In addition, landscape planning has been inconsistent and without thoughtful consideration of the type of trees or plants suited to particular site conditions or the regional climate. Trees and shrubs are planted too close to buildings and utilities, and improper pruning practices are creating unsafe shade trees (SUBASE NLON, 2008). The over-pruned shade trees in the housing areas should be removed during scheduled landscaping activities and replaced with native species that will not reach heights that interfere with utility lines.

#### **Selection of Plant Materials**

The size of plants selected depends on budget, site conditions, planting season, available labor, and desired results. Container-grown stock is more expensive but less susceptible to drying and is better able to compete with surrounding vegetation. Sizes of containers vary from 6-inch tubegrown seedlings (tublings) to large pots or balled and burlapped saplings. Two- to three-gallon container-grown stock is widely available from private nurseries, survives transplanting better than bare-root, and is appropriate for use on a wide range of sites. Areas up to several acres in size can be planted economically with this size planting stock. Large-balled and burlapped stock also has a good survival rate after transplanting in poor or compacted urban soils, but is more costly per plant and is more labor intensive to transport and install than smaller stock. Balled and burlapped stock is most suitable for planting around buildings, along streets, and in high visibility areas that are required to look good quickly. Planting a mixture of sizes of woody plants is an option that creates more diversity and a more naturalistic appearance.

#### <u>Planting</u>

The planning process should allow for planting during a suitable season. The type of planting stock used, in part, determines the appropriate time for planting. Bare-root seedlings should be planted in the spring before the emergence of new leaves. Larger woody material is best planted in the late fall after leaves have dropped. At this time transpiration is minimal and root growth increases. Roots are often damaged in the transplanting process; therefore, planting during the fall allows additional time for root development before the summer months when transpiration peaks. Groundcovers can be planted at any time, as long as there is adequate rainfall or available supplemental watering.

Proper tree planting is another vital element of a healthy urban forest. Using correct planting methods can increase a tree's ability to establish quickly and improve its health and longevity. Planting techniques differ somewhat with the type of material planted, though the goal of each is to provide an environment that encourages root growth. Guidelines that apply to most types of planting stock are that the planting hole should be three to five times greater in diameter than the root ball of the material to be planted and only as deep as the root ball. It is important not to bury the roots too deeply or they will not be able to get enough oxygen. Appropriate planting guidelines for various plant materials are presented in Appendix J. Soil amendments should not be added directly to the planting holes for trees and shrubs. These amendments cause problems



with soil moisture and root growth. If fertilizers are applied, it is important to use a slow-release product with low solubility so nutrients are not easily leached away. To ensure the greatest chance of survival, urban tree and shrub planting should be performed by trained Station personnel or qualified tree care professionals.

## Tree and Shrub Care

The care that newly planted materials receive after planting is critical to their health and longevity. Ensuring adequate soil moisture immediately after planting and during the first two years of establishment is the key factor in planting success. Over watering can deprive the tree of air and should also be avoided.

Preventing damage from mowers and string trimmers is a significant problem for landscape managers. Wounds in a tree's bark make the tree more susceptible to disease and pest infestations and reduce its chance of survival. Mulch can be an effective method of protecting trees from mower damage, when used properly. Mulch protects trees by reducing weed growth around the plant's base, which reduces the need to mow near the plant. Mulch should be applied to a weed-free area around the root mat in a layer about three to four inches thick. Mulch should not be applied too close to the tree trunk or too deeply as this creates an environment that promotes fungal growth and decay. See Appendix J for additional urban forest/tree care guidance.

Existing and proposed utility lines should be considered when selecting trees and other plants for landscaping. Trees or shrubs should be selected for height and growth characteristics when planted under overhead utilities in order to prevent obstructions as the plants mature. Underground utilities and tree root systems should also be taken into consideration, with plant species selected without root structures that will interfere with underground utilities. The ISA publishes a brochure with guidance on selecting trees and shrubs to avoid utility conflicts.

Consistency within the urban forestry practices has historically been difficult at SUBASE NLON, within the housing areas in particular, but also on the main installation. Grounds maintenance and other construction activities frequently damage trees or shrubs. In addition, landscape planning has been inconsistent and without thoughtful consideration of the type of trees or plants suited to particular site conditions or the regional climate. Trees and shrubs are planted too close to buildings and utilities, and improper pruning practices are creating unsafe shade trees (Naval Submarine Base New London, 2008). The over-pruned shade trees in the housing areas should be removed during scheduled landscaping activities and replaced with native species that will not reach heights that will interfere with utility lines.

# 4.3.2 Natural Areas

Natural areas, or undeveloped lands, exist on SUBASE NLON within the central and northern areas of the main installation, Beaverdam Brook Wetland, and AFNRA. (See section 3.3.5.1 for further description of the vegetative communities on the installation.) The vegetative cover types in these natural areas include the following:



- main installation
  - o freshwater emergent wetland
  - freshwater forested/shrub wetland
  - white oak/black oak/northern red oak
  - white pine/red oak/red maple
  - $\circ$  rock outcrop
- housing areas/Beaverdam Brook Wetland
  - freshwater forested/shrub wetland
  - red maple/poison sumac
  - o swamp azalea
- AFNRA
  - freshwater forested/shrub wetland
  - estuarine and marine wetland
  - o freshwater emergent wetland
  - oak/hickory forest

These natural areas can be proactively managed to conserve and restore native habitats for regional protected species, migratory birds, other wildlife, and pollinators.

#### 4.3.3 Pollinators

World-wide, pollinators affect 35 percent of all crop production, boosting outputs for 87 of the leading food crops (FAO, 2021). The Navy recognizes the important ecological role played by pollinators and encourages installations to foster pollinator habitats. Pollinators include bees, butterflies, moths, beetles, flies, hummingbirds, and bats. As a group, pollinators are threatened worldwide by habitat loss and fragmentation, pesticides, disease, and parasites.

Connecticut has over 300 species of bees, which are responsible for the majority of insect-driven pollination. Typical bee species found in the state include honey bee (*Apis mellifera*), squash bee (*Peponapis ruinose*), carpenter bee (*Xylocopa virginica*), bumblebee (*Bombus affinis*), and mason bees (*Osmia* spp.). Additional pollinators in the state include butterflies, moths, hoverflies (*Helophilus intentus*), beetles, wasps, and hummingbirds (Connecticut Department of Energy & Environmental Protection, 2019). Pollinators are addressed in the 2015 Connecticut WAP and, in 2010, Connecticut was the first northeastern state to provide protection for bee species through legislation, when five bee species were proposed and accepted for state listing (Terwilliger Consulting Inc., 2015). Parasites have been identified as sources of mortality in commercially raised bumble bees and have spread into wild bumble bee populations. Pesticide application and pesticide drift are also believed to be killing pollinators, including bumble bees, butterflies, and moths. Habitat loss and fragmentation are also affecting pollinator populations (CT DEEP, 2019).

According to the NRCS, native pollinators are attracted to diverse, colorful floral sources that provide a succession of flowers. Providing flowers of different shapes will attract pollinators that have different body sizes and mouthparts (NRCS, 2005). Use of native plants is preferable



because these are usually adapted to Connecticut's growing conditions, and native pollinators evolved with these plants.

As part of an Installation Conservation Design Plan, management actions should be developed and implemented in the following ways to establish pollinator habitat:

- identifying areas in landscaped grounds, grounds maintenance areas, and no-mow areas that can be enhanced with native plants to establish pollinator gardens (in landscaped and grounds maintenance areas) and habitats (in no-mow areas)
- identifying how natural areas can be managed to support pollinator populations
- developing BMPs for landscaped grounds, grounds maintenance areas, no-mow areas, and natural areas in regard to maintenance and management (e.g., use of pesticides)

# 4.4 FISH AND WILDLIFE MANAGEMENT

The purpose of fish and wildlife management on SUBASE NLON is to protect, conserve, and manage fish and wildlife resources at a level that is compatible with the military mission and federal and state laws. Management guidelines should not necessarily optimize the installation for any one species but should instead provide a diversity of habitats for a variety of species. The laws and regulations that apply to managing fish and wildlife at SUBASE NLON include but are not limited to:

- *Endangered Species Act of 1973* (Public Law [P.L.] 93-205) and amendments of 1988 (P.L. 100-478)
- Fish and Wildlife Coordination Act (P.L. 85-654)
- *Fish and Wildlife Conservation Act* (16 USC § 2901-2912)
- Lacey Act of 1900 (16 USC §§ 3371-3378) as amended by the Lacey Act of 1981
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (P.L. 109-479)
- *Marine Mammal Protection Act of 1972* (P.L. 92-522; 16 USC § 1361–1421; 86 Statute 1027) as amended through 1996
- *Migratory Bird Treaty Act* (16 USC § 703–716)
- Connecticut State Fish and Game Laws
- *Sikes Act Improvement Act* (16 USC § 670 a)

# 4.4.1 Wildlife Management

Wildlife population management is a critical component of the SUBASE NLON Natural Resources Program. Some wildlife populations need to be managed because species become too rare, while others need to be managed because species are overly abundant. Connecticut's WAP (Terwilliger, 2015) lists some of the leading threats to Connecticut's fish and wildlife:

- habitat loss, degradation, and fragmentation
- changes in land use
- competition from non-native or invasive species
- insufficient scientific knowledge regarding wildlife and their habitats (distribution, abundance, and condition)

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- lack of landscape-level conservation
- insufficient resources to maintain and enhance wildlife habitat
- public indifference toward conservation

Not all species are threatened by increasing human influences. Some species, such as the whitetailed deer, raccoon, coyote, and Canada goose, actually flourish in disturbed landscapes. When a wildlife species becomes overly abundant, it can lead to increased human-wildlife conflicts.

With respect to general wildlife management, the following projects are planned for SUBASE NLON:

- migratory bird surveys
- survey for the presence of the northern long-eared bat, Indiana bat, and other bat species
- develop a Wetland Restoration Plan
- Wetland Restoration Plan implementation
- herpetofauna surveys
- promote pollinator habitat
- fish stocking
- deer hunting on the installation
- Canada goose population control
- conduct survey for invertebrates at-risk pollinators
- complete nearshore habitat and species survey
- develop alternative osprey nesting sites
- annually conduct a trash cleanup along the installation shoreline

Wetland restoration may include planting native species, removing and preventing the establishment of invasive plant species, and improving water quality on the SUBASE NLON wetlands. Undertaking wetland restoration activities will improve habitat quality for species that spend all or part of their life cycles in wetlands and water quality in neighboring streams and rivers.

Invasive species can degrade the quality of habitat on SUBASE NLON. For example, the shrubs and grasses present at the Beaverdam Brook Wetland and AFNRA are used for nesting and foraging by birds, amphibians, and small mammals. However, the value of this habitat may be degraded by overgrowth of invasive, non-native plant species (such as *Phragmites*). Thinning invasive plants, while also proactively restoring native plants, can help enhance the quality of these habitats for wildlife. Utilizing BMPs as described in Section 4.7 will improve overall quality of the habitats on SUBASE NLON.

Conservation or beneficial landscaping includes planting native plant species, reducing the use of chemical fertilizers and pesticides, and reducing lawn area, among other things (USFWS conservation landscaping). Conservation landscaping can attract pollinators, increase food resources for wildlife, and provide habitat. Conservation landscaping at SUBASE NLON could include building bird and bat boxes or promoting pollinator habitat in appropriate places. Two



bat houses were placed on Building 558 at SUBASE NLON in 2021. For more information, see Section 4.3 of this INRMP.

Stream habitat restoration may include conducting a stream condition assessment to prioritize areas in greatest need of bank stabilization, riparian buffer restoration, and in-stream habitat restoration. Undertaking these activities will improve habitat quality for species that spend all or part of their life cycles in those streams and would also improve the quality of water entering Long Island Sound, benefitting marine species as well.

# 4.4.1.1 Deer

White-tailed deer were uncommon in Connecticut from 1700 to approximately 1900, and numerous laws were enacted to protect the species. As deer numbers rebounded, they gradually became overabundant nuisance animals, and the state passed a *Deer Management Act* in 1974. The state held its first deer firearms hunting season in 1975, at which point the white-tailed deer became a valuable game animal (CT DEEP, 1999). Deer populations have continued to increase, as deer are highly fecund and have few natural predators. Deer can be voracious browsers and can pose a threat to native vegetation if their population becomes too large. When overpopulated, deer herds can pose a public safety and health hazard through auto strikes, nuisance complaints, and tick borne diseases and also can cause ecological damage to forest habitats by overbrowsing. Hunting is currently the most effective method of deer population management in Connecticut, but the species can also be controlled using fencing and repellents (CT DEEP, 1999).

The CT DEEP, in cooperation with the UCONN Wildlife Conservation Research Center, has monitored the state deer herd for Chronic Wasting Disease (CWD) since 2002. Randomly collected deer were tested for CWD annually from 2002–2011 and 2014–2015. The CT DEEP, Wildlife Division continues to collect samples to test for CWD. No positive samples have ever been recorded and Connecticut is considered a CWD free state (CT DEEP, 2021f).

On SUBASE NLON, deer are abundant (SUBASE NLON, 2008). The deer population on SUBASE NLON is currently managed though controlled bow hunts. Additional information on the hunting program at SUBASE NLON can be found in Section 4.9.1.

To continue to control the deer population on SUBASE NLON, the following project is recommended:

• deer hunting on the installation

# 4.4.1.2 Coyotes

Coyotes, although first documented in Connecticut in the 1950s, have expanded their range and are now common throughout the state. The species is opportunistic and uses a variety of habitat, including developed areas (CT DEEP, 2009). Coyotes and kits have commonly been observed on SUBASE NLON (T. McKenzie, former Natural Resource Manager - Environmental Division SUBASE NLON, 2016, personal communication).

In most cases, coyotes do not pose a threat to public safety or property; however, coyotes have the potential to become aggressive, or show signs of rabies or other diseases. SUBASE NLON



personnel should encourage the public to report any seemingly dangerous coyote to the NRM, and reports of dangerous coyotes should be shared with the CT DEEP immediately by calling (860) 424-3333 (emergency dispatch). No hunting program exists on SUBASE NLON for coyotes, but a coyote can be removed from the installation by a CT DEEP Wildlife Officer if it is deemed a nuisance. The NRM serves as a liaison to the installation security.

# 4.4.1.3 Bats

Threats to the NLEB include loss of habitat, pesticide use, recreational activities, and WNS. The declines documented in the Northeast attributed to WNS have both reduced species abundance as well as resulted in local extirpation of the species in some areas. The current population estimate put forth by the USFWS is 6,546,700 bats, with further declines expected over at least the next seven years as WNS continues to spread throughout the species' range (USFWS, 2016).

According to the USFWS, 12 bat species have been affected by WNS, a disease caused by the fungus, *Pseudogymnoascus destructans* (USFWS, 2021b). WNS has been spreading through the northeast and into the central U.S. and Canada since 2006, killing millions of bats and leading to an estimated 80 to 97 percent decline in hibernating bat populations (Cryan, n.d.). The disease gets its name from the visible white fungal growth on the bat's muzzle and wings that sometimes appears in infected individuals. This disease has no known cure or vaccine. Studies of natural bacteria and skin microbioma of bats have led to new lines of research for treatments using biological or biologically derived agents for bats at risk of WNS infection. Some of the potential treatments are moving to limited field testing. Other treatments under consideration include altering climate in hibernation areas to slow fungal growth or improve bat survival, using ultraviolet light to kill the fungus and vaccines to boost resistance to WNS. Researchers are looking into molecular and genetic tools to reduce the ability of *P. destructans* to cause disease (USFWS, 2021b). Because of the impacts of WNS on *Myotis* species, the USFWS listed NLEB as threatened in 2015.

Annual bat monitoring, including regular acoustic surveys and emergent counts from identified roost sites combined with mist-netting for definitive species identification, could help NRMs better understand which species occur on the installation, when and where they occur, and how their population numbers are changing through time.

To understand the bat population demographics at SUBASE NLON, the following project is recommended:

• Survey for the presence of the northern long-eared bat, Indiana Bat, and other bat species.

SUBASE NLON would undertake bat surveys in accordance with USFWS Summer Survey Guidance for the Indiana bat and the NLEB. This guidance outlines the methodology for presence/probable absence surveys and reporting requirements for bat surveyors. The guidance is typically updated each year; the most recent guidance is available at: https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html.



# 4.4.1.4 Reptiles and Amphibians

Restoration of wetlands, as described in Chapter 5, *Project Descriptions*, of this INRMP will help improve breeding areas for amphibians at SUBASE NLON. In addition, the following outreach project is recommended:

- Conduct surveys of herpetofauna across SUBASE NLON approximately every five years to maintain up-to-date data on presence and distribution of amphibians and reptiles.
- Develop and print educational brochures or factsheets. A reptile and amphibian educational pamphlet is recommended to inform SUBASE NLON residents, personnel, and visitors of the following:
  - Snakes are a natural part of the ecosystem and should be left alone.
  - Contact information for a professional who can safely remove snakes, in case people encounter a snake in a high-traffic area or near their dwelling.
  - Contact information for personnel that the public can call if turtles are sighted on, or near, SUBASE NLON.

## 4.4.2 Migratory Bird Management

The MBTA is the primary legislation in the U.S. established to conserve migratory birds. It implements the U.S.'s commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. The species of birds protected by the MBTA appears in Title 50, Section 10.13, of the Code of Federal Regulations (50 CFR 10.13). On 2 December 2003, the President signed the 2003 National Defense Authorization Act. The act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense.

Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include the following:

- routine operation of installation operating support functions, such as administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; moral, welfare, and recreation activities; shops; and mess halls;
- operation of industrial activities; or
- construction or demolition facilities used for the purpose described in the above two bullets.

The final rule authorizing the DOD to take migratory birds during military readiness activities was published in the Federal Register on February 28, 2007. The regulation can be found at 50 CFR Part 21. The regulation provides that the Armed Forces must confer and cooperate with the USFWS on the development and implementation of conservation measures to minimize or



mitigate adverse effects of a military readiness activity if it determines that such activity may have a significant adverse effect on a population of a migratory bird species.

The requirement to confer with the USFWS is triggered by a determination that the military readiness activity in question will have a significant adverse effect on a population of migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. A population is defined as "a group of distinct, but coexisting individuals of the same species, whose breeding site fidelity, migration routes, and wintering areas are temporally and spatially stable, sufficiently distinct geographically (at some point of the year), and adequately described so that the population can be effectively monitored to discern changes in its status." Assessment of impacts should take into account yearly variations and migratory movements of the affected species.

Migratory bird conservation relative to nonmilitary readiness activities is addressed separately in a memorandum of understanding (MOU) developed in accordance with EO 13186, signed 10 January 2001, "Responsibilities of Federal Agencies to Protect Migratory Birds." The MOU between the DOD and the USFWS was signed on 21 July 2006. The MOU includes, but is not limited to, the following DOD responsibilities:

- obtaining permits for import and export, banding, scientific collection, taxidermy, special purposes, falconry, raptor propagation, and depredation activities
- encouraging incorporation of comprehensive migratory bird management objectives in the planning of DOD planning documents
- incorporating conservation measures addressed in regional or state bird conservation plans in INRMPs
- managing military lands and activities other than military readiness in a manner that supports migratory bird conservation
- avoiding or minimizing impacts on migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds
- developing, implementing, and periodically evaluating conservation measures for management actions to avoid or minimize incidental take of migratory birds, and if necessary, conferring with the USFWS on revisions to these conservation measures

# 4.4.2.1 Regional and State Bird Conservation Plans

The following regional and state bird conservation plans have been reviewed to ensure that this INRMP is consistent with conservation measures outlined in these plans:

*Strategic Plan for Bird Conservation and Management on Department of Defense Lands* (DOD PIF, 2014): For migrant birds on DOD installations, this plan recommends the following types of management actions and projects on DOD installations:

- inventory
- on-the-ground management
- education



- Naval Submarine Base New London
- long-term monitoring to determine changes in migrant bird populations on DOD installations

*New England/Mid-Atlantic Coast Bird Conservation Region Implementation Plan* (ACJV, 2008): This plan identifies high-priority species and their habitats for residential and migratory birds for Bird Conservation Region 30 (of which most of Connecticut is a part). The plan delineates important geographic areas and describes priority monitoring and research needs.

*Northern Atlantic Regional Shorebird Plan* (Clark and Niles, 2013): Produced in partnership between the North Atlantic Shorebird Habitat Working Group and the New Jersey Division of Fish and Wildlife, this plan establishes goals for managing habitats, conducting research, and educating the public about shorebirds in the North Atlantic region.

*Mid-Atlantic/New England/Maritimes Waterbird Conservation Plan* (MANEM Waterbird Working Group, 2006): Created by a partnership of over 200 organizations, including wildlife managers, scientists, policymakers, and educators, this plan provides information on species occurrence, conservation status, threats, and management measures needed for 74 species of waterbird in the region.

# 4.4.2.2 General Migratory Bird Management

SUBASE NLON is in the Atlantic flyway, which is a major bird migration route. The Atlantic flyway stretches over some of the most densely populated and developed areas of the U.S., which makes it critically important that natural areas and undeveloped lands be conserved and managed to support these species. Numerous bird species protected under the MBTA utilize the installation (see Section 3.3.6); as a result, protection of existing habitat for many species of migrating landbirds and shorebirds is an important component of this INRMP. Although many of the lands within SUBASE NLON are developed, habitats remain that are important to migratory birds for nesting, foraging, and providing migratory stopover habitat. These habitats include wetlands such as emergent marshes and shrub swamps, successional fields and forests growing on disturbed lands, and small forest patches of mixed oak-white pine (see Section 3.3.5).

The taking of migratory birds through hunting within the state is regulated by the CT DEEP, Wildlife Division. During annual INRMP reviews, the Navy must report any migratory bird conservation measures that have been implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds. SUBASE NLON also coordinates with the USFWS for all impacts on migratory birds.

Migratory bird monitoring is ongoing at SUBASE NLON. The DOD and USGS jointly developed a "Coordinated Bird Monitoring Plan," which outlines procedures for bird monitoring, including study design, data collection methods, and data analysis. The Navy's guidance is to coordinate with the USACE to review avian data for context. The plan also calls for data to be stored in a long-term repository, such as the Coordinated Bird Monitoring Database (CBMD). SUBASE NLON staff should share their data with the CBMD; ideally, data should be checked for quality and then uploaded immediately following each field season. A coordinated bird monitoring plan avian species list study was last completed for SUBASE NLON in 2014 (Tetra Tech, Inc., 2014).



The DOD PIF Program is another resource for advice on managing and sharing bird monitoring data. DOD PIF representatives assist installation NRMs in improving the monitoring and inventory, research and management, and education programs involving birds and their habitats (DOD PIF, 2021).

In some instances, migratory birds may be injured on SUBASE NLON, as when birds become entangled in electrical wires. According to the USFWS, installation staff should contact a wildlife rehabilitator if an injured bird is discovered. However, it would be advisable for SUBASE NLON to develop a more detailed standard operating procedure for reporting and handling injured birds. This will help ensure that appropriate staff are notified of the incident and that proper procedure is followed. DOD PIF provides guidance on how to reduce injuries and mortalities related to avian collisions with power lines through the creation of an Avian Protection Plan (APLIC, 2012).

The following project for managing migratory birds at SUBASE NLON is planned:

• Migratory Bird Surveys

# 4.4.2.3 Neotropical Migratory Birds

For the breeding birds of North America, 341 species are neotropical migratory birds, identified as those species that breed in the U.S. and Canada but winter in Latin America and the Caribbean; 127 of these species are known to be in population decline (American Bird Conservancy, 2009). The primary threats to neotropical migratory birds include

- fragmentation of their breeding, migratory staging/stopover, and wintering habitats due to development, land conversion, habitat degradation, and deforestation;
- collisions with buildings, communication towers, power lines, and wind turbines;
- poisoning by toxic chemicals such as pesticides;
- predation by introduced predators (e.g., feral/outdoor cats); and
- global climate change.

Increasing plant diversity in natural areas can improve the quality of SUBASE NLON lands for neotropical migrants. Neotropical birds use plants for food, nesting materials, and cover from predators. Planting a variety of species can help ensure that sufficient resources are available to meet these needs. In addition, it is important that management activities take neotropical migratory birds into account. For example, pesticide use can remove the insect prey base of many songbirds, and the mechanical control (e.g., mowing) of invasive plants during the breeding season could remove nesting habitat for certain species. Finally, feral cats can pose a significant hazard to neotropical birds. SUBASE NLON manages the feral cat population under its Pest Management Program. In addition, installation staff should disseminate information about what people can do if they have an unwanted cat (i.e., to avoid the cat being abandoned and left outdoors).



# 4.4.2.4 Migratory Waterfowl and Shorebirds

Migratory waterfowl and shorebirds may use wetlands of SUBASE NLON, as well as the offshore areas that border the installation. Management actions for the federal and state protected species of shorebirds and migratory waterfowl are discussed under Section 4.5.

# 4.4.3 Marine Wildlife Management

Marine mammals include any ocean dwelling mammal, such as whales, sea otters, or dolphins, or any animal that primarily lives in the ocean, such as polar bears. Worldwide, populations of many marine mammals have declined over the past century. Some of the main threats to marine mammals include accidental capture in fishing gear, habitat destruction or degradation, illegal hunting, pollution, underwater noise, and ship strikes (NOAA Fisheries, 2021e). Under the Marine Mammal Protection Act of 1972 (MMPA) (Marine Mammal Protection Act, as amended, 1972), it is unlawful to "take" a marine mammal without authorization; authorization can come from the NOAA Fisheries or the USFWS, depending on the species. Under the MMPA, to "take" is to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect" marine mammals. Any action that produces sound underwater in areas occupied by marine mammals could constitute harassment and, therefore, must be evaluated by the appropriate agency. According to OPNAV M-5090.1E, Environmental Readiness Program Manual, all Navy requests for take authorizations must be coordinated with the Chief of Naval Operations Environmental Readiness Division (Navy, 2021a). Detailed information on the MMPA take authorization process can be found on the NOAA Fisheries' Office of Protected Resources website at https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marinemammal-protection-act.

As described in Section 3.3.6.1.2, seals have been observed at SUBASE NLON. Operations at SUBASE NLON are not known to negatively affect marine mammals; however, some activities, such as in-water construction, may require consultation with NOAA Fisheries. Interim Environmental Policy No. 10-001 provides the following guidance for MMPA compliance for in-water construction:

"Installation Environmental Program Managers (IEPM), in consultation with their installation natural resources (NR) staff, should review planned construction projects that have an in-water component to them such as pile driving, removal, demolition, or dredging, and the potential for marine mammals to be present in the vicinity of the action area. If possible, IEPM's should look programmatically across their region to determine if there are multiple in-water construction projects in the same general vicinity and/or if there are projects that would occur sequentially over a number of years in the same general vicinity. If projects are identified and marine mammals are present, IEPMs shall coordinate with/contact their installation NR staff and/or FEC environmental planning and conservation product line coordinator (PLC) to review the action for MMPA compliance. The installation NR staff/PLCs shall then make a recommendation to the IEPM if an MMPA authorization (i.e., Incidental Harassment Authorization [IHA] or Letter of Authorization [LOA]) is required for the action. NAVFAC Atlantic and Pacific marine resources experts are available to provide assistance in making this determination. The



IEPM shall consider the lead time to obtain an MMPA permit. MMPA website notes that it takes 4–8 months for NMFS to issue an IHA and 8–18 months to issue an LOA. The time starts when NMFS issues an official "Notice of Receipt" of the request. Typical time lines, based on past Navy request, are 12 months for an IHA and 18–24 months for an LOA."

MMPA compliance is included in the SUBASE NLON NEPA Checklist; this checklist covers planning requirements for in-water construction projects and other environmental requirements. In addition, the NRM reviews project designs and identifies associated consultation, authorization, and permit requirements to maintain compliance with the MMPA and other laws and regulations.

Stranding occurs when an animal is found alive or dead on land or else found floating dead in open water. Given its location on the Thames River, it is unlikely, though possible, that marine mammals may become stranded on coastal areas of SUBASE NLON. NOAA Fisheries has established several marine mammal stranding centers to assist stranded or beached animals. Mystic Aquarium, located near SUBASE NLON in Mystic, Connecticut, is a founding member of the Greater Atlantic Region Stranding Network and their Animal Rescue Program staff work closely with NOAA Fisheries to respond to, rehabilitate, and investigate sick, injured, or stranded marine mammals as well as other aquatic animals (Mystic Aquarium 2021).

In the event stranding occurs, SUBASE NLON personnel should adhere to the protocol established by the Chief of Naval Operations (CNO) Environmental Readiness Division (CNO, 2021). These management actions apply to any stranded marine mammal or sea turtle that appears to be injured, disoriented, or dead.

- The installation commander will immediately contact the NOAA Fisheries regional stranding coordinator in the event of a live or dead marine mammal stranding at the installation, with notification to the CNO Environmental Readiness Division occurring immediately thereafter. The current NOAA Fisheries regional stranding coordinator for the Northeast region can be identified through the NOAA website (https://www.fisheries.noaa.gov/contact-directory/marine-mammal-stranging-network-coordinators).
- In addition to contacting the NOAA Fisheries regional stranding coordinator and notifying the CNO Environmental Readiness Division, the Northeast Region Stranding Network Marine Mammal and Sea Turtle Stranding and Entanglement Hotline will be contacted at 866-755-6622. The members of this network are authorized by federal law to respond to marine mammal and sea turtle strandings. Mystic Aquarium in Mystic, Connecticut, is the NOAA Fisheries' authorized responder to rescue stranded marine mammals and sea turtles in the vicinity of SUBASE NLON. Mystic Aquarium can be reached at (860) 572-5955.
- Monitor the animal from a safe distance. Remain a minimum of 100 yards from the stranded animal. Crowding the animal is unsafe for the observer as well as the animal. Do not touch the animal, alive or dead, because wild animals can carry many diseases, parasites, and bacteria, some of which can be transmitted to humans. Do not attempt to



push the animal back into the water and, if it goes back into the water on its own, do not attempt to follow after or swim with it.

• Carefully observe the animal. Observe the position of the alive or dead animal and monitor its breathing. Wait for responders from the NOAA Fisheries and/or the Greater Atlantic Region Stranding Network to arrive and direct them to the animal. Relay all observations to the responders so that they can provide the best possible care for the stranded mammal or sea turtle.

# 4.4.4 Fisheries Management

# 4.4.4.1 Fishing

The *Fish and Wildlife Conservation Act of 1980* (Non-game or *Forsythe-Chafee Act*) sets forth general management guidelines for fish and wildlife resources by encouraging all federal departments and agencies to use their statutory and administrative authority to conserve and promote conservation of non-game fish and wildlife, and their habitats. In addition, two other federal laws apply to the management of fish and wildlife resources: the Lacey Act of 1900, as amended by the Lacey Act of 1981, and the Magnuson-Stevens Fishery Conservation and Management Act, as amended in 1996, and as reauthorized under the *Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006* (MSA). It is DOD policy to allow fishing on military installations, provided that such activities are in accordance with DODI 4715.03 (DOD, 2018a), OPNAVINST 5090.1E (Navy, 2019), OPNAV M-5090.1 (Navy, 2021a), and relevant state and federal regulations.

Recreational fishing on SUBASE NLON is regulated. Refer to Section 4.9.2 for more information on the fishing program.

# 4.4.4.2 Fish Habitat

In addition to regulating fish harvest, SUBASE NLON is also tasked with protecting fish habitat. As part of the MSA, NOAA Fisheries, in cooperation with regional fisheries management councils, establishes criteria for EFH for managed species. EFH is further discussed in Section 4.5.7.

# 4.4.4.3 Shellfish Management

Shellfish along the Connecticut coast include the eastern oyster (*Crassostrea virginica*), quahog (*Mercenaria mercenaria*), soft-shell clam (*Mya arenaria*), surf clam (*Spisula solidissima*), blue mussel (*Mytilus edulis*), bay scallop (*Argopecten irradians irradians*), whelks (*Busycon spp.*), and razor clam (*Ensis directus*) (CT DoAG, 2021). The Thames River along SUBASE NLON is classified as prohibited for shellfish harvest (CT DoAG, 2019). There are shellfish leases across the Thames River for quahogs and oysters.

# 4.5 THREATED AND ENDANGERED SPECIES, CRITICAL HABITAT, AND SPECIES OF CONCERN MANAGEMENT

# 4.5.1 Endangered Species Act of 1973

The ESA was enacted to provide a program of preservation for endangered and threatened species and to provide protection for ecosystems upon which these species depend for their survival (ESA, 1973). The ESA is administered by the USFWS (terrestrial and freshwater



wildlife) and NOAA Fisheries (marine species). Section 7 of the ESA requires all federal agencies, in consultation with the USFWS or NOAA Fisheries, to implement protection programs for designated species, to use their authorities to further the purposes of the act, and to ensure that their actions are not likely to jeopardize the continued existence of listed species as a result of destruction or adverse modification of critical habitat. Responsibility for the listing of an endangered or threatened species, and for the development of recovery plans, lies with the Secretary of the Interior and the Secretary of Commerce. The USFWS is responsible for implementing the ESA within the continental U.S.

An endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those that have been formally proposed in the Federal Register to be listed under section 4 of the ESA.

In addition, the USFWS identifies species that are candidates for possible addition to the List of Endangered and Threatened Wildlife and Plants under the ESA. A candidate species is any species whose status is under review to determine whether it warrants listing. Candidate species have no legal protection under the ESA (ESA, 1973). The USFWS maintains a candidate list to:

- provide advance knowledge of potential listings that could affect land planning decisions,
- solicit input to identify candidates not requiring protection or additional species that may require protection under the act, and
- solicit information needed to prioritize the order in which species will be proposed for listing.

When the USFWS initiated a court-ordered effort to designate critical habitat for all federally listed species, the DOD became concerned that the designation of critical habitat on military lands would add an excessive amount of burden (through administrative compliance and consultation requirements) on military installations, with limited benefit afforded to listed species (Benton et al., 2008). In defense, the DOD argued that it was currently providing extensive protection to listed species through the formal and informal consultation process with the USFWS and via conservation measures specified in installation INRMPs. To address this, the Defense Authorization Act for fiscal year 2004 (108th Congress 2003) granted the USFWS specific authority to exempt DOD lands from the designation of critical habitat, provided that a comprehensive and approved INRMP was in effect, the INRMP specifically addressed the conservation of species under consideration, and the INRMP was implemented.

# 4.5.2 Federally Protected and Candidate Species

In accordance with the ESA, SUBASE NLON must protect and help recover any federally listed TES that occur on installation lands or waters. Further, SUBASE NLON must avoid "taking" any listed species. Under the ESA, "take" includes harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting any TES, or attempting to do so. Staff at SUBASE NLON are required to consult with the USFWS or NOAA Fisheries staff in advance of any activity that may adversely affect or result in take of a listed species. In such cases, the agency will work with installation staff to prevent or reduce takes, and, if appropriate,



will issue an incidental take permit. Discussions and listing of federally listed TES are included in Section 3.3.7.

The defined projects for TES and candidate species include the following:

- migratory bird surveys
- survey for the presence of the northern long-eared bat, Indiana Bat, and other bat species
- develop and print educational brochures or factsheets
- coordinate with CT DEEP and NYSDEC (Appendix D) during wildlife action plan development and updates

A 2018 acoustic bat survey at three locations identified seven bat species but not the northern long-eared bat or Indiana bat. Additional surveys will be conducted to determine the presence of protected bat species on SUBASE NLON. Additional acoustic bat surveys will provide trends in bat populations and help the installation to manage any protected bat species that use SUBASE NLON for foraging or roosting, and periodic mist netting will enable definitive species identification (which is often impossible with acoustic analysis due to the similarities of call sequences among different *Myotis* species).

Listed species of sea turtles, whales, and sturgeon may occur within the vicinity of SUBASE NLON (see Section 3.3.6.5). The Navy is responsible for determining whether a proposed action may affect any of these listed species. If the Navy determines that a proposed action will not affect listed species, a concurrence under Section 7 of the ESA is not required. Any project or work that creates any of the following stressors will need to be reviewed, and a determination of effects, along with justification and a request for concurrence, will need to be supplied to NOAA Fisheries:

- increase in suspended sediment
- suspension of contaminated sediments
- discharge of any other pollutant
- loss of prey
- increased vessel traffic
- increase in underwater sound pressure waves
- impacts to habitat or conditions that make affected water bodies unsuitable for these species

As a general rule, educating hunters and other recreational users about how to identify TES, candidate species, state-listed species, or other species of concern can help prevent accidental takes. Moreover, educational materials should also instruct people on how to report a sighting of one of these species.

#### 4.5.3 State Protected Species

The Connecticut Endangered Species Act, under Chapter 495, Sections 26-303 to 26-316 of the CGS, authorizes the commissioner of the CT DEEP to designate species as endangered, threatened, or of special concern considering the continued existence of the species within the



state. State-listed species are afforded the following protection under § 26-311 of the CGS (State of Connecticut, 2011):

"Except as otherwise provided in section 26-310, it is unlawful for (1) any person to willfully take any endangered or threatened species on or from public property, waters of the state or property of another without the written permission of the owner on whose property the species occurs; (2) any person, including the owner of the land on which an endangered or threatened species occurs, to willfully take an endangered or threatened species for the purpose of selling, offering for sale, transporting for commercial gain or exporting such specimen; (3) any state agency to destroy or adversely modify essential habitat designated pursuant to section 26-306, so as to reduce the viability of the habitat to support endangered or threatened species or so as to kill, injure, or appreciably reduce the likelihood of survival of the species."

The CT DEEP reviews the state-designated species list at least every five years to examine the designation of species as endangered, threatened, or species of concern and determine whether the species should be added or removed from the list, or, if necessary, its determination changed from one category to another.

The following projects will be conducted at SUBASE NLON:

- migratory bird surveys
- survey for the presence of the northern long-eared bat, Indiana bat, and other bat species
- herpetofauna surveys

#### 4.5.4 Critical Habitat

Critical habitat has not been designated on SUBASE NLON or in its surrounding waters (USFWS, 2021c). The ESA directs both the NOAA Fisheries and USFWS to designate critical habitat for listed species. Critical habitat is defined as a specific geographic area that is essential for the conservation of a threatened or endangered species. The ESA requires that federal agencies consult with either NOAA Fisheries or the USFWS if an agency action may adversely modify critical habitat. In 2004, Congress amended the ESA to specify that critical habitat should not be designated on land controlled by the DOD if it is determined that the INRMP provides sufficient benefit to the species in question.

A nearshore survey conducted in 2014/2015 discovered the presence of the federally threatened Atlantic sturgeon in the Thames River. One Atlantic sturgeon was observed during the nearshore surveys conducted at SUBASE NLON. The sturgeon was detected using acoustic telemetry as it moved through the estuary for spawning or foraging (Tetra Tech, Inc., 2016). Thus, SUBASE NLON can work with NOAA Fisheries to ensure that the installation is supporting adequate habitat for the species.

In addition, even if the installation or its surrounding waters are designated as critical habitat in the future, the Navy could qualify for exemption due to management measures included in this INRMP, if implemented, that will benefit protected species.



# 4.5.5 Species of Concern

Species of concern are any native plant species or any native non-harvested wildlife species that have a naturally restricted range or habitat within the state, have a low population level, are in such high demand that its unregulated taking would be detrimental to the conservation of its population, or has been extirpated from the state. State species of concern are listed in Appendix B.

## 4.5.6 Rare Ecosystems

There are areas on SUBASE NLON that are considered "Significant Natural Communities" by the Natural Diversity Database, a project from the CT DEEP. These locations are not directly delineated; they are a general representation of species and community locations. On SUBASE NLON these areas are along the Thames River shoreline and on the northern portion of the installation that includes North Lake, Site 2B wetland, and the additional wetland area in the northeastern portion of Main Base. See Figure 2-1 for the location of these areas. There are no known critical habitat locations on SUBASE NLON (CT DEEP, 2021g).

# 4.5.7 Essential Fish Habitat

EFH includes all types of aquatic habitat where fish spawn, breed, feed, or grow to maturity. As discussed in Section 4.4.4, the MSA protects EFH by requiring all federal agencies to consult with NOAA Fisheries on all actions or proposed actions that are either permitted, funded, or undertaken by the agency, and that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct (e.g., contamination, physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts including individual, cumulative, or synergistic consequences of actions. As part of the consultation, NOAA Fisheries may provide conservation recommendations for how the agency can avoid, minimize, or offset impacts on EFH. Importantly, the conservation recommendations from NOAA Fisheries are only advisory—agencies are still authorized to act in contravention to the recommendations, though they must justify their actions in writing. The Navy Policy Regarding Essential Fish Habitat Assessments and Consultations (OPNAV M-5090.1 [Navy, 2021a]) was updated in March 2011 to align with the compliance requirements of the MSA and contribute to consistency in EFH consultations across the Navy.

In order to conduct an EFH consultation with NOAA Fisheries, the federal agency must submit an EFH Assessment, which describes the proposed action; analyzes the effects of the action on EFH, the managed species, and associated species; and provides the agency's view regarding the effects of the action on EFH. NOAA Fisheries, Greater Atlantic Regional Fisheries Office, has developed a worksheet to assist federal agencies in evaluating the impact of their actions on EFH and determining the magnitude of those impacts. The worksheet is available from https://media.fisheries.noaa.gov/2021-08/EFHWorksheet-fillable%20form-aug%202021final.pdf.

As discussed in Section 3.3.6.4, the nearshore environment of SUBASE NLON supports a variety of fish species and has been designated as EFH for multiple species.



# 4.6 PEST MANAGEMENT

The pest management program at SUBASE NLON operates consistently with, and under the authority of, federal laws and military guidelines. These laws and regulations are implemented at SUBASE NLON through the installation *Integrated Pest Management Plan* and are overseen by the installation pest management coordinator:

- Federal Insecticide, Fungicide, and Rodenticide Act
- Federal Noxious Weed Act of 1974
- EO 13112 (Invasive Species)
- Occupational Safety and Health Standards (29 CFR 1910)
- USEPA Regulations for Pesticide Programs (40 CFR 150-186)
- DOD Pest Management Program (DOD DIR 4150.07)
- Environmental Readiness Program Manual (OPNAV M-5090.1)
- Navy Safety and Occupational Health Manual (OPNAV M-5100.23 CH-1)
- Navy Pest Management Program (OPNAVINST 6250.4C)
- Navy Medical P-5010
- Design of Pest Management Facilities (Military Handbook 1028/8A)

A "pest" as defined by DODI 4150.07, *The DOD Pest Management Program*, is an organism that does not cause disease, but adversely affects readiness, military operations, or the well-being of personnel and animals; attacks or damages real property, material, or vegetation; or is otherwise undesirable (DOD, 2019b). IPM is a science-based, sustainable, decision-making process that identifies and reduces risks from pests and pest management-related strategies. IPM coordinates the use of pest biology, environmental information, and available technology to prevent unacceptable levels of pest damage using the most economical means, while minimizing risk to people, property, resources, and the environment. IPM provides an effective strategy for pest management in all arenas from developed agricultural, residential, and public lands to natural and wilderness areas (DOD, 2019b). It is DOD policy to use IPM to control pests whenever possible.

The pest management program at SUBASE NLON is described in the installation's PMP. The goal of the PMP is to prevent pests from having a potential for, or having an actual, impact on the mission, health, morale, structures, materials, or property of SUBASE NLON. As specified in the PMP, pesticides should only be used when necessary, and only in accordance to package directions. Measures should be taken to minimize pesticide "drift," whereby a pesticide leaves the targeted area and affects non-target organisms. Drift can be reduced by selecting low or nonvolatile pesticides, using larger spray nozzles (to increase droplet size), spraying only when wind velocity is under 10 miles per hour, and employing other tactics outlined in the PMP. All pesticides used must be reported using the NAVFAC Online Pesticide Reporting System (NOPRS), registered with the USEPA, and included on the installation's pesticide authorized use list (SUBASE ENLON, 2008).

# 4.6.1 Vector-Borne Diseases

Some pests pose public health risks because they act as vectors for human disease, such as mosquitos (*Culex, Aedes, Anopheles*, and other species) and ticks (specifically the black-legged



tick/deer tick *[Ixodes scapularis])* (SUBASE NLON, 2008). Mosquitos and ticks are documented to occur on SUBASE NLON.

The major viruses that have been known to be spread through mosquitos in Connecticut are West Nile virus and EEE. See Section 3.5.1 for a discussion of these vector-borne diseases.

Black-legged ticks, also known as deer ticks, are the major species that carries Lyme disease. According to the Centers for Disease Control and Prevention, the State of Connecticut has a high incidence of Lyme disease, meaning an average incidence of at least 10 confirmed cases per 100,000 persons for three reporting years. Figure 4-1 provides an overview of the number of reported cases of Lyme disease in the U.S. in 2019 (CDC, 2021).



Figure 4-1: Reported Cases of Lyme Disease in 2019

(One dot placed randomly within county of residence for each confirmed case) Source: (CDC, 2021)

#### 4.6.2 Geese and Other Nuisance Birds

Canada geese can damage managed open space and grassy areas through overgrazing and through their excrement due to its high nitrogen content. Bird feces can also damage buildings, rooftops, and sidewalks or have human health risks. Geese require open space habitat and will continue to increase in population as long as they are not threatened by human activity and their habitat is not degraded. Other waterfowl species that have been documented on the installation are mute swans (*Cygnus olor*), greylag geese (*Anser anser*), Muscovy ducks (*Cairina moschata*), and Pekin ducks (*Anas platyrhynchos domesticus*) (SUBASE NLON, 2008).



The following projects in reference to geese and other nuisance species bird management will be conducted at SUBASE NLON:

- migratory bird surveys
- Canada goose population control

#### **4.6.3** Gypsy Moth, Asian Long-Horned Beetle, Emerald Ash Borer, Spotted Lanternfly Insect pests can do different types of damage to an installation's trees. Species that are of concern for SUBASE NLON include the gypsy moth (*Lymantria dispar dispar*), Asian longhorned beetle (*Anoplophora glabripennis*), and the emerald ash borer (*Agrilus planipennis*).

Gypsy moths (*Lymantria dispar*) were introduced from Europe to the U.S. in 1869. The species was first detected in Connecticut in Stonington in 1905 and had spread throughout the state by 1952. The gypsy moth is most destructive in the caterpillar stage, when it feeds on the foliage of a wide diversity of trees and shrubs. Oaks are its preferred food plant, but it also favors apple, birch, poplar, and willow. During heavy infestations, the moths will attack conifers and other less favored species. Healthy trees can generally withstand one or two instances of partial to complete defoliation, but may experience thinning or dieback of branches. Older trees may be more vulnerable to defoliation and the entire tree may die. Use of the entomopathogenic fungus *Entomophaga maimaiga* has been the primary control agent since 1989 (Stafford, 2019).

The first sighting of the Asian long-horned beetle was in New York in 1996. Originally from China, the Asian long-horned beetle can cause destruction to maple and other hardwood trees due to wood-boring. The only way to make sure the beetle is removed is to cut down an infected tree. There are preemptive vaccinations for hardwood trees to avoid an infection (USDA, n.d.[b]).

The emerald ash borer arrived in the U.S. in 2002 from Asia. Emerald ash borers begin their lifecycle on the tree's bark as eggs, and then bore into the tree as larva to feed off of the tree's nutrients. After a tree has been infected with an emerald ash borer, it can lose up to 50 percent of its canopy after two years and die within three to four years (USDA, n.d.[c]). In 2020, several infested ash trees near Rock Lake at SUBASE NLON were removed because they posed a life-safety threat.

The spotted lanternfly (*Lycorma delicatula*) has been identified to have established populations in the western Connecticut counties of Fairfield and New Haven. All of Connecticut is under state quarantine for spotted lanternfly as of July 1, 2021. Originally a native of China, India, and Taiwan, the species is a large planthopper first identified in the U.S. in 2014. The spotted lanternfly has a host range of over 70 plant species, including important agricultural and silvicultural species such as grape vines, fruit trees, ornamental trees, and woody trees, including apples and several stone fruits. (UCONN 2021)

# 4.6.4 Feral Pets

Feral pets can become a concern on military installations. They threaten public health through the spread of disease. In addition, feral cats can pose a risk to wildlife because they are both predators and prey; they are known to hunt birds and other small animals, but they are also



attractive prey for coyotes. According to a recent scientific study, free-ranging domestic cats kill an estimated 1.4 to 3.7 billion birds and from 6.9 to 20.7 billion mammals annually (Loss et al., 2013).

As per Chief of Naval Operations letter N456M/1U595820, *Policy Letter Preventing Feral Cat and Dog Populations on Navy Property*, it is against Navy policy to allow stray cats to roam Navy property (CNO, 2002). SUBASE NLON has partnered with several organizations to address feral cats. Arrangements have been made for the ED to trap feral cats in identified problem areas and transport the cats to the U.S. Army veterinarian at SUBASE NLON. Once the veterinarian has verified the cats are healthy, volunteer organizations collect the cats and bring them to a facility for neutering. They are then placed in homes or facilities that accommodate feral cats. In addition, SUBASE NLON issued an instruction (SUBASELONINST 5090.1, 2016) on the installation's feral cat management policy, which prohibits feeding of feral cats.

The Armed Forces Pest Management Board (AFPMB) Technical Guide 37, *Integrated Management of Stray Animals on Military Installations*, provides detailed information about various trapping techniques (AFPMB, 2012). The Association of Fish and Wildlife Agencies *Toolkit to Address Free-ranging Cats (Felis catus) on Agency Lands Managed for Native Wildlife and Ecosystem Health* provides additional information about integrated management solutions (Schweitzer and Gillin, 2020).

In reference to feral pets, and all pest species SUBASE NLON will implement the following projects:

- develop and print educational brochures or factsheets
- continue to work with outside organizations to remove feral cats from problem areas affecting the SUBASE NLON mission, neuter, and place the feral cats into homes

# 4.7 INVASIVE SPECIES MANAGEMENT

EO 13112 defines an invasive species as any species that is not native to an ecosystem and whose introduction does, or is likely to cause, economic or environmental harm or harm to human health. According to EO 13112, subject to the availability of appropriations and to the extent practicable and permitted by law, each federal agency should use relevant programs and authorities to do the following:

- prevent the introduction of invasive species;
- detect and control such species in a cost-effective manner;
- monitor invasive species populations;
- provide for restoration of native habitats that have been invaded;
- conduct research on invasive species to prevent introduction and control invasive species; and
- promote public education on invasive species (Clinton, 1999).

Three laws are important to invasive species management: the Noxious Weed Act of 1974, the Lacey Act of 1900 (as amended in 1998), and the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990. The Noxious Weed Act of 1974 provides for the control of noxious



plants on lands under the control or jurisdiction of the federal government. The law allows poisonous plants and noxious weeds to be controlled or destroyed in an approved manner when the plants interfere with the safe and efficient use of the land, endanger the health and welfare of personnel, or infest adjacent property (*Federal Noxious Weed Act*, 1975). The Lacey Act of 1900 identifies certain species as "injurious" (*Lacey Act*, 1900). The Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 was established to prevent introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake (*Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990*, 1990).

Invasive species management encompasses control of insect pests, invasive plant species, and noxious weeds through treatment and prevention measures. Invasive species management can be implemented first by adopting an IPM strategy that will aid in control by changing routine practices or making habitat and structural alterations. The integration of IPM strategies should reduce the use and need for application of chemical controls; however, chemical controls may be required if problems persist despite the use of IPM methods. If chemical controls are necessary, they should be applied carefully to kill only targeted pests, with minimum use of the least toxic product available. The application of herbicide to control invasive species must be done in accordance with state and federal regulations.

Invasive species are present on SUBASE NLON (See Figure 3-14). There are nine invasive plant species identified at SUBASE NLON: common reed, Asiatic bittersweet, multiflora rose, Asiatic shrub honeysuckles, Japanese barberry, autumn olive, purple loose strife, M-A-M, and Japanese knotweed. Of these nine invasive plant species, two are of primary concern—common reed and Asiatic bittersweet—both aggressive invaders that rapidly outcompete native vegetation (SUBASE NLON, 2008). See Section 3.3.5.2 for more information on each species. The California Invasive Plant Council (Cal-IPC) provides the following detailed guidance on numerous best management practices for invasive species (Cal-IPC, 2012):

- Plant native plant species whenever soil is disturbed or plant species are removed. This will help prevent non-native plant species from colonizing these areas.
- Be careful when removing non-native plant species not to spread seeds, fruits, or fragments that could possibly transfer plants from one area to another.
- Invasive species control is most effective at the early stages of an invasion. Once a nonnative species establishes a viable, reproducing colony, it can be very difficult and expensive to control. Natural resource staff should therefore prioritize controlling incipient invasions and protecting high-quality areas from being invaded.

The Center for Invasive Species and Ecosystem Health provides information about how to identify and manage 1,627 different non-native species, including common reed. The National Invasive Species Information Center, provides links to numerous best management practices guides from a variety of agencies (USDA, n.d.[d]).

Table 4-2 provides selected BMPs for minimizing the spread of invasive species at SUBASE NLON as well as links to comprehensive guides for various user groups.



# Table 4-2: Best Management Practices for Slowing the Spread of Invasive Species at SUBASE NLON

Vector for Dispersing Invasive Species	Examples of Best Management Practices		
Construction and Landscaping Activities	Construction contracts should include language about planting only native species. The Ladybird Johnson Wildflower Center at the University of Texas at Austin provides a list of species native to Connecticut that are suitable for landscaping ( <u>https://www.wildflower.org/plants/</u> ). Avoid planting species known to be invasive in Connecticut. See "Tips for preventing the spread of invasive species on construction sites and along roadways," <u>https://www.sleloinvasives.org/wp-content/uploads/2020/07/ESC- Slides-PDF.pdf</u> .		
Visitors to Natural Areas	All visitors should inspect and clean all vehicles, equipment, tools, and clothing—especially footwear. This should be done before moving from one area of the installation to another. Minimize disturbances to soil. See "Non-Native Invasive Species Best Management Practices: Guidance for the U.S. Forest Service Eastern Region," which has special guidance for recreation (USFS, 2012).		
Boats	After boating, inspect and remove all visible plant, fish, and animals as well as mud or other debris at the launch. Eliminate all water from every conceivable space and item before you leave the area you are visiting. Dry equipment; if possible, allow for 5 days of drying time before entering new waters. For more detailed guidance, see "Aquatic Invasive Species," on the CT DEEP website (CT DEEP, 2021h).		
Natural Resource Field Personnel	<ul> <li>When removing non-native plant species, be careful not to spread seeds, fruits, or fragments that could possibly transfer plants from one area to another.</li> <li>When visiting multiple sites, be careful to inspect and clean vehicles, equipment, tools, and clothing—especially footwear-before transitioning from one site to another.</li> <li>For further guidance, see "Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.)," by the California Invasive Plant Council (Cal-IPC, 2012).</li> </ul>		

In reference to invasive species SUBASE NLON will implement the following projects:

- develop and print educational brochures or factsheets
- continue annual efforts to manage invasive species at SUBASE NLON, including wetland restoration



## 4.8 LAND MANAGEMENT

#### 4.8.1 Navy Environmental Restoration (ER) Program

The release of hazardous substances, pollutants, and contaminants may result in adverse impacts on natural resources. The Navy Environmental Restoration (ER) Program identifies and evaluates contaminated Navy facilities. It provides for compliance with the requirements of the CERCLA, as amended by the *Superfund Amendments and Reauthorization Act* (SARA). The ER identifies hazardous releases, considers the risks, and assesses the impact on human health and the environment (to include impacts on TES, migratory birds, and biotic communities). When the impact may result in an unacceptable risk to human health and the environment, the ER develops response actions to lessen the impact.

• Initially, 25 ER sites and study areas were identified on SUBASE NLON. In 2021, a 26<sup>th</sup> ER site was identified at SUBASE NLON. A majority of the ER sites have been closed under CERCLA; however, long-term monitoring and maintenance are conducted in accordance with each site's remedy under the oversight of EPA and CT DEEP.

Sites where contaminants remain in place at levels that prevent unrestricted use and unlimited exposure are subject to a Five-Year Review, in accordance with CERCLA statutory requirements. The Five-Year Review evaluates the implementation and performance of each site's remedy to determine whether the remedy remains protective of human health and the environment.

The SUBASE NLON ER Program is managed by a Remedial Program Manager in the Mid-Atlantic (MIDLANT) region with support from SUBASE NLON's ED. When necessary, installation natural resource staff assist in identifying potential impacts on natural resources caused by contaminant releases. ED staff communicates natural resource issues to the NRM, attend Restoration Advisory Board meetings, review and comment on ER reports, and ensure that contaminant response actions minimize impacts on the natural resources on SUBASE NLON, to the extent possible.

#### 4.8.2 Hazardous Waste Management and Spill Prevention

The Fleet Industrial Supply Center Norfolk – Detachment New London provides logistics and supply support services to all SUBASE NLON commands, including material inventory management, Defense Fuel Support Point management, management of Designated Support Point functions in the Navy Depot Level Repairables (DLR) program, management of the base Consolidated Hazardous Material Inventory Management Program (CHRIMP), and other activities (URS ONYX, 2017).

A Hazardous Waste Management Plan establishes standard operating procedures and policies for the proper storage, management, transportation, and disposal of hazardous waste at SUBASE NLON. Where appropriate, this INRMP integrates standard operating procedures and policies for hazardous waste management on SUBASE NLON.

The Hazardous Waste Program Manager is a member of the SUBASE NLON ED staff and provides management and compliance oversight concerning hazardous waste management at the



SUBASE NLON sites. The ED will ensure proper coordination of hazardous waste management activities to ensure that there are no adverse effects on natural resources.

# 4.8.3 Reclamation of Disturbed Sites

Proper land management is important, not only for achieving appropriate vegetation ground cover, but also for improving soil microbes and nutrients, the hydrological balance through infiltration and percolation, sustainable water quality, quality wildlife habitat, and reduction of runoff and soil erosion. Construction or other activities potentially may leave an area inhospitable for vegetative growth or better suited for noxious weeds to take over (due to changing the landscape, removing several feet of soil, and leaving a bare mineral soil exposed).

To return disturbed grounds to viable soils, SUBASE NLON will implement these management actions:

- soil abatement (such as fertilization) to add vital nutrients to allow seeds to propagate
- soil stabilization to keep unstable soils and seeds from blowing, eroding, or washing away
- establishment of native or non-invasive plant communities through seeding with accepted seed mixes, irrigation, weed management, and pest management

SUBASE NLON may also lay sod or establish xeriscaping on disturbed sites. Section 4.7 discusses invasive species management on SUBASE NLON, including listing of best management practices to slow the spread of invasive species on the base. These management actions should be taken into account as the installation reclaims disturbed sites.

# 4.9 OUTDOOR RECREATION

Outdoor recreation is defined by OPNAV M-5090.1 as any program, activity, or opportunity dependent on the natural environment (Navy, 2021a). Outdoor recreational opportunities provide a cost-effective manner in which to enhance the quality of life for military personnel and their families, as well as civilian and contract personnel and retired personnel and their family members. The purpose of this section is to identify outdoor recreational opportunities at SUBASE NLON. The goal of outdoor recreation and environmental education at SUBASE NLON is to enhance the lives of personnel using the installation resources by providing educational and fitness opportunities that are sustainable, within the military mission and established carrying capacities, and are consistent with the natural resources upon which they are based.

AFNRA is the largest designated recreation area associated with SUBASE NLON. This 36-acre area is reserved for military personnel and their families. The AFNRA includes barbecue pits and grills, a volleyball court, horseshoe pits, children's play areas, a boating dock, and about four acres of trails with interpretive natural resource and cultural resource interpretive signs.

# 4.9.1 Hunting

It is DOD policy to allow hunting at military installations in compliance with state regulations and best wildlife management methods. SUBASE NLON allows bow hunting of white-tailed deer as a recreational activity with an additional function of maintaining healthy deer population



levels. Hunts have been conducted annually since 1997. The NRM leads a Hunt Management Team, which determines a hunt quota based on the number of deer (fawns, does, and bucks) observed and/or reported each year, as well as subjective observations of deer grazing on SUBASE NLON by the NRM.

The following hunting-related management actions are recommended at SUBASE NLON:

- Deer hunting on the installation
  - SUBASE NLON currently controls deer population as necessary using volunteer bow hunters (September–December). Continuation of the program will help maintain the deer population at levels that limit deleterious impact of deer on facilities, grounds, and mission.

## 4.9.2 Fishing and Boating

The Thames River and Stonington Harbor provide opportunities for a variety of aquatic recreational activities. The Thames View Marina on the main installation provides powered boat slips with seasonal dockage and winter dry storage, providing direct access to the Thames River. The marina also rents kayaks and other small watercraft to those with installation access.

DOD policy allows recreational fishing at military installations in compliance with federal and state regulations and best wildlife management practices. Rock Lake on the SUBASE NLON main installation is regularly stocked with native species (e.g., large-mouth bass and bluegills) for recreational fishing. The NRM obtains a Fish Liberation Permit from CT DEEP prior to any fish stocking at the installation or AFNRA.

The following fishing and boating management actions are recommended at SUBASE NLON:

- Fish Stocking
  - Stocking fish within Rock Lake and other water bodies provides additional recreational activities for base personnel. In addition, stocking can support existing native populations of fish.

#### 4.9.3 Other Outdoor Recreation Opportunities

A variety of other outdoor recreation opportunities are available at SUBASE NLON. Trails at the main installation and AFNRA allow for active and passive enjoyment of natural amenities at the installation. In addition to the interpretive nature trails at AFNRA, tidal marshes and freshwater ponds on the property attract a number of waterfowl and songbirds, providing opportunities for birdwatching. Swimming is also permitted at North Lake on the main installation. Rock Lake, which has provided opportunities for swimming in the past, does not currently have a swimming program. However, a pavilion with picnic tables at Rock Lake, as well as a sandy beach with a volleyball net and a fire pit for recreational use, are currently available.

#### 4.10 CONSERVATION LAW ENFORCEMENT

Conservation law enforcement staff is not present on SUBASE NLON. The NRM serves as a liaison to the installation security and CT DEEP wildlife officers when any conservation law enforcement issues occur.



# 4.11 Environmental Awareness, Education, and Outreach

In order to successfully manage its natural resources, SUBASE NLON must engage and educate community members on and off the installation. Increasing environmental awareness will increase involvement and support for the installation's conservation programs.

SUBASE NLON has proposed a project that will be implemented to increase environmental awareness both on and off the installation:

- Include environmental education and outreach materials such as brochures, factsheets, and a map of outdoor recreational opportunities on SUBASE NLON's website.
- Host volunteer and outreach events with military residents, personnel, and community partners. Invite military families, base personnel, and community groups to participate in volunteer events. Consider the following projects for volunteer events:
  - trash cleanups along the shore of the installation
  - invasive plant removal
  - native species plantings
  - living shoreline and wetland restoration projects
  - installing bluebird and bat boxes

# 4.12 SUSTAINABILITY AND CLIMATE CHANGE

Climate change refers to "any significant change in climate (such as temperature, precipitation, or wind) lasting for decades or longer" (Melillo et al., 2014). According to the U.S. Global Change Research Program, warming of the climate is both "unequivocal" in its occurrence and primarily human-induced (Melillo et al., 2014). Climate change is already affecting U.S. water and land resources and biodiversity, and these effects are expected to be even greater in the next few decades and beyond. Across the U.S., clear scientific evidence exists that the sea level is rising, Atlantic Coast hurricane intensities are increasing, average temperatures are rising, and precipitation is occurring more frequently during heavy, single-day events (USEPA, 2021). These primary effects of climate change (i.e., sea level rise, extreme weather events, and temperature and precipitation changes) are causing impacts on natural resources such as shifts in species' ranges and distributions, changes in phenology, and variations in ecological processes such as drought, fire, and flood (DOD, 2018a).

DOD M-4715.03 requires climate change to be addressed in INRMPs to help mitigate potential impacts of climate change on the natural resources on installations (DOD, 2018b). A climate change vulnerability assessment project for SUBASE NLON will provide a detailed analysis of installation natural resources that are at-risk from climate change. This vulnerability assessment can then be used to devise installation-specific climate adaptation strategies. The vulnerability assessment and adaptation plan also will address the following factors:

- sea-level-rise scenarios
- potential flood zone shifts caused by sea-level-rise scenarios
- evaluating the risk to hazardous waste and oil locations from sea level rise, storm surge, and flood zone shifts


It is a goal of this INRMP to assess the potential impacts of climate change on natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.

## 4.13 TRAINING OF NATURAL RESOURCES PERSONNEL

The goals and requirements for training of NAVFAC natural resources personnel are outlined in OPNAV M-5090.1 (Chapter 3 Environmental Readiness Training), as part of the Navy Environmental Readiness Training Program, which identifies specific training courses and sources of training to address these requirements (Navy, 2021a). In addition, the NAVFAC Environmental Community Management Plan (1 September 2011 Draft) indicates that environmental community professionals (including the installation NRM) should be credentialed by independent outside organizations; understand how their specific jobs align with the installation's mission, the NAVFAC Strategic Plan, and the NAVFAC Environmental Business Line Plan; and seek partnerships and alliances with environmental professionals at other agencies and professional organizations to help achieve training goals. All environmental scientists and environmental protection specialists must participate in meaningful, continuous learning activities to stay current and proficient in technical/functional disciplines, policy initiatives, and leadership and management skills. Participation in periodic training courses and workshops will keep environmental staff up to date on natural resources management issues and laws, as they relate to natural resources management at military installations.

To enhance the NRM's expertise and the implementation of this INRMP, the SUBASE NLON NRM will attend trainings on natural resources issues, applicable laws and regulations, and other subjects relevant to natural resource management and conservation.

## 4.14 GIS MANAGEMENT, DATA INTEGRATION, ACCESS, AND REPORTING

GIS is an integral part of natural resources and environmental protection and planning. This tool provides the installation and natural resource managers with a database that includes information pertaining to the spatial facets of data. In this database, which contains data from aerial photographs, topographic surveys, monitoring efforts, and other natural resources information, there are references to geographic coordinate systems. Being able to represent data spatially enhances the installation's ability to effectively coordinate management efforts. GIS also helps ensure that current and planned mission activities do not adversely affect natural resources such as watersheds, wetlands, floodplains, natural landscapes, soils, forests, and wildlife that must be protected, conserved, and managed using an ecosystem approach. In addition, GIS supports efficient and effective land use planning, maintaining military readiness and sustainability, and protecting and enhancing natural resources for multiple uses, sustained yield, and biological integrity.

In accordance with OPNAV M-5090.1, NRMs are encouraged to use GIS to develop and implement their INRMP (Navy, 2021a). Navy GeoReadiness Centers provide overall coordination and acquisition of installation-specific GIS data and resources, maintain the Common Installation Picture data layers, and ensure that the quality control includes accuracy, currency, and compliance of all geospatial data holdings. At the Regional Environmental

#### CHAPTER 4.0 – NATURAL RESOURCES PROGRAM OVERVIEW



Business Line, one person manages GIS support for all of the natural resources programs for the installations in the MIDLANT region. The support from the GeoReadiness Center enables program managers to view, report, analyze, and update data.

Maintaining the GIS database to ensure that it contains up-to-date data for all pertinent natural resource data such as habitat and species surveys, natural resource management project areas, and mission impacts is essential for establishing a proactive natural resources management program that supports the SUBASE NLON's mission and ecosystem integrity. Training personnel to use GIS and global positioning systems (GPS) to accurately collect spatial data at the meter or sub-meter scale is essential for building and maintaining a comprehensive GIS database that meets the installation's natural resources planning needs.

In accordance with guidance pertaining to the use of GIS for natural resource management, all GIS data layers associated with the SUBASE NLON INRMP are provided to NAVFAC MIDLANT and SUBASE NLON's ED. All GIS data created or modified for use in this INRMP follow the Navy Data Model (NDM). Likewise, all GIS deliverables associated with implementation of applicable INRMP projects should adhere to NDM standards.

The map figures presented in this INRMP were developed using

- existing digital data files provided by the Navy in 2021, and
- other GIS databases available to the public.

The base imagery used is the National Agriculture Imagery Program (NAIP) imagery ESRI map service that is created from recent high-resolution (1 meter) aerial imagery for the continental U.S., made available by the USDA Farm Services Agency. The files are provided as digital ortho quarter quad tiles (DOQQs). Each individual tile covers a 3.75 x 3.75 minute quarter quadrangle plus a 300 meter buffer on all four sides. The DOQQs are provided as GeoTIFF, and each tile area corresponds to a USGS topographic quadrangle. All individual DOQQs are rectified in the UTM coordinate system, NAD 83.

Additional data from public sources such as the CT DEEP, NYSDEC, UCONN, and NOAA Fisheries are used to identify the state of natural resources beyond the installation boundary and the natural-resource-related efforts and interests of other stakeholders, which in turn illustrates the role SUBASE NLON plays in current and future natural resource management at the local community and state levels.

SUBASE NLON projects that reference GIS management, data integration, access, and reporting include the following:

- migratory bird survey, northern long-eared bat and Indiana bat surveys, and herpetofauna surveys
  - During any surveys on the installation, including NSA Saratoga Springs locations, GIS data should be collected in the proper format. Currently, there is minimal GIS data available for NSA Saratoga Springs and AFNRA installation areas.



• Department of the Navy annual natural resource program data-call and metrics

## 4.15 LEASES

The Navy entered into a public-private partnership (known as the Northeast Housing LLC) with a private entity (Beacon Point Homes) that would build/replace, maintain, and manage military housing. The Navy no longer owns the military family housing units; instead, the Navy is a minority partner with the Beacon Point Homes. Under the existing lease terms, at the end of 50 years all housing units and improvements would revert back to federal control (URS ONYX, 2017).

## 4.15.1 Enhanced Use Leasing

SUBASE NLON has entered into an enhanced use lease (EUL) agreement with the Connecticut Municipal Electric Energy Cooperative for fuel cells adjacent to the base main substation (Building 463). Other EUL agreements can be used to implement energy developments between a federal agency and private developer (URS ONYX, 2017).

An EUL site (EUL 1, also referred to as the North Site) is located north-east of Wahoo Avenue and south of the former landfill site. It is expected to provide up to 8 megawatts (MW) of electricity by fuel cells. Another EUL site (EUL 2, also referred to as the South Site) is located south of Gudgeon Avenue on the former site of Building 427 and will also provide, when constructed, up to 8 MW of electricity by fuel cells (URS ONYX, 2017).

These EULs have no impacts on natural resources. Any additional parcels being considered for an EUL will be evaluated for potential impacts to natural resources.

## 4.15.2 Agricultural Out Leases

There are currently no agricultural out leases at SUBASE NLON.



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# 5.0 MANAGEMENT RECOMMENDATIONS SUMMARY

This chapter provides the descriptions for proposed projects. The INRMP Project Summary Table, located in Appendix C, contains a listing of all the projects with their applicable project codes, implementation schedule, the legal driver, the Navy assessment level, funding priorities, cost estimates, funding sources, and the targeted dates for completion. The projects are intended to develop, enhance, and maintain natural resources management practices at SUBASE NLON and have been prioritized for implementation. The DOD funding priority classifications are explained in Section 6.1.1.

# 5.1 **PROJECT DESCRIPTIONS**

The INRMP project descriptions below address relevant INRMP goals and objectives that each project supports, in addition to details such as anticipated location, potential collaborators, timeframe for implementation, and recurrence.

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
	Objective 3.2. Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species to minimize "takes" of these species resulting from military readiness activities.
Location	Installation-wide
Potential Collaborators	USFWS, CT DEEP, Audubon Society
Project Description	Conduct migratory bird surveys to obtain data on migratory bird utilization in support of the MBTA and EO 13186 for federal agencies to promote the conservation of migratory bird populations. Conduct Migratory Bird Stopover Habitat Surveys to help identify Connecticut's priority sites and help guide conservation efforts at the state and local levels. Contribute information on sightings along the Thames River during late April and June, and from late August through September. Assist the researchers at the University of Connecticut, in collaboration with Audubon – Connecticut, by providing information on resighting of banded birds. Conduct breeding bird surveys using the North American Breeding Bird Survey protocol to assess breeding bird utilization and potential impacts on breeding birds.

## **Project 1. Migratory Bird Surveys.**

1.3 Assess sustain and enhance the health of natural vegetation
munities, wildlife species populations, and suitable habitats.
ective 3.1. Identify, monitor, and manage rare, threatened, and endangered cies (TES) in the terrestrial, aquatic, and nearshore environments.
allation-wide
FWS, CT DEEP
e acoustic bat surveys were completed in 2018 and provided valuable baseline ormation (see Section 3.3.6.1.1) on bat species composition and activity at BASE NLON. Follow-on acoustic bat surveys are recommended. Collected a will provide trends in bat populations at SUBASE NLON that will build n previously collected data. SUBASE NLON would undertake bat surveys in ordance with USFWS Range-Wide Survey Guidance for the Indiana bat the NLEB, even though the initial acoustic monitoring did not icate the presence of these species at SUBASE NLON. This guidance ines the methodology for presence/probable absence surveys and reporting uirements for bat surveyors (USFWS, 2020.)

Project 2. Survey for the presence of the northern long-eared bat, Indiana Bat, and othe	r
bat species	

# **Project 3. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.**

Applicable INRMP Goal(s)	<ul><li>Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.</li><li>Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.</li></ul>
Applicable INRMP Objective(s)	Objective 1.1. Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and nonpoint source pollution, and/or erosion and sedimentation.
	Objective 1.4. Promote and implement alternative stormwater management approaches, including low-impact development and rain gardens, to minimize adverse impacts of surface runoff from impervious areas, and to promote water quality within the watershed. Objective 3.3. Restore and enhance wildlife habitats.
Location	Installation-wide



# **Project 3. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.**

Potential Collaborators	USACE, CT DEEP
Project Description	Current wetland restoration/control of invasive species projects are using mowing/mulching with subsequent herbicide treatments to reduce invasive species biomass (All Habitat Services, 2020). Investigate alternative methods to reduce the spread of invasive species in on-base wetlands. Other methods, such as altering water levels or adjusting the topography, will be evaluated to identify other strategies to support native plant communities and prevent the spread of invasive species.

# **Project 4. Develop a Wetlands Restoration Plan.**

Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
Applicable INRMP Objective(s)	Objective 1.3. Enhance the function(s) and value(s) of aquatic freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.
Location	Installation-wide
Potential Collaborators	USACE, CT DEEP
Project Description	The Wetland Restoration Plan document will outline various conservation measures, mitigation techniques, and restoration activities that will enhance wetland health and function across SUBASE NLON.

#### **Project 5. Wetland Restoration Plan Implementation.**

Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 1.3. Enhance the function(s) and value(s) of aquatic freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.
	Objective 1.5. Avoid and protect wetlands in accordance with state regulations (at a minimum), and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.



	Objective 3.3. Restore and enhance wildlife habitats.
	Objective 3.5. Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.
Location	Wetland Habitats
Potential Collaborators	USFWS, USACE, CT DEEP
Project Description	<ul> <li>Restoration of wetlands will follow the Wetland Restoration Plan and will result in a multitude of ecological benefits including water quality improvement, habitat for native flora and fauna, sequestration of carbon, and absorption of floodwaters. Wetlands in need of restoration will be identified by the findings of the jurisdictional wetlands delineation and the wetlands condition assessment. The SUBASE NLON wetlands capture stormwater runoff from developed lands.</li> <li>Establishing native vegetation within installation wetlands will improve existing wetland values and functions and to prevent establishment of invasive species</li> </ul>

# Project 6. Herpetofauna Surveys.

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
Location	Installation-wide
Potential Collaborators	USFWS, CT DEEP, UCONN, Conn College
Project Description	Conduct surveys of herpetofauna across SUBASE NLON approximately every five years to maintain up-to-date data on amphibians and reptiles at SUBASE NLON and Admiral Fife Naval Recreation Area.

# **Project 7. Erosion Control.**

Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
Applicable	Objective 1.2. Apply best management practices for protecting water quality in
INRMP	order to minimize sediment inputs from erosion areas and shorelines, and to
Objective(s)	eliminate potential sources of direct and nonpoint source pollutant discharges.



Location	Installation-wide, Main Installation
Potential	n/a
Collaborators	
Project	Support erosion control projects implemented under the stormwater program
Description	across the installation to improve the stormwater drainage system.
	Recommendations for development of soil erosion and sediment control plans
	should be followed according to the Connecticut Guidelines for Soil Erosion
	and Sediment Control.

# Project 8. Develop an Installation Conservation Design Plan.

Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
	Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.
	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 1.4. Promote and implement alternative stormwater management approaches developed as part of the stormwater program, including low-impact development and rain gardens, to minimize adverse impacts of surface runoff from impervious areas, and to promote water quality within the watershed. Objective 1.5. Avoid and protect wetlands in accordance with state regulations (at a minimum), and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.
	Objective 2.1. Increase urban tree canopy, and conserve individual trees and groups of trees within the urban environment. Objective 2.2. Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.
	Objective 3.5. Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.
Location	Installation-wide
Potential	n/a
Collaborators	
Project	SUBASE NLON will develop an Installation Conservation Design Plan to
Description	facilitate the integration of the installation's grounds maintenance and stormwater programs with the natural resources program objectives.



## Project 8. Develop an Installation Conservation Design Plan.

Implementation of this plan will provide multiple natural resource benefits,
including enhancing wildlife habitat, promoting native plants and natural
habitats, reducing nonpoint source pollution, and conserving water. The plan
will outline beneficial landscaping BMPs for grounds maintenance areas and no-
mow areas; stormwater management practices, including LID practices (e.g.,
elimination of curb and gutter; use of permeable pavers; use of mulch, mowed
grass, or gravel for walkways) and green roofs; urban tree protection,
maintenance, and restoration; habitat enhancement of landscaped grounds for
wildlife and pollinator species (including where native plants, pollinator habitats,
bird boxes, bat houses, and rain gardens can be installed); and restoration and
management of natural areas for wildlife and pollinator species. The plan also
will include a blueprint of where these activities can occur on the installation.

#### **Project 9. Promote pollinator habitat.**

Applicable INRMP Goal(s)	<ul> <li>Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.</li> <li>Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.</li> <li>Goal 4. Provide sustainable natural-resources-related outdoor recreation</li> </ul>
	opportunities.
Applicable INRMP Objective(s)	Objective 2.2. Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.
	Objective 2.4. Evaluate existing habitat for pollinators and encourage the use of pollinator plants in landscaping.
	Objective 3.3. Restore and enhance wildlife habitats.
	Objective 3.5. Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.
	Objective 4.2. Develop and promote additional opportunities/sites for passive outdoor recreation, including establishment of watchable wildlife areas and nature trails.
Location	Installation-wide
Potential Collaborators	CT DEEP, USFWS, Navy
Project Description	As part of the Installation Conservation Design Plan, SUBASE NLON will increase habitat for valuable pollinators such as bees and butterflies. To provide habitat for native pollinators, diverse floral sources that provide a succession of



flowers throughout the spring, summer, and fall are needed, so that nectar and
pollen are available to insects for the entire growing season. Flowers of different
shapes also are needed to attract pollinators that have different body sizes and
mouthparts. Wildflower gardens will be created using native plants that have
adapted to Connecticut's growing conditions and native pollinators. Certain
areas may need to be designated as no-mow areas in order to allow flowering
plants to flourish. Once established, these sites also can be utilized as future
watchable wildlife viewing areas.

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.6. Implement integrated pest management controls to reduce or eliminate invasive or nuisance species, and species that pose a potential threat to human health.
Location	SUBASE NLON Wetland Sites 2B and Site 3, southern hillside of Alpha Lot, Rock Lake and AFNRA
Potential Collaborators	SUBASE NLON 1 <sup>ST</sup> LT or XO (for support crew); USDA, CT DEEP
Project Description	Site 2B - Annually apply herbicide treatment in spring and fall to an approximately 19 acres of wetland (includes adjacent upland buffers and island in the central portion of the wetland and mow/mulch invasives semiannually. Site 3 - Manual cutting of invasive shrubs. Alpha Lot - Annual late spring/early summer cutting of invasive shrubs. Rock Lake - Annual fall cutting of invasives. AFNRA - Annual herbicide application.

# Project 10. Invasive species control.

# **Project 11. Fish Stocking**

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.		
	Goal 4. Provide sustainable natural-resources-related outdoor recreation opportunities.		
Applicable INRMP Objective(s)	Objective 3.3. Restore and enhance wildlife habitats. Objective 4.1. Manage SUBASE NLON's hunting program to allow for the maximum participation possible without compromising the military mission, and to enable hunters to harvest the annual quotas recommended to maintain sustainable populations.		
Location	Rock Lake and other water bodies		



Potential	CT DEEP, Navy
Collaborators	
Project Description	Stocking fish within Rock Lake and other water bodies provides additional recreational activities for base personnel.

## **Project 12. Deer hunting on the installation.**

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Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.			
	Goal 4. Provide sustainable, natural-resources-related outdoor recreation opportunities.			
Applicable INRMP	Objective 3.3. Restore and enhance wildlife habitats.			
Objective(s)	Objective 3.4. Monitor populations and herd health of select game species to adjust harvest limits, as needed.			
	Objective 3.6. Implement integrated pest management controls to reduce or eliminate invasive or nuisance species, and species that pose a potential threat to human health.			
	Objective 4.1. Manage SUBASE NLON's hunting program to allow for the maximum participation possible without compromising the military mission, and to enable hunters to harvest the annual quotas recommended to maintain sustainable populations.			
Location	Installation-wide			
Potential Collaborators	N/A			
Project Description	SUBASE NLON currently controls deer population, as necessary, through operation of a bow-hunting program, which operates in accordance with CT State laws (hunt season: (September 15 through December 31 each year). Continuation of the program will help maintain the deer population at levels that limit deleterious impact of deer on facilities and grounds.			



#### Project 13. Canada goose population control.

#### **Project 14. Conduct Survey for Invertebrates and At-Risk Pollinators**

Applicable INRMP Goal(s)	Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.	
	vegetation communities, wildlife species populations, and suitable habitats.	
	Goal 7. Assess the potential impacts of climate change of natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement edentive management strategies to ansure the long	
	term sustainability of those resources and the military mission.	
Applicable INRMP Objective(s)	<i>Objective 2.4 Evaluate existing habitat for pollinators and encourage the use of pollinator plants in landscaping.</i>	
	<i>Objective 3.3 Restore and enhance wildlife habitats.</i>	
	<i>Objective 3.5 Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.</i>	
	<i>Objective 7.3 Implement natural resource management strategies and best management practices that provide</i>	



Project 14	Conduct Su	rvev for Ir	vertebrates	and At-Ris	k Pollinators
110jeee 14.	Conduct Sur	vcy 101 11	iver teor ates	and At-Ms	K I Unnatul S

	conservation benefits to the ecosystem and are intended to address risks posed by climate change.		
Location	SUBASE NLON and Admiral Fife Naval Recreation Area		
Potential Collaborators	CT DEEP, UCONN		
Project Description	Complete diversity and abundance surveys for at-risk pollinators in SUBASE and AFNRA habitats. Data will be used to evaluate presence of at-risk species on the installation and SUBASE properties and will help quantify the effectiveness of efforts to restore native plant species and create additional pollinator habitat.		

Project 15.	Complete	Nearshore	Habitat	and S	pecies	Survey
						•

Applicable INRMP Goal(s)	<ul><li>Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.</li><li>Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.</li></ul>
Applicable INRMP Objective(s)	<ul> <li>Objective 1.1 Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and nonpoint source pollution, and/or erosion and sedimentation.</li> <li>Objective 3.3 Restore and enhance wildlife habitats.</li> </ul>
Location	Nearshore
Potential Collaborators	CT DEEP, UCONN, USFWS, NOAA Fisheries
Project Description	Conduct surveys to provide updated data on the installation's near shore environment. Recommended components include TES acoustic monitoring, EFH assessment, benthic habitat surveys, and submerged aquatic vegetation mapping.



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Applicable INRMP Goal(s)	<ul><li>Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.</li><li>Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.</li></ul>
Applicable INRMP Objective(s)	<i>Objective 2.1</i> Increase urban tree canopy, and conserve individual trees and groups of trees within the urban environment.
	<i>Objective 2.2 Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.</i>
	<i>Objective 2.3 Implement a tree replacement policy during reviews of projects under the National Environmental Policy Act of 1969 (NEPA).</i>
	<i>Objective 3.3 Restore and enhance wildlife habitats.</i>
	<i>Objective 3.5 Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.</i>
Location	Installation-wide
Potential Collaborators	CT DEEP
Project Description	Develop a forest succession plan to develop a strategy to replace trees lost due to age, climate change, or infestation. Plan will include recommended species and improve policies and procedures for forest management.

# **Project 17. Develop Alternative Osprey Nesting Sites**

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	<i>Objective 3.1 Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.</i>



#### **Project 17. Develop Alternative Osprey Nesting Sites**

	Objective 3.2       Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species, as well as bats, to minimize "takes" of these species resulting from military readiness activities.         Objective 3.3       Restore and enhance wildlife habitats.	
Location	SUBASE NLON waterfront and aquatic habitat	
Potential Collaborators	Navy, USFWS, CT DEEP, PIF, NABCI	
Project Description	Ospreys have regularly constructed nests on cranes positioned on lower base along the Thames River. Project would add up to two nesting platforms away from SUBASE NLON's industrialized waterfront to help avoid operational conflicts.	

## **Project 18. NEPA Project Reviews.**

Applicable INRMP Goal(s)	Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving riparian areas.
Applicable INRMP Objective(s)	Objective 2.3. Implement a tree replacement policy during reviews of projects under the National Environmental Policy Act (NEPA).
Location	Installation-wide
Potential Collaborators	USFWS, CT DEEP, Navy
Project Description	Ongoing NEPA reviews of SUBASE NLON infrastructure projects for potential natural resources impacts (e.g. soil erosion control, tree cutting, wetland impacts, and floodplain impacts).

#### Project 19. Annually conduct a trash cleanup along the installation shoreline.

Applicable INRMP Goal(s)	<ul><li>Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.</li><li>Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.</li></ul>
Applicable	Objective 1.2. Apply best management practices for protecting water quality
INRMP	in order to minimize sediment inputs from erosion areas and shorelines, and to
Objective(s)	eliminate potential sources of direct and nonpoint source pollutant discharges.



	Objective 1.3. Enhance the function(s) and value(s) of aquatic freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.
	Objective 3.3. Restore and enhance wildlife habitats.
Location	Shoreline
Potential Collaborators	N/A
Project Description	An annual shoreline trash cleanup will be organized, with volunteers recruited to participate. This cleanup can be held on volunteer-oriented days such as Earth Day or National Public Lands Day.

# Project 19. Annually conduct a trash cleanup along the installation shoreline.

#### **Project 20. Develop and print educational brochures or factsheets.**

Applicable INRMP Goal(s)	Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receives adequate training and resources, and by promoting environmental awareness, education, and outreach among internal and external stakeholders.
Applicable INRMP Objective(s)	Objective 5.2. Implement training, education, outreach, and stewardship initiatives for ecosystem management.
Location	n/a
Potential Collaborators	USFWS, CT DEEP
Project Description	SUBASE NLON will develop and print educational brochures and factsheets to share with installation residents, personnel, and visitors. These resources can be used to increase awareness of the installation's natural resources and the programs in place to conserve them.

## **Project 21. Attend Training.**

Applicable INRMP Goal(s)Goal 5. Integrate the various activities conducted un that natural resource staff receive adequate training a promoting environmental awareness, education, and external stakeholders.	Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receive adequate training and resources, and by promoting environmental awareness, education, and outreach among internal and external stakeholders.
	Goal 7. Assess the potential impacts of climate change of natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.



# **Project 21. Attend Training.**

Applicable INRMP	Objective 5.1. Provide adequate staffing, equipment, technology, and training for the NRP to ensure proper implementation of this INRMP.	
Objective(s)	Objective 7.1. Participate in, contribute to, or at least monitor the findings of, regional partnerships focused on regional or landscape-scale assessment,	
Location	monitoring, and adaptation of natural resources to chinate change.	
Diation		
Potential Collaborators	n/a	
Project Description	• The Natural Resource Manager will attend trainings on natural resource issues, applicable laws and regulations, and other subjects relevant to natural resource management and conservation.	

#### Project 22. Develop a climate change vulnerability assessment and adaptation plan.

Applicable INRMP Goal(s)	Goal 7. Assess the potential impacts of climate change on natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.	
Applicable INRMP Objective(s)	Objective 7.2. Conduct a vulnerability assessment of how climate change may affect the natural resources of interest, and develop and implement a climate adaptation plan.	
Location	Installation-wide	
Potential Collaborators	UCONN, CT DEEP	
Project Description	A climate change vulnerability assessment project for SUBASE NLON will provide a detailed analysis of installation natural resources that are at-risk from climate change. This vulnerability assessment can then be used to devise installation-specific climate adaptation strategies. The vulnerability assessment and adaptation plan also will address the following factors:	
	Sea level rise scenarios	
	<ul> <li>Potential flood zone shifts caused by sea-level-rise scenarios</li> </ul>	
	• Evaluating the risk to hazardous waste and oil locations from sea level rise, storm surge, and flood zone shifts	



Project 23. Department of the Navy Annual	Natural Resources Program Data-Call and
Metrics.	

Applicable INRMP	n/a
Goal(s)	
Applicable INRMP	n/a
Objective(s)	
Location	Installation-wide
Potential Collaborators	n/a
Project Description	Annual review and update of the SUBASE NLON INRMP and completion of Department of Defense data calls

# Project 24. Conduct five-year revision to the INRMP.

Applicable	n/a
INRMP Goal(s)	
Applicable	n/a
INRMP	
Objective(s)	
Location	n/a
Potential	CT DEEP, NYSDEC, USFWS, NOAA Fisheries
Collaborators	
Project	The INRMP will be updated annually, as well as revised every five years, per
Description	the Sikes Act. Failure to maintain an updated INRMP would violate the Sikes
	Act and could subject the installation to enforcement actions from federal and
	state wildlife regulatory agencies that could affect the military mission. The
	objective of the SUBASE NLON INRMP is to furnish recommendations and
	scheduled implementation for the proper stewardship, management, and
	protection of the natural resources at the installation. Updates entail
	incorporation of new survey data, update of existing GIS layers, incorporation of
	any species that might become listed or identified as being at risk, incorporation
	of changes in natural resources management, and update of the INRMP project
	implementation tables. The next comprehensive five-year revision is
	programmed for 2026.



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#### 5.2 **PROJECT RELATIONSHIPS TO GOALS AND OBJECTIVES**

Table 5-1 is a cross-reference table showing the alignment of projects to INRMP goals/objectives. Note that projects are activities that require programmed or external funding. In Chapter 4, additional management actions are described for the implementation of the INRMP goals and objectives.

Goals / Objectives	Applicable Projects	
Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.		
Objective 1.1. Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and nonpoint source pollution, and/or erosion and sedimentation.	<ul> <li>Project 3. Evaluate the condition of wetlands and prioritize areas in need of wetlands restoration.</li> <li>Project 15. Complete Nearshore Habitat and Species Survey</li> </ul>	
Objective 1.2. Apply best management practices for protecting water quality to minimize sediment inputs from erosion areas and shorelines, and to eliminate potential sources of direct and nonpoint source pollutant discharges.	<ul> <li>Project 7. Erosion Control.</li> <li>Project 16. Annually conduct a trash cleanup along the installation shoreline.</li> </ul>	
Objective 1.3. Enhance the function(s) and value(s) of aquatic, freshwater ecosystems through the protection and restoration of wetlands and riparian areas.	<ul> <li>Project 4. Develop a Wetlands Restoration Plan.</li> <li>Project 5. Wetland Restoration Plan Implementation.</li> <li>Project 19. Annually conduct a trash cleanup along the installation shoreline.</li> </ul>	
Objective 1.4. Promote and implement alternative stormwater management approaches, including low-impact development and rain gardens, to minimize adverse impacts of surface runoff from impervious areas, and to promote water quality within the watershed.	<ul> <li>Project 3. Evaluate the condition of wetlands and prioritize areas in need of wetlands restoration.</li> <li>Project 8. Develop an Installation Conservation Design Plan.</li> </ul>	

#### Table 5-1: Projects and Goals/Objectives Cross –Reference Table





Table 5-1: Projects and	<b>Goals/Objectives</b>	<b>Cross</b> – <b>Reference Table</b>
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Goals / Objectives	Applicable Projects	
Objective 1.5. Avoid and protect wetlands in accordance with state regulations (at a minimum) and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.	<ul> <li>Project 5. Wetland Restoration Plan Implementation.</li> <li>Project 8. Develop an Installation Conservation Design Plan.</li> </ul>	
Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and conserving rinarian areas		
Objective 2.1. Increase urban tree canopy, and conserve individual trees and groups of trees within the urban environment.	<ul> <li>Project 8. Develop an Installation Conservation Design Plan.</li> <li>Project 16. Develop a Forest Succession Plan</li> </ul>	
<i>Objective 2.2. Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.</i>	<ul> <li>Project 8. Develop an Installation Conservation Design Plan.</li> <li>Project 9. Promote pollinator habitat.</li> <li>Project 16. Develop a Forest Succession Plan</li> </ul>	
Objective 2.3. Implement a tree replacement policy during reviews of projects under the National Environmental Policy Act (NEPA).	<ul> <li>Project 15. NEPA Project Reviews.</li> <li>Project 16. Develop a Forest Succession Plan</li> </ul>	
<i>Objective 2.4. Evaluate existing habitat for pollinators and encourage the use of pollinator plants in landscaping.</i>	<ul><li>Project 9. Promote pollinator habitat.</li><li>Project 14. Conduct Survey for At-Risk Pollinators</li></ul>	
Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.		
<i>Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.</i>	<ul> <li>Project 1. Migratory bird surveys.</li> <li>Project 2. Survey for the presence of the northern long-eared bat, Indiana Bat, and other bat species.</li> <li>Project 6. Herpetofauna surveys.</li> <li>Project 17. Develop Alternative Osprey Nesting Sites.</li> </ul>	



Goals / Objectives	Applicable Projects
Objective 3.2. Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species, as well as bats, to minimize "takes" of these species resulting from military readiness activities.	<ul> <li>Project 1. Migratory bird surveys.</li> <li>Project 17. Develop Alternative Osprey Nesting Sites.</li> </ul>
Objective 3.3. Restore and enhance wildlife habitats.	<ul> <li>Project 3. Evaluate the condition of wetlands and prioritize areas in need of wetlands restoration.</li> <li>Project 5. Wetland Restoration Plan implementation.</li> <li>Project 8. Conduct a nearshore habitat assessment and species inventory.</li> <li>Project 9. Promote pollinator habitat.</li> <li>Project 11. Fish Stocking.</li> <li>Project 12. Deer hunting on the installation.</li> <li>Project 13. Canada goose population control Project</li> <li>Project 14. Conduct Survey for At-Risk Pollinators</li> <li>Project 15. Complete Nearshore Habitat and Species Survey</li> <li>Project 16. Develop a Forest Succession Plan</li> <li>Project 19. Annually conduct a trash cleanup along the installation</li> </ul>
<i>Objective 3.4. Monitor populations and herd health of select game species to adjust harvest limits, as needed.</i>	<ul> <li>Project 12. Deer hunting on the installation.</li> </ul>
<i>Objective 3.5. Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.</i>	<ul> <li>Project 5. Wetland Restoration Plan implementation.</li> <li>Project 8. Develop an Installation Conservation Design Plan.</li> <li>Project 9. Promote pollinator habitat.</li> <li>Project 14. Conduct Survey for At-Risk Pollinators.</li> <li>Project 16. Develop a Forest Succession Plan.</li> </ul>

# Table 5-1: Projects and Goals/Objectives Cross –Reference Table



Table 5-1: Projects and	Goals/Objectives	<b>Cross</b> – <b>Reference Table</b>
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Goals / Objectives	Applicable Projects
Objective 3.6. Implement integrated pest management controls	Project 10. Invasive species control.
to reduce or eliminate invasive or nuisance species, and species	• Project 12. Deer hunting on the installation.
that pose a potential threat to human health.	• Project 13. Canada goose population control.
Goal 4. Provide sustainable natural-resources-related of	atdoor recreation opportunities.
<i>Objective 4.1. Manage SUBASE NLON's hunting program to</i>	Project 11. Fish Stocking.
allow for the maximum participation possible without	• Project 12. Deer Hunting on the Installation.
compromising the military mission, and to enable hunters to	
harvest the annual quotas recommended to maintain sustainable	
populations.	
<i>Objective 4.2. Develop and promote additional</i>	Project 9. Promote Pollinator Habitat.
opportunities/sites for passive outdoor recreation, including	
establishment of watchable wildlife areas and nature trails.	
Goal 5. Integrate the various activities conducted under	this INRMP by ensuring that natural resource staff receives
adequate training and resources, and by promoting env	ironmental awareness, education, and outreach among internal and
external stakeholders.	
Objective 5.1. Provide adequate staffing, equipment,	Project 21. Attend Training.
technology, and training for the NRP to ensure proper	
implementation of this INRMP.	
Objective 5.2. Implement training, education, outreach, and	• Project 20. Develop and Print Educational Brochures or Factsheets.
stewardship initiatives for ecosystem management.	
Objective 5.3. Provide opportunities for public access among	
regional stakeholders for environmental education and	(no project identified)
scientific research and study consistent with resource	(no project identified)
conservation, in coordination with SUBASE NLON's NRP.	



# Table 5-1: Projects and Goals/Objectives Cross –Reference Table

Goals / Objectives	Applicable Projects
Objective 5.4. Educate employees, tenants, housing residents, contractors, and academic institutions about natural resources issues and best management practices to protect the Thames River watershed, and engage these parties in conservation initiatives.	(no project identified)
Goal 6. Protect, conserve, and enhance the ecological va	lue and diversity of natural resources by building productive
relationships with resource and regulatory agencies, reg	ional partnerships, nongovernmental organizations (NGO),
universities, and the public, to sustain the military missi	on.
Objective 6.1. Maintain interagency cooperation with the USFWS, Connecticut Department of Energy and Environmental Protection (CT DEEP), New York State Department of Environmental Conservation (NYSDEC) and New York Department of the State (for coastal issues in Long Island Sound).	(no project identified)
Objective 6.2. Develop partnerships with the National Oceanic and Atmospheric Administration (NOAA) Fisheries, DOD Partners in Flight (PIF), academic institutions, and other local agencies and organizations to implement wildlife monitoring and protection programs and habitat restoration projects.	(no project identified)
<i>Objective</i> 6.3. <i>Maintain Naval Branch Health Clinic (NBHC)</i> Groton's continued work with the Connecticut Department of Agriculture for mosquito surveillance on and off base.	(no project identified)



# Table 5-1: Projects and Goals/Objectives Cross –Reference Table

Goals / Objectives	Applicable Projects	
Goal 7. Assess the potential impacts of climate change on natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission		
Objective 7.1. Participate in, contribute to, or at least monitor the findings of regional partnerships focused on regional or landscape-scale assessment, monitoring, and adaptation of natural resources to climate change.	Project 21. Attend Training.	
<i>Objective 7.2. Conduct a vulnerability assessment of how climate change may affect the natural resources of interest, and develop and implement a climate adaptation plan.</i>	• Project 22. Develop a Climate Change Vulnerability Assessment and Adaptation Plan.	
Objective 7.3. Implement natural resource management strategies and best management practices that provide conservation benefits to the ecosystem and are intended to address risks posed by climate change.	Project 14. Conduct Survey for At-Risk Pollinators	
All goals applicable		
All Objectives applicable	<ul> <li>Project 23. Department of the Navy Annual Natural Resources Program Data-Call and Metrics.</li> <li>Project 24. Conduct a Five-Year Revision of the INRMP.</li> </ul>	



# **6.0 IMPLEMENTATION**

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. This INRMP will be considered implemented once the following actions are completed:

- Funding is secured for completion of all Environmental Readiness Level (ERL) 4 projects, as described in Section 6.3.
- Installation is staffed with enough professionally trained environmental personnel needed to perform the tasks required by the INRMP.
- Annual coordination with all cooperating offices is performed.
- Specific INRMP action accomplishments that are undertaken are documented each year.

The following sections provide an overview of the role that implementation of this INRMP would play in understanding project development and classification, achieving no net loss, identifying funding sources, establishing commitment, and endorsing the use of cooperative agreements. The project table presented in Appendix C 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. The project list in Appendix C summarizes the funding-dependent projects according to the ERLs described in Section 6.1.2.

# 6.1 **PROJECT DEVELOPMENT AND CLASSIFICATION**

This INRMP is a public document that requires the mutual agreement of the installation, the USFWS, and state fish and wildlife agencies. It is, therefore, crucial that these entities reach a common understanding as to which projects are most likely to be funded through the sources identified in Section 6.3. An annual strategy must be adopted for INRMP funding that addresses the installation's legal requirements. 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 funding classification of recurring and nonrecurring projects consists of four ERLs, as defined by OPNAV M-5090.1. The ERLs, as defined below, are listed in order of funding priority, where ERL 4 is the absolute minimum requirement to achieve compliance and has the highest funding priority.

Environmental Readiness Level 4 (ERL 4) - Environmental Compliance

• ERL 4 is for legal requirements derived from existing laws, regulations, EOs, final governing standards, or the Overseas Environmental Baseline Guidance Document, as applicable; and applies to Navy activities, platforms, and operations.

Environmental Readiness Level 3 (ERL 3) - Navy or DOD Policy Requirement

• ERL 3 is for requirements derived from DOD policy and Navy policy, or proactive initiatives that could enable future compliance or result in a positive return on Navy



investments. They could also support critical readiness activities by decreasing encumbrances of statutory compliance requirements. These efforts are not mandated by law or other federal, state, or local requirements but would minimize current or future impacts (including costs) on the Navy mission.

Environmental Readiness Level 2 (ERL 2) - Pending Requirements for Future Compliance

• ERL2 is for requirements derived from pending federal, state, or local legal requirements, laws, regulations, or EOs that could enable future compliance but result in less certain returns on investments and uncertain benefits to the Navy mission. These project efforts are not mandated by existing law or other federal, state, or local requirements. Funding requirements should be based on best available scientific or commercial data; or on pending federal, state, or local regulations under development (where publication is scheduled) under model state regulations or permit standards, if available.

Environmental Readiness Level 1 (ERL 1) - Navy Environmental Stewardship

• ERL 1 is for investments in environmental leadership and general proactive environmental stewardship.

#### 6.1.2 Project Classification

The list of projects described in this INRMP consists of both "must fund" compliance-type projects and stewardship-type projects. "Must fund" compliance-type projects and activities must meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including EOs. These projects are designated ERL 4 in the Navy funding classification system, described above in Section 6.1.1.

"Must fund," or ERL 4, projects could include

- Developing, updating, and revising INRMPs;
- Salaries and annual training of professional personnel, in accordance with Individual Development Plans, involved in the development and implementation of INRMPs;
- Terms and conditions of biological opinions issued by the USFWS or NOAA Fisheries;
- 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 Program, Coral Reef Protection Program, Chesapeake Bay Program, and Mojave Desert Ecosystem Management Initiative; and
- Memoranda of agreement/understanding (MOA/MOU) commitments.



This list is not intended to be all-inclusive, and not all examples may be applicable to SUBASE NLON; the intent is 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, or ERL 1 or 2, 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;
- forest stand improvements and other management efforts; and
- wildlife management efforts.

All INRMP projects must be entered into the Environmental Program Requirements Web system (EPR-web) to receive funding. CNO Environmental Readiness Division is the final authority for designating the appropriate ERL for a given INRMP project.

## 6.2 ACHIEVING NO NET LOSS OF MILITARY MISSION

Section 101(b)(1)(I) of the Sikes Act states that each INRMP shall, to the extent appropriate and applicable, and consistent with the use of the installation to ensure the preparedness of the Armed Forces, provide for "no net loss in the capability of military installation lands to support the military mission of the installation." It is DOD policy that appropriate management objectives to protect mission capabilities of installation lands (from which annual projects are developed) be clearly articulated and receive high priority in the INRMP planning process (Navy, 2006).

The effectiveness of this INRMP in preventing "net loss" will be evaluated annually. Mission requirements and priorities identified in this INRMP will, where applicable, be integrated into other environmental programs and policies. It is not the intent that natural resources are to be consumed by mission requirements, but rather are sustained for the use of mission requirements. In order to achieve this, the goal of this INRMP is to conserve the environment for the purpose of the military mission. There may be instances in which a "net loss" may be unavoidable in order to fulfill regulatory requirements other than the Sikes Act, such as complying with a Biological Opinion under the provisions of the ESA, or from the protection of wetlands under the provisions of the CWA. However, both the USFWS and USACE are required to adhere to the Sikes Act provision of no net loss. Loss of mission capability in these instances will be identified



in the annual update of the INRMP and will include a discussion of measures being undertaken to recapture any net loss in mission capability.

## 6.3 FUNDING SOURCES

Once INRMP projects have been validated and entered into EPR-web, ERL 4 and 3 projects are typically programmed in for funding. ERL 2 and 1 projects are not usually funded through the EPR-web system, and alternate sources of funding should be sought for these projects. EPR-web project entries should include clear justification of funds being requested so that 1) natural resources funds are distributed wisely, and 2) funding levels are not threatened by the use of funds in ways that are inconsistent with funding program rules (U.S. Department of the Navy, 2006).

## 6.3.1 Operation and Maintenance, Navy (O&MN) Environmental Funds

Most natural resources projects are funded with O&MN environmental funds and are primarily restricted to support "must-fund" environmental compliance projects (i.e., Navy ERL 4 projects). O&MN funds are generally not allocated for ERL 1–3 projects. Other limitations for the use of O&MN funds include the following:

- Only the initial procurement, construction, and modification of a facility or project are considered valid environmental funding requirements. The subsequent operation, modification due to mission requirements, maintenance, repair, or eventual replacement is considered a Real Property Maintenance funding requirement.
- When natural resources requirements are tied to a specific construction project or other action, funds for the natural resources requirements should be included in the overall project costs.

O&MN Environmental Funds are expected to be the primary source of funding for SUBASE NLON INRMP Environmental Compliance projects.

# 6.3.2 DOD Legacy Resource Management Program

The Legacy Program was part of a special Congressionally mandated initiative for funding military conservation projects. Although the Legacy Program was originally funded from 1991 to 1996 only, funds for new projects have continued to be available through this program. Legacy Program funds can be used for 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. More information on requirements for Legacy Program applications can be found at: www.denix.osd.mil/legacy.

Requests for Legacy funds should consider the following:

- The availability of Legacy Program funds is generally uncertain early in the year.
- Pre-proposals for Legacy Program projects are due in March and submitted using the Legacy Program Tracker Website: <u>http://www.dodlegacy.org/</u>.
- Project proposals are reviewed by the Navy chain of command before being submitted to the DOD Legacy Resources Management Office for final project selection.



• The Legacy Program website provides further guidance on the proposal process and types of projects requested.

Legacy Program funds should be considered as a potential funding source for SUBASE NLON INRMP projects.

#### 6.3.3 Forestry Revenues

Forestry Revenues originate from the sale of forest products on Navy lands and can be used to fund forestry and potentially other natural resources management programs. SUBASE NLON does not have the potential for Forestry Revenues because of lack of harvestable forested areas; therefore, this Navy funding source is not applicable.

#### 6.3.4 Agricultural Outleasing Funds

Agricultural Outleasing funds are collected through the leasing of Navy-owned property for agricultural use. However, SUBASE NLON does not have any Agricultural Outleases; therefore, this funding source is not applicable.

#### 6.3.5 Fish and Wildlife Fees

Fish and wildlife fees are generally collected as part of installation hunting, fishing, or trapping programs. 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 from where they are collected and be used exclusively for fish and wildlife conservation and management at the installation where they are collected.

MWR does not charge for fishing at SUBASE NLON, and fees are not charged by the ED for participation in the deer hunt.

## 6.3.6 Recycling Funds

Installations that have a Qualified Recycling Program (QRP) may use their proceeds for some types of natural resources projects. Any proceeds collected as part of the installation QRP must first be used to cover QRP costs, and then up to 50 percent 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.

#### 6.3.7 Strategic Environmental Research and Development Program (SERDP) Funds

The SERDP is the DOD's corporate environmental research and development program, planned and executed in full partnership with the Department of Energy and USEPA, with participation by numerous other federal and nonfederal organizations (Navy, 2006). SERDP funds are allocated for environmental and conservation projects through a competitive process. The focus of the SERDP is on cleanup, compliance, conservation, and pollution prevention technologies. The process involved with allocation of SERDP funds is competitive and it may be difficult for SUBASE NLON to receive funds through this source.



# 6.3.8 Other 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 nonfederal matching funds; however, installations can partner with other groups for preparing proposals for eligible projects.

Other natural resource funding sources may be available to the installation only through a partnership with the state or nonprofit organizations. Section 3.6 discusses potential partnerships and collaboration available to SUBASE NLON. SUBASE NLON should consider grant funding and partnerships as a potential funding source for INRMP projects.

Some potential opportunities for funding and grants in collaboration with SUBASE NLON partners include the following:

- National Fish and Wildlife Foundation (NFWF)
  - NFWF has more than 50 grant programs to protect and restore wildlife and habitats, for example:
    - *Five Star and Urban Waters Restoration Program* This funding is focused on stewardship and restoration of coastal, wetland, and riparian ecosystems.
    - Long Island Sound Futures Fund Supports projects to fully restore the health and living resources of Long Island Sound. It operates within a partnership of federal and state agencies, foundations, non-governmental organizations, educational institutions, user groups, and individuals dedicated to restoring and protecting the Sound.
    - *Monarch Butterfly and Pollinators Conservation Fund* Supports work that advances the conservation of the monarch butterfly and other at-risk native insect pollinators.

Federal, state, and local governments, educational institutions, and nonprofit organizations are eligible to apply.

# 6.4 COMMITMENT

This INRMP will require formal adoption by the SUBASE NLON Commanding Officer to ensure commitment for pursuing funding and to execute all ERL 4 projects, subject to the availability of funding. Funding of ERL 4 projects should be pursued within the specific timeframes identified in the projects table in Appendix C of this INRMP.

# 6.5 COOPERATIVE AGREEMENTS

A cooperative agreement is used to acquire goods or services or stimulate an activity that will be implemented for the public good. Section 103a of the Sikes Act (16 USC §670c-1) provides the authority to enter into cooperative agreements with state and local governments, NGOs, and individuals to provide for the maintenance and improvement of natural resources or to benefit natural and historic research on DOD installations. In addition to standard cooperative



agreements, examples of other agreements include MOAs/MOUs and Cooperative Assistance Agreements. Funds appropriated for multiyear agreements during a fiscal year may be obligated to cover the cost of goods and services provided under a cooperative agreement entered, or through, an agency agreement during any 18-month period beginning in that fiscal year, without regard to whether the agreement crosses fiscal years. Cooperative agreements entered are subject to the availability of funds.

EO 13352, *Facilitation of Cooperative Conservation*, directs that the Secretaries of the Interior, Agriculture, Commerce, and Defense, and the Administrator of the USEPA shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate (Bush, 2004), do the following:

- Carry out the programs, projects, and activities of the agency that they respectively head that implements laws relating to the environment and natural resources in a manner that facilitates cooperative conservation;
- Take appropriate account, and respect the interests, of persons with ownership or other legally recognized interests in land and other natural resources;
- Properly accommodate local participation in federal decision making; and
- Provide that the programs, projects, and activities are consistent with protecting public health and safety.
  - SUBASE NLON has a cooperative agreement with NOAA Fisheries (formerly known as NMFS) for handling marine mammals or sea turtle stranding's and whale necropsies. In the event of a live or dead stranding on SUBASE NLON, installation personnel will immediately contact the NOAA Fisheries regional stranding coordinator(s) and secure the area (Appendix H).



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# 7.0 REFERENCES

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### APPENDIX A. LIST OF ACRONYMS AND ABBREVIATIONS

## A

AFNRA – Admiral Fife Naval Recreation Area

AFPMB – Armed Forces Pest Management Board

ANSI – American national Standards Institute

# В

BRAC - Base Realignment and Closure

BMP - Best Management Practice

### C

°C – degrees Celsius

CAC - Common Access Card

CAES – Connecticut Agricultural Experiment Station

Cal-IPC – California Invasive Plan Council

CBMD – Coordinated Bird Monitoring Database

CCMA – Connecticut Coastal Management Act

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

CEQ – Council on Environmental Quality

CFR – Code of Federal Regulations

CGS - Connecticut General Statues

CHRIMP – Consolidated Hazardous Material Inventory Management Program CNDD – Connecticut Natural Diversity Database

CNIC – Commander, Navy Installations Command

CNO - Chief of Naval Operations

CNO (N45) – Chief of Naval Operations Energy and Environmental Readiness Division

CNRMA – Commander, Navy Region, Mid-Atlantic

COMNAVFACENGCOM – Commander, Naval Facilities Engineering Command

Conn College – Connecticut College

CT - Connecticut

CT DEEP – Connecticut Department of Energy and Environmental Protection

CWA – Clean Water Act

CWD – Chronic Wasting Disease

CZMA – Coastal Zone Management Act of 1972

# D

dbh - diameter at breast height

DOD – Department of Defense

DODI – Department of Defense Instruction

**DPS** – Distinct Population Segments



DRMO – Defense Reutilization and Marketing Office

# E

E&SC-erosion and sediment control

EA - Environmental Assessment

EEE - eastern equine encephalitis

ED – Environmental Division

EDMWeb – Environmental Data and Metrics

EFH – Essential Fish Habitat

EO – Executive Order

EPR-web – Environmental Program Requirements Web system

ER - Environmental Restoration

ERL – Navy Environmental Readiness Level

ESA – Endangered Species Act of 1973

EUL – Enhanced Use Leasing

## F

°F – degrees Fahrenheit

FEMA – Federal Emergency Management Agency

FONSI - Finding of No Significant Impact

# G

GCN - greatest conservation need

GIS – geographic information system

GP – General Permit

GPS - global positioning system

# Ι

ICO – Installation Commanding Officer

IEPM – Installation Environmental Program Managers

IHA - Incidental Harassment Authorization

INRMP – Integrated Natural Resources Management Plan

Installation – Naval Submarine Base New London, or SUBASE NLON

IPM - Integrated Pest Management

ISA – International Society of Arboricultural

L LCC – Landscape Conservation Cooperative

LUC - Land Use Controls

LID - Low Impact Development

LOA - Letter of Authorization

### Μ

M-A-M – mile-a-minute

MA – Massachusetts

MBTA – Migratory Bird Treaty Act

MIDLANT – Mid-Atlantic

MMPA – *The Marine Mammal Protection Act of 1972* 

MOA/MOU – Memorandum of Agreement/Understanding



MOU – Memorandum of Understanding

MSA – Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006

MW-megawatts

MWR - Morale Welfare and Recreation

N NABCI – North American Bird Conservation Initiative

NAVFAC – Naval Facility

Navy – U.S. Department of the Navy

NBHC - Naval Branch Health Clinic

NEPA – National Environmental Protection Act of 1969

NFWF – National Fish and Wildlife Foundation

NGO - Nongovernmental Organization

NH - New Hampshire

NMFS - National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

NPL – National Priorities List

NPS – nonpoint source

NRCS – Natural Resources Conservation Service

NRM - Natural Resources Manager

NRP – Natural Resource Program

NSA - Naval Support Activity

NY-New York

NYSDEC – New York State Department of Conservation

## 0

O&MN - Operation and Maintenance, Navy

OBDA - Overbank Disposal Area

OBDANE – Overbank Disposal Areas Northeast

OPNAVINST – Chief of Naval Operations Instructions

### Р

PARC – Partners in Amphibian and Reptile Conservation

PIF – Partners in Flight

P.L. – Public Law

PLC – product line coordinator

PMP -- Integrated Pest Management Plan

PWD – Public Works Department

Q QRP – Qualified Recycling Program

R RD – Remedial Designs

REPI – Readiness and Environmental Integration

### S

SARA - Superfund Amendments and Reauthorization Act

SAV - submerged aquatic vegetation



SDSFIE – spatial data standards for facilities, infrastructure, and environment

SERDP – Strategic Environmental Research and Development Program

Sikes Act – Sikes Act Improvement Act of 1997

SLAMM – Sea Level Affecting Marshes Models

SLR – sea level rise

SUBASE NLON – Naval Submarine Base New London

SWG - State Wildlife Grants

SWPPP – Stormwater Pollution Prevention Plan

## Т

TES - Threatened and Endangered Species

TMDL - total maximum daily load

## U

UCONN - University of Connecticut

URI – University of Rhode Island

USACE – U.S. Army Corps of Engineers

USC – U.S. Code

USCG – U.S. Coast Guard

USDA – U.S. Department of Agricultural

USEPA – U.S. Environmental Protection Agency

USFWS – U.S. Fish and Wildlife Service

USGS – U.S. Geological Survey

### W

WAP – Wildlife Action Plan

WNS – white nose syndrome



### APPENDIX B. FLORA AND FAUNA SPECIES LISTS

Common Name	Scientific Name
Trees	
American Beech	Fagus grandifolia
American Chestnut	Castanea dentata
American Elm	Ulmus americana
Atlantic White Cedar	Chamaecyparis thyoides
Beaked Willow	Salix bebbiana
Bigtooth Aspen	Populus grandidentata
Black Birch	Betula lenta
Black Cherry	Prunus serotina
Black Gum	Nyssa sylvatica
Black Oak	Quercus velutina
Black Willow	Salix nigra
Cottonwood	Populus deltoides
Eastern Hemlock	Tsuga canadensis
Flowering Dogwood	Cornus florida
Gray Birch	Betula populifolia
Hornbeam	Carpinus carolinana
Mockernut Hickory	Carya tomentosa
Pignut Hickory	Carya glabra
Quaking Aspen	Populus tremuloides
Red Cedar	Juniperus virginiana
Red Maple	Acer rubrum
Red Oak	Quercus rubra
Red Osier Dogwood	Cornus sericea (formerly C. stolonifera)
Sassafras	Sassafras albidum
Silky Dogwood	Cornus amomum
Smooth Alder	Alnus serrulata
Speckled Alder	Alnus incana ssp. rugosa
Sugar Maple	Acer saccharinum
Tulip-tree	Liriodendron tulipifera
White Ash	Fraxinus americana
White Oak	Quercus alba
White Pine	Pinus strobus

### Table B-1: Flora Observed on SUBASE NLON



Common Name	Scientific Name
Yellow Birch	Betula alleghaniensis
Shrubs	
Autumn Olive	Elaeagnus umbellata
Bayberry	Morella pensylvanica (formerly Myrica)
Black Chokeberry	Aronia melanocarpa (formerly Photinia melanocarpa)
Buttonbush	Cephalanthus occidentalis
Common Blackberry	Rubus allegheniensis
Common Elderberry	Sambucus canadensis
Great Laurel	Rhododendron maximum
Groundsel Tree	Baccharis halimifolia
Highbush Blueberry	Vaccinium corymbosum
Huckleberry	Gaylussacia baccata
Japanese Barberry	Berberis thunbergii
Maleberry	Lyonia ligustrina
Maple-leaved Viburnum	Viburnum acerifolium
Marsh Elder	Iva frutescens
Meadowsweet	Spiraea alba var. latifolia
Mountain Laurel	Kalmia latifolia
Multiflora Rose	Rosa multiflora
Northern Arrowwood	Viburnum recognitum
Poison Sumac	Toxicodendron vernix (formerly Rhus vernix)
Privet	Ligustrum vulgare
Serviceberry	Amelanchier sp.
Shrub Honeysuckle	Lonicera sp.
Spicebush	Lindera benzoin
Staggerbuch	Lyonia mariana
Staghorn Sumac	Rhus typhina
Swamp Azalea	Rhododendron viscosum
Swamp Leucothoe	Eubotrys racemosus (formerly Leucothoe racemosa)
Swamp Rose	Rosa palustris
Sweet Fern	Comptonia peregrina
Sweet Gale	Myrica gale
Sweet Pepperbush	Clethra alnifolia
Winged Euonymus	Euonymus alatus



Common Name	Scientific Name
Winged Sumac	Rhus copallina
Winterberry	Ilex verticillata
Witch Hazel	Hamamelis virginiana
Herbs	
Arrow Arum	Peltandra virginica
Arrow-leaved Tearthumb	Polygonum sagittatum
Bedstraw	Galium sp.
Big-leaved Arrowhead	Sagittaria latifolia
Blue Flag	Iris versicolor
Blue-stemmed goldenrod	Solidago caesia
Boneset	Eupatorium perfoliatum
Broad-leaved Helleborine	Epipactis helleborine
Bushy Aster	Symphyotrichum dumosum (formerly Aster dumosus)
Butter and Eggs	Linaria vulgaris
Canada Mayflower	Maianthemum canadense
Cardinal Flower	Lobelia cardinalis
Clearweed	Pilea pumila
Climbing False Buckwheat	Polygonum scandens
Coltsfoot	Tussilago farfara
Common Burdock	Arctium minus
Cow Vetch	Vicia cracca
Deadly Nightshade	Solanum dulcamara
Dewberry	Rubus flagellaris
Duckweed	Lemna minor
Enchanter's Nightshade	<i>Circaea</i> sp.
False Hellebore	Veratrum viride
False Nettle	Boehmeria cylindrica
False Solomon's Seal	Maianthemum racemosum (formerly Smilacina racemosa)
Ground Cedar	Lycopodium tristachyum
Halberd-leaved Tearthumb	Polygonum arifolium
Horsetail	<i>Equisetum</i> sp.
Indian Cucumber-root	Medeola virginiana
Indian Pipe	Monotropa uniflora
Jack-in-the-Pulpit	Arisaema sp.



Common Name	Scientific Name
Japanese Knotweed	Polygonum cuspidatum
Jewelweed	Impatiens capensis
Lance-leaved Goldenrod	Solidago graminifolia
Norther Willow Herb	<i>Epilobium ciliatum</i> (formerly <i>E. glandulosum</i> )
Orach	Atriplex patula
Partridgeberry	Mitchella repens
Pickerelweed	Pontederia cordata
Purple Joe-Pye-Weed	Eupatorium purpureum
Rattlesnake Plantain	Goodyera sp.
Rough-stemmed Goldenrod	Solidago rugosa
Sea Lavender	Limonium carolinianum
Seaside Goldenrod	Solidago sempervirens
Shinleaf	Pyrola elliptica
Skunk Cabbage	Symplocarpus foetidus
Sphagum Moss	Sphagnum sp.
St. John's Wort	Hypericum sp.
Stinging Nettle	Urtica dioica
Striped Wintergreen	Chimaphila maculata
Tall Meadow Rue	Thalictrum pubescens
Tree Club-moss	Lycopodium obscurum
Turk's-cap Lily	Lilium superbum
Violet	<i>Viola</i> sp.
Virginia Water Horehound	Lycopus virginicus
Water Hemlock	Cicuta maculata
Water Purslane	Ludwigia palustris
Water Smartweed	Polygonum punctatum
Water Starwort	Callitriche hetertophylla
Wavy leaved Aster	Aster undulatum (formerly A. undulatus)
White Water Lilly	Nymphaea odorata
Whitewood Aster	<i>Eurybia divaricata</i> (formerly <i>Aster divaricatus</i> )
Wild Sarsaparilla	Aralia nudicaulis
Wood Aster	Aster sp.
Yarrow	Achillea millefolium
Yellow Wood Sorrel	Oxalis stricta (formerly O. europaea)



Common Name	Scientific Name
Ferns	
Bracken Fern	Pteridium aquilinum
Christmas Fern	Polystichum acrostichoides
Cinnamon Fern	Osmunda cinnamomea
Hayscented Fern	Dennstaedtia punctilobula
Lady Fern	Athyrium filix-femina
Marginal Woodfern	Dryopteris marginalis
Marsh Fern	Thelypteris palustris
Netted Chain Fern	Woodwardia areolata
New York Fern	Thelypteris noveboracensis
Royal Fern	Osmunda regalis
Sensitive Fern	Onoclea sensibilis
Spinulose Woodfern	Dryopteris carthusiana (formerly D. spinulosa)
Grasses, Rushes, and Sedges	
Barnyard Grass	Echinochloa crus-galli
Black Grass	Juncus gerardii
Bluejoint	Calamagrostis canadensis
Broad-leaved Cattail	Typha latifolia
Bur-reed	Sparganium americanum
Common Reed	Phragmites australis
Deer-tongue Grass	Panicum clandestinum
Little Bluestem	Schizachyrium scoparium (formerly Andropogon scoparius)
Path Rush	Juncus tenuis
Red Top	Agrostis stolonifera
Rice Cutgrass	Leersia oryzoides
Salt-marsh Cordgrass	Spartina alterniflora
Salt-meadow Cordgrass	Spartina patens
Sedge	Carex intumescens
Sedge	Carex laxiflora
Sedge	Carex lurida
Soft Rush	Juncus effusus
Switch Grass	Panicum virgatum
Tussock Sedge	Carex stricta
Upland Bentgrass	Agrostis perennans
Wool grass	Scirpus cyperinus



Common Name	Scientific Name
Vines	
Asiatic Bittersweet	Celastrus orbiculatus
Climbing Hempweed	Mikania scandens
Common Dodder	Cuscuta gronovii
Common Greenbrier	Smilax rotundifolia
Fox Grape	Vitis labrusca
Ground-nut	Apios americana
Hog Peanut	Amphicarpaea bracteata
Japanese Honeysuckle	Lonicera japonica
Poison Ivy	<i>Toxicodendron rydbergii</i> (formerly <i>Rhus radicans</i> )
Sawbrier	Smilax glauca
Virginia Creeper	Parthenocissus quinquefolia
Wild Yam	Dioscorea villosa

Sources: (Naval Submarine Base New London, 2016)

Common Name	Scientific Name
White-tailed deer	Odocoileus virginianus
Woodchuck	Marmota monax
Chipmunk	Tamias striatus
Gray squirrel	Sciurus carolinensis
Coyote	Canis latrans
Black bear	Ursus americanus
Red fox	Vulpes vulpes
Gray fox	Urocyon cinereoargenteus
Opossum	Didelphis virginiana
Raccoon	Procyon lotor
Muskrat	Ondatra zibethicus
Flying squirrel	Glaucomys sabrinus
Striped skunk	Mephitis mephitis
Long-tailed weasel	Mustela frenata
Short-tailed weasel	Mustela erminea
Eastern cottontail	Sylvilagus floridanus
Little brown bat	Myotis lucifugus
Big brown bat	Eptesicus fuscus

### Table B-2: Mammals Observed on SUBASE NLON

#### APPENDIX B

Naval Submarine Base New London



Common Name	Scientific Name
Harp Seal	Pagophilus groenlandicus

Sources: (Naval Submarine Base New London, 2016; T. McKenzie personal communication, 2019 Annual SUBBASE NLON INRMP Review)

### Table B-3: Birds Observed on SUBASE NLON

Common Name	Scientific Name	
Accipitriformes (Hawks, Kites, Eagles, and Allies)		
Cooper's Hawk	Accipiter cooperii	
Red-tailed Hawk	Buteo jamaicensis	
Red-shouldered Hawk	Buteo lineatus	
Broad-winged Hawk	Buteo platypterus	
Turkey Vulture	Cathartes aura	
Black Vulture	Coragyps atratus	
Bald Eagle	Haliaeetus leucocephalus	
Osprey	Pandion haliaetus	
Anseriformes (Ducks, Geese, and Swans)		
Wood Duck	Aix sponsa	
Mallard	Anas platyrhynchos	
Lesser Scaup	Aythya affinis	
Canada Goose	Branta canadensis	
Mute Swan	Cygnus olor	
Hooded Merganser	Lophodytes cucullatus	
Red-breasted Merganser	Mergus serrator	
Charadriiformes (Plovers, Sandpipers, and Allies)		
Killdeer	Charadrius vociferus	
Herring Gull	Larus argentatus	
Ring-billed Gull	Larus delawarensis	
Great Black-backed Gull	Larus marinus	
Laughing Gull	Leucophaeus atricilla	
Greater Yellowlegs	Tringa melanoleuca	
Columbiformes (Pigeons and Doves)		
Rock Pigeon	Columba livia	
Mourning Dove	Zenaida macroura	
Coraciiformes (Kingfishers and Allies)		
Belted Kingfisher	Megaceryle alcyon	





Common Name	Scientific Name	
Gaviiformes (Loons)		
Common Loon	Gavia immer	
Passerformes (Perching Birds)		
Red-winged Blackbird	Agelaius phoeniceus	
Tufted Titmouse	Baeolophus bicolor	
Cedar Waxwing	Bombycilla cedrorum	
Canada Warbler	Cardellina canadensis	
Wilson's Warbler	Cardellina pusilla	
Northern Cardinal	Cardinalis cardinalis	
Veery	Catharus fuscescens	
Hermit Thrush	Catharus guttatus	
Swainson's Thrush	Catharus ustulatus	
Eastern Wood-Pewee	Contopus virens	
American Crow	Corvus brachyrhynchos	
Common Raven	Corvus corax	
Fish Crow	Corvus ossifragus	
Blue Jay	Cyanocitta cristata	
Gray Catbird	Dumetella carolinensis	
Common Yellowthroat	Geothlypis trichas	
House Finch	Haemorhous mexicanus	
Barn Swallow	Hirundo rustica	
Wood Thrush	Hylocichla mustelina	
Baltimore Oriole	Icterus galbula	
Dark-eyed Junco	Junco hyemalis	
Swamp Sparrow	Melospiza georgiana	
Song Sparrow	Melospiza melodia	
Northern Mockingbird	Mimus polyglottos	
Black-and-white Warbler	Mniotilta varia	
Brown-headed Cowbird	Molothrus ater	
Great Crested Flycatcher	Myiarchus crinitus	
House Sparrow	Passer domesticus	
Indigo Bunting	Passerina cyanea	
Eastern Towhee	Pipilo erythrophthalmus	
Scarlet Tanager	Piranga olivacea	
Black-capped Chickadee	Poecile atricapillus	
Blue-gray Gnatcatcher	Polioptila caerulea	



Common Name	Scientific Name
Common Grackle	Quiscalus quiscula
Ruby-crowned Kinglet	Regulus calendula
Golden-crowned Kinglet	Regulus satrapa
Eastern Phoebe	Sayornis phoebe
Ovenbird	Seiurus aurocapilla
Northern Parula	Setophaga americana
Hooded Warbler	Setophaga citrina
Yellow-rumped Warbler	Setophaga coronata
Prairie Warbler	Setophaga discolor
Palm Warbler	Setophaga palmarum
Yellow Warbler	Setophaga petechia
Pine Warbler	Setophaga pinus
American Redstart	Setophaga ruticilla
Blackpoll Warbler	Setophaga striata
Black-throated Green Warbler	Setophaga virens
Eastern Bluebird	Sialia sialis
White-breasted Nuthatch	Sitta carolinensis
American Goldfinch	Spinus tristis
Chipping Sparrow	Spizella passerina
Northern Rough-winged Swallow	Stelgidopteryx serripennis
European Starling	Sturnus vulgaris
Tree Swallow	Tachycineta bicolor
Carolina Wren	Thryothorus ludovicianus
House Wren	Troglodytes aedon
American Robin	Turdus migratorius
Eastern Kingbird	Tyrannus tyrannus
Blue-winged Warbler	Vermivora cyanoptera
Warbling Vireo	Vireo gilvus
White-eyed Vireo	Vireo griseus
Red-eyed Vireo	Vireo olivaceus
Blue-headed Vireo	Vireo solitarius
White-throated Sparrow	Zonotrichia albicollis
Pelicaniformes (Pelicans, Herons, Ibises, and Allie	s)
Great Egret	Ardea alba
Great Blue Heron	Ardea herodias
Snowy Egret	Egretta thula



Common Name	Scientific Name		
Piciformes (Woodpeckers)			
Northern Flicker	Colaptes auratus		
Red-bellied Woodpecker	Melanerpes carolinus		
Downy Woodpecker	Dryobates pubescens (formerly Picoides pubescens)		
Hairy Woodpecker	<i>Leuconotopicus villosus</i> (formerly <i>Picoides villosus</i> )		
Yellow-bellied Sapsucker	Sphyrapicus varius		
Strigiformes (Owls)			
Great Horned Owl	Bubo virginianus		
Suliformes (Frigatebirds, Boobies, Cormorants, Darters, and Allies)			
Double-crested Cormorant	Phalacrocorax auritus		

Sources: (Tetra Tech, Inc., 2014)

Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Accipiter cooperii	Cooper's Hawk	<u>0</u>	0	U	U
Accipiter gentilis	Northern Goshawk	R	R	R	R
Accipiter striatus	Sharp-shinned Hawk	0	R	U	0
Buteo jamaicensis	Red-tailed Hawk*	<u>C</u>	U	<u>C</u>	С
Buteo lagopus	Rough-legged Hawk	X	Х	R	R
Buteo lineatus	Red-shouldered Hawk*	<u>U</u>	U	U	U
Buteo platypterus	Broad-winged Hawk*	<u>0</u>	0	R	Х
Cathartes aura	Turkey Vulture*	<u>C</u>	C	<u>C</u>	С
Circus hudsonius	Northern Harrier	R	R	U	U
Coragyps atratus	Black Vulture	<u>0</u>	0	<u>R</u>	0
Haliaeetus leucocephalus	Bald Eagle	<u>0</u>	R	0	U
Pandion haliaetus	Osprey	<u>C</u>	C	<u>C</u>	R
Aix sponsa	Wood Duck	<u>U</u>	U	<u>U</u>	R
Anas acuta	Northern Pintail	R	X	R	R
Mareca americana	American Wigeon	0	X	R	0
Spatula clypeata	Northern Shoveler	R	X	R	R
Anas crecca	Green-winged Teal	U	R	0	R
Spatula discors	Blue-winged Teal	R	R	R	Х
Anas platyrhynchos	Mallard*	<u>C</u>	С	<u>C</u>	С

### Table B-4: Bird Species that are Known or Potentially Occur at SUBASE NLON

#### APPENDIX B



Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Anas rubripes	American Black Duck	C	0	С	С
Mareca strepera	Gadwall	0	R	R	0
Anser albifrons	Greater White-fronted Goose	X	X	Х	R
Aythya affinis	Lesser Scaup	R	X	<u>R</u>	R
Aythya collaris	Ring-necked Duck	U	X	U	U
Aythya marila	Greater Scaup	R	R	R	0
Aythya valisineria	Canvasback	R	R	Х	R
Branta bernicla	Brant	U	R	0	U
Branta canadensis	Canada Goose*	<u>A</u>	C	<u>C</u>	С
Bucephala albeola	Bufflehead	U	R	0	U
Bucephala clangula	Common Goldeneye	0	X	R	U
Cygnus olor	Mute Swan*	<u>C</u>	U	<u>C</u>	С
Lophodytes cucullatus	Hooded Merganser	U	R	U	С
Mergus merganser	Common Merganser	0	R	R	U
Mergus serrator	Red-breasted Merganser	<u>U</u>	R	0	С
Oxyura jamaicensis	Ruddy Duck	R	X	0	0
Archilochus colubris	Ruby-throated Hummingbird	U	C	U	Х
Chaetura pelagica	Chimney Swift*	<u>U</u>	C	R	Х
Antrostomus vociferus	Eastern Whip-poor-will	R	R	R	Х
Chordeiles minor	Common Nighthawk	R	R	R	Х
Actitis macularius	Spotted Sandpiper	0	U	0	Х
Calidris minutilla	Least Sandpiper	0	U	0	Х
Charadrius vociferus	Killdeer*	U	U	<u>0</u>	R
Chroicocephalus philadelphia	Bonaparte's Gull	R	X	R	R
Chroicocephalus ridibundus	Black-headed Gull	R	X	Х	R
Gallinago delicata	Wilson's Snipe	0	X	R	R
Larus argentatus	Herring Gull	<u>C</u>	C	<u>C</u>	С
Larus delawarensis	Ring-billed Gull	<u>U</u>	U	<u>C</u>	С
Larus marinus	Great Black-backed Gull	<u>C</u>	C	<u>C</u>	С
Leucophaeus atricilla	Laughing Gull	R	U	<u>U</u>	R
Scolopax minor	American Woodcock	0	R	R	R
Tringa flavipes	Lesser Yellowlegs	0	0	0	Х
Tringa melanoleuca	Greater Yellowlegs	<u>U</u>	U	U	R
Tringa solitaria	Solitary Sandpiper	R	R	R	Х
Columba livia	Rock Pigeon*	<u>U</u>	U	<u>C</u>	U
Zenaida macroura	Mourning Dove*	A	Α	A	С



Scientific Name	Common Name	Mar- Mav	Jun- Aug	Sep- Nov	Dec- Feb
Megaceryle alcyon	Belted Kingfisher	U	U	<u>C</u>	U
Coccyzus americanus	Yellow-billed Cuckoo	0	U	0	X
Coccyzus erythropthalmus	Black-billed Cuckoo	R	0	R	Х
Falco columbarius	Merlin	R	R	U	R
Falco peregrinus	Peregrine Falcon	R	R	0	0
Falco sparverius	American Kestrel*	<u>0</u>	R	0	R
Meleagris gallopavo	Wild Turkey	U	U	0	0
Gavia immer	Common Loon	U	0	U	С
Fulica americana	American Coot	R	X	0	U
Porzana carolina	Sora	R	R	R	Х
Rallus limicola	Virginia Rail	R	R	R	R
Rallus crepitans	Clapper Rail	R	R	R	R
Acanthis flammea	Common Redpoll	R	X	R	R
Agelaius phoeniceus	Red-winged Blackbird*	A	A	U	U
Ammospiza caudacutus	Saltmarsh Sparrow	R	U	R	X
Ammospiza maritimus	Seaside Sparrow	R	0	R	Х
Ammospiza nelsoni	Nelson's Sparrow	R	R	0	Х
Anthus rubescens	American Pipit	R	X	0	R
Baeolophus bicolor	Tufted Titmouse*	A	A	A	А
Bombycilla cedrorum	Cedar Waxwing	U	C	<u>C</u>	0
Calcarius lapponicus	Lapland Longspur	R	X	Х	R
Cardellina canadensis	Canada Warbler	<u>R</u>	R	R	Х
Cardellina pusilla	Wilson's Warbler	R	R	<u>R</u>	Х
Cardinalis cardinalis	Northern Cardinal*	A	A	<u>A</u>	А
Catharus fuscescens	Veery*	U	C	0	Х
Catharus guttatus	Hermit Thrush*	<u>0</u>	Ο	U	U
Catharus minimus	Gray-cheeked Thrush	Х	X	R	Х
Catharus ustulatus	Swainson's Thrush	R	R	<u>0</u>	Х
Certhia americana	Brown Creeper	0	R	U	0
Cistothorus palustris	Marsh Wren	<u>O</u>	U	0	R
Contopus cooperi	Olive-sided Flycatcher	X	R	R	Х
Contopus virens	Eastern Wood-Pewee*	<u>U</u>	C	<u>U</u>	Х
Corvus brachyrhynchos	American Crow*	A	C	<u>A</u>	С
Corvus corax	Common Raven	0	Ο	<u>U</u>	0
Corvus ossifragus	Fish Crow*	U	U	<u>0</u>	0
Cyanocitta cristata	Blue Jay*	<u>C</u>	C	A	C
Dolichonyx oryzivorus	Bobolink	0	U	0	X



Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Dumetella carolinensis	Gray Catbird*	<u>C</u>	A	<u>C</u>	0
Empidonax alnorum	Alder Flycatcher	R	R	Х	Х
Empidonax flaviventris	Yellow-bellied Flycatcher	Х	R	R	Х
Empidonax minimus	Least Flycatcher	0	0	R	Х
Empidonax traillii	Willow Flycatcher	0	U	R	Х
Empidonax virescens	Acadian Flycatcher	R	R	Х	Х
Eremophila alpestris	Horned Lark	Х	Х	R	R
Euphagus carolinus	Rusty Blackbird	0	Х	R	R
Geothlypis trichas	Common Yellowthroat*	<u>C</u>	С	<u>C</u>	R
Haemorhous mexicanus	House Finch*	<u>C</u>	С	<u>C</u>	С
Haemorhous purpureus	Purple Finch	0	R	U	0
Helmitheros vermivorum	Worm-eating Warbler	U	0	R	Х
Hirundo rustica	Barn Swallow*	<u>C</u>	А	0	Х
Hylocichla mustelina	Wood Thrush*	<u>C</u>	С	R	Х
Icteria virens	Yellow-breasted Chat	R	Х	R	R
Icterus galbula	Baltimore Oriole*	<u>C</u>	С	0	R
Icterus spurius	Orchard Oriole	0	0	Х	Х
Junco hyemalis	Dark-eyed Junco	<u>C</u>	Х	<u>C</u>	А
Melospiza georgiana	Swamp Sparrow*	<u>0</u>	0	<u>C</u>	0
Melospiza lincolnii	Lincoln's Sparrow	R	Х	0	R
Melospiza melodia	Song Sparrow*	<u>A</u>	А	A	С
Mimus polyglottos	Northern Mockingbird*	<u>C</u>	С	<u>C</u>	U
Mniotilta varia	Black-and-white Warbler	U	U	<u>U</u>	Х
Molothrus ater	Brown-headed Cowbird*	<u>C</u>	С	0	U
Myiarchus crinitus	Great Crested Flycatcher*	<u>C</u>	С	U	Х
Oporornis agilis	Connecticut Warbler	Х	X	R	Х
Leiothlypis celata	Orange-crowned Warbler	Х	X	R	Х
Leiothlypis peregrina	Tennessee Warbler	R	R	R	Х
Leiothlypis ruficapilla	Nashville Warbler	R	R	0	Х
Parkesia motacilla	Louisiana Waterthrush	0	0	Х	Х
Parkesia noveboracensis	Northern Waterthrush	0	R	R	Х
Passer domesticus	House Sparrow*	<u>C</u>	A	<u>C</u>	С
Passerculus sandwichensis	Savannah Sparrow	U	R	U	0
Passerella iliaca	Fox Sparrow	0	X	0	U
Passerina cyanea	Indigo Bunting*	<u>0</u>	U	R	X
Petrochelidon pyrrhonota	Cliff Swallow	R	R	R	X





Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Pheucticus ludovicianus	Rose-breasted Grosbeak*	U	С	U	X
Pipilo erythrophthalmus	Eastern Towhee*	<u>C</u>	C	<u>C</u>	0
Piranga olivacea	Scarlet Tanager*	<u>U</u>	U	<u>U</u>	X
Plectrophenax nivalis	Snow Bunting	R	X	R	0
Poecile atricapillus	Black-capped Chickadee*	<u>A</u>	C	<u>A</u>	А
Polioptila caerulea	Blue-gray Gnatcatcher*	<u>C</u>	U	U	X
Pooecetes gramineus	Vesper Sparrow	R	X	R	R
Progne subis	Purple Martin	U	U	R	X
Quiscalus quiscula	Common Grackle*	<u>C</u>	C	<u>U</u>	U
Regulus calendula	Ruby-crowned Kinglet	0	X	<u>C</u>	R
Regulus satrapa	Golden-crowned Kinglet	R	R	<u>U</u>	0
Riparia riparia	Bank Swallow	0	U	R	X
Sayornis phoebe	Eastern Phoebe*	<u>C</u>	C	<u>C</u>	R
Seiurus aurocapilla	Ovenbird*	<u>C</u>	C	0	X
Setophaga americana	Northern Parula	0	R	<u>U</u>	X
Setophaga caerulescens	Black-throated Blue Warbler	R	R	U	X
Setophaga castanea	Bay-breasted Warbler	R	X	R	X
Setophaga cerulea	Cerulean Warbler	Ο	0	X	X
Setophaga citrina	Hooded Warbler*	<u>R</u>	R	R	X
Setophaga coronata	Yellow-rumped Warbler	U	R	<u>C</u>	U
Setophaga discolor	Prairie Warbler	U	U	<u>O</u>	X
Setophaga fusca	Blackburnian Warbler	R	R	R	X
Setophaga magnolia	Magnolia Warbler	Ο	R	U	X
Setophaga palmarum	Palm Warbler	<u>O</u>	X	<u>C</u>	X
Setophaga pensylvanica	Chestnut-sided Warbler	R	R	0	X
Setophaga petechia	Yellow Warbler*	<u>C</u>	C	0	R
Setophaga pinus	Pine Warbler*	<u>U</u>	Ο	<u>0</u>	R
Setophaga ruticilla	American Redstart*	<u>C</u>	C	<u>U</u>	X
Setophaga striata	Blackpoll Warbler	<u>O</u>	R	<u>U</u>	X
Setophaga tigrina	Cape May Warbler	R	X	R	X
Setophaga virens	Black-throated Green Warbler	<u>R</u>	R	<u>U</u>	X
Sialia sialis	Eastern Bluebird*	<u>C</u>	U	<u>C</u>	U
Sitta canadensis	Red-breasted Nuthatch	0	R	U	0
Sitta carolinensis	White-breasted Nuthatch*	<u>C</u>	C	A	С
Spinus pinus	Pine Siskin	R	Х	0	R

#### APPENDIX B



Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Spinus tristis	American Goldfinch*	<u>C</u>	A	<u>C</u>	С
Spiza americana	Dickcissel	X	R	R	R
Spizelloides arborea	American Tree Sparrow	0	X	0	С
Spizella pallida	Clay-colored Sparrow	X	Х	R	R
Spizella passerina	Chipping Sparrow*	<u>C</u>	С	<u>U</u>	R
Spizella pusilla	Field Sparrow	U	U	U	0
Stelgidopteryx serripennis	Northern Rough-winged Swallow*	<u>U</u>	U	R	Х
Sturnella magna	Eastern Meadowlark	R	R	0	R
Sturnus vulgaris	European Starling*	<u>C</u>	C	<u>C</u>	С
Tachycineta bicolor	Tree Swallow*	<u>C</u>	A	<u>C</u>	X
Thryothorus ludovicianus	Carolina Wren*	<u>C</u>	C	<u>C</u>	C
Toxostoma rufum	Brown Thrasher*	<u>0</u>	0	0	R
Troglodytes aedon	House Wren*	<u>U</u>	C	<u>U</u>	Х
Troglodytes hiemalis	Winter Wren	R	X	0	R
Turdus migratorius	American Robin*	<u>A</u>	Α	<u>A</u>	С
Tyrannus tyrannus	Eastern Kingbird*	U	C	R	X
Vermivora cyanoptera	Blue-winged Warbler	С	U	<u>O</u>	Х
Vireo flavifrons	Yellow-throated Vireo	U	U	0	Х
Vireo gilvus	Warbling Vireo*	U	U	0	Х
Vireo griseus	White-eyed Vireo*	U	U	0	Х
Vireo olivaceus	Red-eyed Vireo*	<u>C</u>	C	<u>U</u>	Х
Vireo philadelphicus	Philadelphia Vireo	R	R	0	Х
Vireo solitarius	Blue-headed Vireo	0	R	<u>U</u>	X
Zonotrichia albicollis	White-throated Sparrow	<u>C</u>	R	<u>C</u>	А
Zonotrichia leucophrys	White-crowned Sparrow	R	X	0	R
Ardea alba	Great Egret	С	C	<u>C</u>	R
Ardea herodias	Great Blue Heron	C	C	<u>C</u>	U
Botaurus lentiginosus	American Bittern	X	R	R	R
Butorides virescens	Green Heron	0	U	0	Х
Egretta caerulea	Little Blue Heron	R	0	R	Х
Egretta thula	Snowy Egret	U	C	U	R
Nycticorax nycticorax	Black-crowned Night- Heron	R	0	0	R
Plegadis falcinellus	Glossy Ibis	U	U	0	X
Colaptes auratus	Northern Flicker*	U	U	<u>C</u>	U
Dryocopus pileatus	Pileated Woodpecker	0	0	0	0



Scientific Name	Common Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Melanerpes carolinus	Red-bellied Woodpecker*	<u>C</u>	С	<u>C</u>	С
Melanerpes erythrocephalus	Red-headed Woodpecker	R	Х	R	R
Dryobates pubescens	Downy Woodpecker*	<u>C</u>	С	<u>A</u>	А
Leuconotopicus villosus	Hairy Woodpecker*	<u>U</u>	U	<u>U</u>	U
Sphyrapicus varius	Yellow-bellied Sapsucker	<u>R</u>	R	U	U
Podiceps auritus	Horned Grebe	0	Х	0	U
Podiceps grisegena	Red-necked Grebe	R	Х	R	0
Podilymbus podiceps	Pied-billed Grebe	R	R	U	0
Aegolius acadicus	Northern Saw-whet Owl	Х	Х	Х	R
Asio otus	Long-eared Owl	R	R	Х	R
Bubo virginianus	Great Horned Owl*	<u>R</u>	R	0	R
Megascops asio	Eastern Screech-Owl	R	R	R	R
Strix varia	Barred Owl	0	0	0	R
Phalacrocorax auritus	Double-crested Cormorant	<u>C</u>	С	<u>C</u>	U
Phalacrocorax carbo	Great Cormorant	0	Х	0	U

A - abundant: common species that is very numerous

C - common: certain to be seen in suitable habitat

U - uncommon: present but not certain to be seen

O - occasional: seen only a few times during a season

R - rare: seen at intervals of 2 to 5 years

X - extremely rare: species highly unlikely to occur

\* - nests on study area

underlined letter - species observed during 2013 - 2014 DoD coordinated bird monitoring survey Source: (Tetra Tech, Inc. 2014)

Common Name	Scientific Name
Toads and Frogs	
American Toad	Anaxyrus americanus
Gray Treefrog	Drophytes versicolor
American Bullfrog	Lithobates catesbeianus
Green Frog	Lithobates clamitans
Pickerel Frog	Lithobates palustris
Wood Frog	Lithobates sylvaticus
Spring Peeper	Pseudacris crucifer
Salamanders	
Spotted Salamander	Ambystoma maculatum
Four-toed Salamander	Hemidactylium scutatum

### Table B-5: Herpetofauna Observed on SUBASE NLON


Common Name	Scientific Name
Eastern Red-backed Salamander	Plethodon cinereus
Northern Two-lined Salamander	Eurycea bislineata
Snakes	
Ring-necked Snake	Diadophis punctatus
Eastern Ratsnake	Pantherophis) alleganiensis
Eastern Ribbonsnake	Thamnophis sauritus
Common Gartersnake	Thamnophis sirtalis
Turtles	
Snapping Turtle	Chelydra serpentina
Painted Turtle	Chrysemys picta
Red-eared Slider	Trachemys scripta elegans

Sources: (Naval Submarine Base New London, 2003)

Common Name	Scientific Name
Bay anchovy	Anchoa mitchilli
Scup	Stenotomus chrysops
Butterfish	Peprilus triacanthus
Atlantic herring	Clupea harengus
Atlantic moonfish	Selene setapinnis
Atlantic silverside	Menidia menidia
Juvenile sciaenid	Family Sciaenidae
Bluefish	Pomatomus saltatrix
Winter flounder	Pseudopleuronectes americanus
Alewife	Alosa pseudoharengus
Black seabass	Centropristis striata
Summer flounder	Paralichthys dentatus
Spotted hake	Urophycis regia
Atlantic menhaden	Brevoortia tyrannus
Cunner	Tautogolabrus adspersus
Juvenile gadid	Family Gadidae
Weakfish	Cynoscion regalis
Bluestripe lizardfish	Synodus saurus
Shorthorn sculpin	Myoxocephalus scorpius
Tautog	Tautoga onitis
Atlantic tomcod	Microgadus tomcod

## Table B-6: Fish Observed on SUBASE NLON



Common Name	Scientific Name
Fourspot flounder	Paralichthys oblongus
Silver hake	Merluccius bilinearis
Smallmouth flounder	Etropus microstomus
Striped anchovy	Anchoa hepsetus
Striped searobin	Prionotus evolans
Windowpane	Scophthalmus aquosus
Northern pipefish	Syngnathus fuscus

Sources: (Tetra Tech, Inc., 2016)

#### Table B-7: Invertebrates Observed on SUBASE NLON

Common Name	Scientific Name
Longfin squid	Doryteuthis pealeii
Shrimp	Species undetermined
Blue crab	Callinectes sapidus
Mud crab	Xanthidae spp
Spider crab	Libinia emarginata
Hermit crab	Pagurus pollicaris
Jonah crab	Cancer borealis

Sources: (Tetra Tech, Inc., 2016)

# Table B-8: State and Federal Threatened and Endangered, and Special Concern Species Potentially Occurring in New London County, Connecticut

Common Name	Scientific Name	Status
Birds		
Piping plover	Charadrius melodus	FT, ST
Roseate tern	Sterna dougallii dougallii	FE, SE
Northern goshawk	Accipiter gentilis	ST
Saltmarsh sharp-tailed sparrow	Ammospiza caudacutus	SC
Henslow's sparrow	Passerculus henslowii	SC*
Seaside sparrow	Ammospiza maritimus	ST
Grasshopper sparrow	Ammodramus savannarum	SE
Great egret	Ardea alba	ST
Short-eared owl	Asio flammeus	ST
Long-eared owl	Asio otus	SE
Upland sandpiper	Bartramia longicauda	SE
American bittern	Botaurus lentiginosus	SE
Whip-poor-will	Caprimulgus vociferus	SC



Common Name	Scientific Name	Status
Northern harrier	Circus cyaneus	SE
Sedge wren	Cistothorus platensis	SE
Bobolink	Dolichonyx oryzivorus	SC
Little blue heron	Egretta caerulea	SC
Snowy egret	Egretta thula	ST
Alder flycatcher	Empidonax alnorum	SC
Horned lark	Eremophila alpestris	SE
Peregrine falcon	Falco peregrinus	ST
Common moorhen	Gallinule galeata	SE
Common loon	Gavia immer	SC
American oystercatcher	Haematopus palliatus	ST
Bald eagle	Haliaeetus leucocephalus	ST
Yellow-breasted chat	Icteria virens	SE
Least bittern	Ixobrychus exilis	ST
Red-headed woodpecker	Melanerpes erythrocephalus	SE
Savannah sparrow	Passerculus sandwichensis	SC
Ipswich sparrow	Passerculus sandwichensis ssp. princeps	SC
Glossy ibis	Plegadis falcinellus	SC
Purple martin	Progne subis	SC
King rail	Rallus elegans	SE
Northern parula	Setophaga americana	SC
Cerulean warbler	Setophaga cerulea	SC
Common tern	Sterna hirundo	SC
Least tern	Sternula antillarum	ST
Eastern meadowlark	Sturnella magna	ST
Brown thrasher	Toxostoma rufum	SC
Barn owl	Tyto alba	SE
Plants		
Sandplain gerardia	Agalinis acuta	FE, SE
Small whorled pogonia	Isotria medeoloides	FT, SE
Virginia copperleaf	Acalypha virginica	SC
Small white snakeroot	Ageratina aromatica	SE
Short-awned meadow foxtail	Alopecurus aequalis	ST
Sea-coast angelica	Angelica lucida	SE
Puttyroot	Aplectrum hyemale	SC*



Common Name	Scientific Name	Status
Dragon's mouth	Arethusa bulbosa	SC*
Needlegrass	Aristida longespica var. geniculata	SC
Arrowfeather	Aristida purpurascens	SE
Purple milkweed	Asclepias purpurascens	SC
White milkweed	Asclepias variegata	SC*
Mountain spleenwort	Asplenium montanum	SC
Bracted orache	Atriplex glabriuscula	SC
Beck's water-marigold	Bidens beckii	SC
Eaton's beggarticks	Bidens eatonii	SE
Bayonet grass	Bolboschoenus maritimus ssp. paludosus	SC
Salt marsh bulrush	Bolboschoenus novae-angliae	SC
Low bindweed	Calystegia spithamaea	SC*
Broadwing sedge	Carex alata	SE
Bush's wedge	Carex bushii	SC
Brown bog sedge	Carex buxbaumii	SE
Crawford sedge	Carex crawfordii	SC*
Clustered sedge	Carex cumulata	ST
Davis' sedge	Carex davisii	ST
Black-edge sedge	Carex nigromarginata	SC*
Few-seeded sedge	Carex oligosperma	SC*
Variable sedge	Carex polymorpha	SE
Dioecious sedge	Carex sterilis	SC
Cattail sedge	Carex typhina	SC
Indian paintbrush	Castilleja coccinea	SE
American bittersweet	Celastrus scandens	SC
Red goosefoot	Chenopodium rubrum	SC*
Yellow thistle	Cirsium horridulum	SE
Long-bracted green orchid	Coeloglossum viride	SE
Long-leaved redtop-panicgrass	Coleataenia longifolia ssp. elongata	SC*
Early coral root	Corallorhiza trifida	SC
Pygmyweed	Crassula aquatica	SE
Bushy frostweed	Crocanthemum dumosum	SC*
Low frostweed	Crocanthemum propinquum	SC
Blue waxweed	Cuphea viscosissima	SC*



Common Name	Scientific Name	Status
Hazel dodder	Cuscuta coryli	SC*
Yellow lady's-slipper	Cypripedium parviflorum	SC
Tufted hairgrass	Deschampsia cespitosa	SC
Dillenius' tick-trefoil	Desmodium glabellum	SC
Sessile-leaf tick-trefoil	Desmodium sessilifolium	SC*
Stiff-leaved rosette-panicgrass	Dichanthelium ovale ssp. pseudopubescens	SC*
Tall swamp rosette-panicgrass	Dichanthelium scabriusculum	SE
Whitlow-grass	Draba reptans	SC
Horsetail spikesedge	Eleocharis equisetoides	SE
Small-fruited spikesedge	Eleocharis microcarpa var. filiculmis	SC*
Square-stemmed spikesedge	Eleocharis quadrangulata var. crassior	SE
Virginia snakeroot	Endodeca serpentaria	SC
Marsh horsetail	Equisetum palustre	SC*
Parker's pipewort	Eriocaulon parkeri	SE
White thoroughwort	Eupatorium album	SE
Rough aster	Eurybia radula	SE
Showy aster	Eurybia spectabilis	ST
Purple cudweed	Gamochaeta purpurea	SC*
Creeping snowberry	Gaultheria hispidula	SC
Seabeach sandwort	Honckenya peploides	SC
Featherfoil	Hottonia inflata	SC
Longleaf bluet	Houstonia longifolia	ST
Golden-heather	Hudsonia ericoides	SE
Woolly beach-heather	Hudsonia tomentosa	ST
Water pennywort	Hydrocotyle umbellata	SE
Whorled pennywort	Hydrocotyle verticillata	SE
Creeping St. John's-wort	Hypericum adpressum	SC*
Inkberry	Ilex glabra	ST
Weak rusk	Juncus debilis	SC*
Carolina redroot	Lachnanthes caroliniana	SE
Saltpond Grass	Leptochloa fusca ssp. fascicularis	SE
Creeping bush-clover	Lespedeza repens	SC
New England blazing-star	Liatris novae-angliae	SC





Common Name	Scientific Name	Status
Scotch lovage	Ligusticum scoticum	SE
Lilaeopsis	Lilaeopsis chinensis	SC
Mudwort	Limosella australis	SC
Twinflower	Linnaea borealis ssp. americana	SE
Sandplain flax	Linum intercursum	SC*
Lily-leaved twayblade	Liparis liliifolia	SE
Globe-fruited false-loosestrife	Ludwigia sphaerocarpa	SE
Clasping-leaved water-horehound	Lycopus amplectens	SC
Climbing fern	Lygodium palmatum	SC
Winged loosestrife	Lythrum alatum	SE
Green adder's mouth	Malaxis unifolia	SE
One-flower wintergreen	Moneses uniflora	SE
Cutleaf water-milfoil	Myriophyllum pinnatum	SE
Small yellow pond lily	Nuphar microphylla	SC*
Bog aster	Oclemena nemoralis	SE
Southern adder's-tongue	Ophioglossum vulgatum	SE
Eastern prickly pear	Opuntia humifusa	SC
Golden club	Orontium aquaticum	SC
One-sided pyrola	Orthilia secunda	SC*
Violet wood-sorrel	Oxalis violacea	SC
American ginseng	Panax quinquefolius	SC
Bitter panicgrass	Panicum amarum var. amarum	ST
Field paspalum	Paspalum laeve	ST
Thin paspalum	Paspalum setaceum var. psammophilum	SC*
Swamp lousewort	Pedicularis lanceolata	ST
Wild kidney bean	Phaseolus polystachios var. polystachios	SC*
American reed	Phragmites americanus	SC
Slender mountain ricegrass	Piptatherum pungens	SE
Sickle-leaved golden aster	Pityopsis falcata	SE
Hoary plantain	Plantago virginica	SC
Yellow-fringed orchid	Platanthera ciliaris	SE
Pale green orchid	Platanthera flava var. herbiola	SC
Hooker's orchid	Platanthera hookeri	SC*
Large round-leaved orchid	Platanthera orbiculata	SC*



Common Name	Scientific Name	Status
Alternate milkwort	Polygala ambigua	SC
Field milkwort	Polygala cruciata	SE
Nutall's milkwort	Polygala nuttallii	ST
Seabeach knotweed	Polygonum glaucum	SC
Swamp cottonwood	Populus heterophylla	ST
Tuckerman's pondweed	Potamogeton confervoides	SE
Capillary pondweed	Potamogeton gemmiparus	ST
Vasey's pondweed	Potamogeton vaseyi	ST
Alleghany plum	Prunus alleghaniensis	SC*
Goose grass	Puccinellia pumila	SC*
Water-plantain spearwort	Ranunculus ambigens	SE
Seaside crowfoot	Ranunculus cymbalaria	SE
Bristly buttercup	Ranunculus pensylvanicus	SC
Tall beaksedge	Rhynchospora macrostachya	ST
Toothcup	Rotala ramosior	ST
Sand blackberry	Rubus cuneifolius	SC
Sea-side dock	Rumex persicarioides	SC*
Marsh pink	Sabatia stellaris	SE
Awl-leaved arrowhead	Sagittaria subulata	SC
Sandbar willow	Salix exigua	SE
Slender willow	Salix petiolaris	SC
Lizard's tail	Saururus cernuus	SE
Pod grass	Scheuchzeria palustris ssp. americana	SE
Torrey bulrush	Schoenoplectus torreyi	ST
Chaffseed	Schwalbea americana	SC*
Few-flowered nutrush	Scleria pauciflora var. caroliniana	SE
Whip nutrush	Scleria triglomerata	SE
Hyssop skullcap	Scutellaria integrifolia	SE
Wild senna	Senna hebecarpa	ST
Starry campion	Silene stellata	ST
Early wrinkle-leaved goldenrod	Solidago aestivalis	SC*
Elliott's goldenrod	Solidago latissimifolia	SC*
Canada sand-spurry	Spergularia canadensis	ST
Rough dropseed	Sporobolus clandestinus	SE
Sand dropseed	Sporobolus cryptandrus	ST





Common Name	Scientific Name	Status
Small dropseed	Sporobolus neglectus	SE
Hispid hedge-nettle	Stachys hispida	ST
Hyssop-leaf hedge-nettle	Stachys hyssopifolia	SE
Crooked-stem aster	Symphyotrichum prenanthoides	SC*
Nodding pogonia	Triphora trianthophora	SE
Resupinate bladderwort	Utricularia resupinata	SE
Large-flowered bellwort	Uvularia grandiflora	SE
Beaked corn-salad	Valerianella radiata	SC*
Narrow-leaved vervain	Verbena simplex	SC*
Possum haw	Viburnum nudum	SC*
Northern yellow-eyed grass	Xyris montana	ST
Small's yellow-eyed	Xyris smalliana	SE
Golden Alexanders	Ziza aptera	SE
Mammals		
Northern long-eared bat	Myotis septentrionalis	FT, SE
Silver-haired bat	Lasionycteris noctivagans	SC
Red bat	Lasiurus borealis	SC
Hoary bat	Lasiurus cinereus	SC
Eastern small-footed bat	Myotis leibii	SE
Tri-colored bat	Perimyotis subflavus	SE
Southern bog lemming	Synaptomys cooperi	SC
Reptiles and Amphibians		
Blue-spotted salamander	Ambystoma laterale	SE, SC
Eastern spadefoot	Scaphiopus holbrookii	SE
Loggerhead turtle	Caretta caretta	FT, ST
Atlantic green turtle	Chelonia mydas	FT, ST
Spotted turtle	Clemmys guttata	SC
Timber rattlesnake	Crotalus horridus	SE
Leatherback turtle	Dermochelys coriacea	FE, SE
Wood turtle	Glyptemys insculpta	SC
Eastern hognose snake	Heterodon platirhinos	SC
Kemp's ridley turtle	Lepidochelys kempii	FE, SE
Northern diamondback terrapin	Malaclemys terrapin terrapin	SC
Smooth green snake	Opheodrys vernalis	SC
Five-lined skink	Plestiodon fasciatus	ST



Common Name	Scientific Name	Status
Eastern box turtle	Terrapene carolina carolina	SC
Eastern ribbon snake	Thamnophis sauritus	SC
Fish		
Shortnose sturgeon	Acipenser brevirostrum	FE, SE
Atlantic sturgeon	Acipenser oxyrinchus oxyrinchus	FE, SE
Blueback herring	Alosa aestivalis	SC
Banded sunfish	Enneacanthus obesus	SC
Bridle shiner	Notropis bifrenatus	SC
Invertebrates		
Coastal heathland cutworm	Abagrotis nefascia benjamini	ST
Spotted dart moth	Agrotis stigmosa	SC
Brook floater	Alasmidonta varicosa	SE
Apamea moth	Apamea inordinata	ST
Sand wainscot moth	Apamea lintneri	SC
Short-lined chocolate	Argyrostrotis anilis	SC
Rusty-patched bumble bee	Bombus affinis	SC*
Yellow-banded bumble bee	Bombus terricola	ST
Bombardier beetle	Brachinus cyanipennis	SC
Bombardier beetle	Brachinus patruelis	SC
Henry's elfin	Callophrys henrici	SC
Hessel's hairstreak	Callophrys hesseli	SE
Frosted elfin	Callophrys irus	ST
Sparkling jewelwing	Calopteryx dimidiata	ST
Precious underwing moth	Catocala pretiosa pretiosa	SC*
Waxed sallow	Chaetaglaea cerata	SC
Big sand tiger beetle	Cicindela formosa generosa	SC
Hairy-necked tiger beetle	Cicindela hirticollis	SC
Saltmarsh tiger beetle	Cicindela marginata	SC
Purple tiger beetle	Cicindela purpurea	SC*
Dark-bellied tiger beetle	Cicindela tranquebarica	ST
Regal moth	Citheronia regalis	SC*
Nine-spotted lady beetle	Coccinella novemnotata	SC
Tiger spiketail	Cordulegaster erronea	ST
Pink streak	Dargida rubripennis	ST
Noctuid moth	Dichagyris acclivis	SC
False heather underwing	Drasteria graphica atlantica	ST





Common Name	Scientific Name	Status
Imperial moth	Eacles imperialis imperialis	SC
Atlantic bluet	Enallagma doubledayi	ST
Little bluet	Enallagma minusculum	SC
Scarlet bluet	Enallagma pictum	SC
Macropis cuckoo	Epeoloides pilosula	SE
Sleepy duskywing	Erynnis brizo	ST
Horace's duskywing	Erynnis horatius	SC
Persius duskywing	Erynnis persius persius	SE
Fairy shrimp	Eubranchipus holmanii	SE
Pitcher plant moth	Exyra fax	ST
Lymnaeid snail	Fossaria rustica	SC
Mustached clubtail	Gomphus adelphus	SC
Midland clubtail	Gomphus fraternus	ST
Cobra clubtail	Gomphus vastus	SC
Skillet clubtail	Gomphus ventricosus	SC
Phyllira tiger moth	Grammia phyllira	SE
Horse fly	Hybomitra frosti	SC
Horse fly	Hybomitra trepida	ST
Horse fly	Hybomitra typhus	ST
Blue corporal dragonfly	Ladona deplanata	SC
Tidewater mucket	Leptodea ochracea	SC
Eastern pondmussel	Ligumia nasuta	SC
Yellow-horned beaded lacewing	Lomamyia flavicornis	SC
Bog copper	Lycaena epixanthe	SC
Fringed loosestrife oil-bee	Macropis ciliata	SC
Eastern pearlshell	Margaritifera margaritifera	SC
Tabanid fly	Merycomyia whitneyi	ST
Pitcher plant borer	Papaipema appassionata	ST
Seaside goldenrod stem borer	Papaipema duovata	ST
Common sanddragon	Progomphus obscurus	ST
Pink sallow	Psectraglaea carnosa	ST
Slender flower moth	Schinia gracilenta	SE
Spinose flower moth	Schinia spinosae	SC
Coppery emerald	Somatochlora georgiana	ST
Purse web spider	Sphodros niger	SC
Woodland pondsnail	Stagnicola catascopium	SC



Common Name	Scientific Name	Status
Riverine clubtail	Stylurus amnicola	ST
Scribbled sallow moth	Sympistis perscripta	SC
Dune sympistis	Sympistis riparia	SC
Horse fly	Tabanus fulvicallus	ST
Ringed boghaunter	Williamsonia lintneri	SE
Oblique zale	Zale obliqua	SC

Sources: (Connecticut Department of Energy & Environmental Protection, 2015; U.S. Fish and Wildlife Service, 2021a) \* = Believe Extirpated in State

FE = Federally EndangeredFT = Federally Threatened

SE = State Endangered ST = State Threatened

FC = Federal Candidate

SC = State Special Concern

#### Table B-9: Threatened and Endangered Species in New York

Common Name	Scientific Name	Status
Birds		
Bald Eagle	Haliaeetus leucocephalus	ST
Black Rail	Laterallus jamaicensis	SE
Black Tern	Chlidonias niger	SE
Common Tern	Sterna hirundo	ST
Eskimo Curlew	Numenius borealis	FE, SE
Golden Eagle	Aquila chrysaetos	SE
Henslow's Sparrow	Ammodramus henslowii	ST
King Rail	Rallus elegans	ST
Least Bittern	Ixobrychus exilis	ST
Least Tern	Sterna antillarum	ST
Loggerhead Shrike	Lanius ludovicianus	SE
Northern Harrier	Circus cyaneus	ST
Peregrine Falcon	Falco peregrinus	SE
Pied-billed Grebe	Podilymbus podiceps	ST
Piping plover	Charadrius melodus	FE, SE
Red knot	Calidris canutus rufa	FT
Roseate tern	Sterna dougallii	FE, SE
Sedge Wren	Cistothorus platensis	ST
Short-eared Owl	Asio flammeus	SE
Spruce Grouse	Falcipennis canadensis	SE
Upland Sandpiper	Bartramia longicauda	ST
Mollusks		
Brook Floater	Alasmidonta varicosa	ST



Common Name	Scientific Name	Status
Chittenango ovate amber snail	Succinea chittenangoensis	FT, SE
Clubshell	Pleurobema clava	FE, SE
Dwarf wedgemussel	Alasmidonta heterodon	FE, SE
Fat pocketbook	Potamilus capax	FE, SE
Green Floater	Lasmigona subviridis	ST
Pink mucket	Lampsilis abrupta	FE, SE
Rayed bean	Villosa fabalis	FE, SE
Snuffbox	Epioblasma triquetra	FE, SE
Wavy-rayed Lampmussel	Lampsilis fasciola	ST
Plants		
Alpine Azalea	Kalmia procumbens	SE
Alpine Cliff Fern	Woodsia alpina	SE
Alpine Goldenrod	Solidago leiocarpa	ST
Alpine Sweetgrass	Anthoxanthum monticola ssp. monticola	SE
Alpine Willow-herb	Epilobium hornemannii ssp. hornemannii	SE
American Dragonhead	Dracocephalum parviflorum	SE
American Ipecac	Euphorbia ipecacuanhae	SE
American Shore-grass	Littorella uniflora	SE
American Strawberry-bush	Euonymus americanus	SE
American Waterwort	Elatine americana	SE
Angled Spikerush	Eleocharis quadrangulata	SE
Appalachian Shoestring Fern	Vittaria appalachiana	SE
Appalachian Trichomanes	Trichomanes intricatum	SE
Appendaged Waterleaf	Hydrophyllum appendiculatum	SE
Arctic Rush	Juncus trifidus	ST
Atlantic White Cedar	Chamaecyparis thyoides	ST
Auricled Twayblade	Listera auriculata	SE
Autumnal Water-starwort	Callitriche hermaphroditica	SE
Back's Sedge	Carex backii	ST
Barberry-leaved Hawthorn	Crataegus berberifolia	SE
Barratt's Sedge	Carex barrattii	SE
Basil Mountain-mint	Pycnanthemum clinopodioides	SE
Basil-balm	Monarda clinopodia	SE
Bayard's Adder's-mouth Orchid	Malaxis bayardii	SE
Bead Pinweed	Lechea pulchella var. moniliformis	SE
Beakgrass	Diarrhena obovata	ST



Common Name	Scientific Name	Status
Bearberry Willow	Salix uva-ursi	ST
Bear's-foot	Smallanthus uvedalius	SE
Beggar-lice	Desmodium obtusum	SE
Bent Sedge	Carex styloflexa	SE
Big Shellbark Hickory	Carya laciniosa	ST
Bigelow's Sedge	Carex bigelowii	ST
Bigleaf Yellow Avens	Geum macrophyllum var. macrophyllum	SE
Bird's-eye Primrose	Primula mistassinica	ST
Black Sedge	Carex nigra	SE
Black-edge Sedge	Carex nigromarginata	ST
Blue Wild Rye	Elymus glaucus ssp. glaucus	SE
Blue-eyed-Mary	Collinsia verna	SE
Bluegrass	Poa cuspidata	SE
Blue-hearts	Buchnera americana	SE
Blunt Mountain-mint	Pycnanthemum muticum	ST
Blunt-lobe Grape Fern	Botrychium oneidense	ST
Boott's Rattlesnake-root	Prenanthes boottii	SE
Bradley's Spleenwort	Asplenium bradleyi	SE
Bristly Nodding Sedge	Carex echinoides	SE
Broad-lipped Twayblade	Listera convallarioides	SE
Broom Crowberry	Corema conradii	SE
Brown Bog Sedge	Carex buxbaumii	ST
Burdick's Wild Leek	Allium tricoccum var. burdickii	SE
Bushy Cinquefoil	Potentilla paradoxa	SE
Bushy Rockrose	Crocanthemum dumosum	ST
Bushy St. John's-wort	Hypericum densiflorum	SE
Butterwort	Pinguicula vulgaris	ST
Button Sedge	Carex bullata	SE
Button-bush Dodder	Cuscuta cephalanthi	SE
Calypso	Calypso bulbosa	SE
Canada Ricegrass	Piptatherum canadense	ST
Canadian Single-spike Sedge	Carex scirpoidea ssp. scirpoidea	SE
Carey's Sedge	Carex careyana	SE
Carey's Smartweed	Persicaria careyi	SE
Carolina Clubmoss	Pseudolycopodiella caroliniana	SE
Carolina Redroot	Lachnanthes caroliana	SE



Common Name	Scientific Name	Status
Carolina sedge	Carex carolininana	SE
Carolina Whitlow-grass	Draba reptans	ST
Catfoot	Pseudognaphalium micradenium	SE
Cat-tail Sedge	Carex typhina	SE
Champlain Beachgrass	Ammophila breviligulata ssp. champlainensis	SE
Climbing Fern	Lygodium palmatum	SE
Clinton's Clubrush	Trichophorum clintonii	SE
Cloud Sedge	Carex haydenii	SE
Clustered Bluets	Oldenlandia uniflora	SE
Clustered Sedge	Carex cumulata	ST
Coast Flatsedge	Cyperus polystachyos var. texensis	SE
Coast Violet	Viola brittoniana	SE
Coastal Goldenrod	Solidago latissimifolia	SE
Coastal Silverweed	Argentina egedii ssp. egedii	ST
Collins' Sedge	Carex collinsii	SE
Comb-leaved Mermaid-weed	Proserpinaca pectinata	ST
Common Mare's-tail	Hippuris vulgaris	SE
Common Moonwort	Botrychium lunaria	SE
Cooper's Milkvetch	Astragalus neglectus	SE
Coppery St. John's-wort	Hypericum denticulatum	SE
Cork Elm	Ulmus thomasii	ST
Cranefly Orchid	Tipularia discolor	SE
Crawe's Sedge	Carex crawei	ST
Creeping Juniper	Juniperus horizontalis	SE
Creeping Sedge	Carex chordorrhiza	ST
Creeping Spikerush	Eleocharis fallax	SE
Creeping St. John's-wort	Hypericum adpressum	ST
Crested Fringed Orchis	Platanthera cristata	SE
Culver's-root	Veronicastrum virginicum	ST
Curlygrass Fern	Schizaea pusilla	SE
Cut-leaved Evening-primrose	Oenothera laciniata	SE
Cypress-knee Sedge	Carex decomposita	SE
Daisy Fleabane	Erigeron hyssopifolius	SE
Dark-green sedge	Carex venusta	SE
Davis' Sedge	Carex davisii	ST



Common Name	Scientific Name	Status
Deer's Hair Sedge	Trichophorum cespitosum ssp. cespitosum	ST
Diapensia	Diapensia lapponica var. lapponica	ST
Doubtful Toad-rush	Juncus ambiguus	SE
Douglas' Knotweed	Polygonum douglasii	ST
Downy Hawthorn	Crataegus mollis	SE
Downy Lettuce	Lactuca hirsuta	SE
Downy Phlox	Phlox pilosa	SE
Downy Wood-mint	Blephilia ciliata	SE
Dragon's Mouth Orchid	Arethusa bulbosa	ST
Drowned Beakrush	Rhynchospora inundata	ST
Drummond's Rock-cress	Boechera stricta	ST
Dune Sandspur	Cenchrus tribuloides	ST
Dwarf Blueberry	Vaccinium cespitosum	SE
Dwarf Bulrush	Lipocarpha micrantha	SE
Dwarf Glasswort	Salicornia bigelovii	ST
Dwarf Hawthorn	Crataegus uniflora	SE
Dwarf Huckleberry	Gaylussacia bigeloviana	SE
Dwarf Sand-cherry	Prunus pumila var. depressa	ST
Dwarf White Birch	Betula minor	SE
Dwarf Willow	Salix herbacea	SE
Early Frostweed	Crocanthemum propinquum	ST
Eastern Grasswort	Lilaeopsis chinensis	ST
Eastern Prairie Fringed Orchid	Platanthera leucophaea	SE
Elk Sedge	Carex garberi	SE
Emory's Sedge	Carex emoryi	SE
Engelmann's Spikerush	Eleocharis engelmannii	SE
Ensiform Rush	Juncus ensifolius	SE
Estuary Beggar-ticks	Bidens hyperborea var. hyperborea	SE
Fairy Wand	Chamaelirium luteum	SE
False China-root	Smilax pseudochina	SE
False Hop Sedge	Carex lupuliformis	ST
False Lettuce	Lactuca floridana	SE
Farwell's Water-milfoil	Myriophyllum farwellii	ST
Featherfoil	Hottonia inflata	ST
Fernald's Bluegrass	Poa laxa ssp. fernaldiana	SE
Fernald's Sedge	Carex merritt-fernaldii	ST



Common Name	Scientific Name	Status
Few-flowered Nutrush	Scleria pauciflora var. caroliniana	SE
Few-flowered Panic Grass	Dichanthelium oligosanthes var. oligosanthes	SE
Fibrous Bladderwort	Utricularia striata	ST
Field Beadgrass	Paspalum laeve	SE
Field Dodder	Cuscuta campestris	SE
Field Pansy	Viola bicolor	SE
Fir Clubmoss	Huperzia selago	SE
Fireweed	Erechtites hieraciifolius var. megalocarpa	SE
Flax-leaf Whitetop	Sericocarpus linifolius	ST
Floating Pennywort	Hydrocotyle ranunculoides	SE
Flowering Pixiemoss	Pyxidanthera barbulata	SE
Four-flowered Loosestrife	Lysimachia quadriflora	SE
Fragrant Cliff Fern	Dryopteris fragrans	SE
Frank's Sedge	Carex frankii	SE
Fringed Boneset	Eupatorium torreyanum	ST
Georgia Bulrush	Scirpus georgianus	SE
Giant Pine-drops	Pterospora andromedea	SE
Glaucous Sedge	Carex glaucodea	ST
Globe-fruited Ludwigia	Ludwigia sphaerocarpa	ST
Globose Flatsedge	Cyperus echinatus	SE
Glomerate Sedge	Carex aggregata	SE
Golden Club	Orontium aquaticum	ST
Golden Corydalis	Corydalis aurea	ST
Golden Dock	Rumex fueginus	SE
Golden Puccoon	Lithospermum caroliniense ssp. croceum	SE
Golden-seal	Hydrastis canadensis	ST
Goosefoot Corn-salad	Valerianella chenopodiifolia	SE
Green Gentian	Frasera caroliniensis	ST
Green Milkweed	Asclepias viridiflora	ST
Green Parrot's-feather	Myriophyllum pinnatum	SE
Green Rock-cress	Boechera missouriensis	ST
Green Spleenwort	Asplenium trichomanes-ramosum	SE
Gypsy-wort	Lycopus rubellus	SE
Hair-like Sedge	Carex capillaris	SE
Handsome Sedge	Carex formosa	ST



Common Name	Scientific Name	Status
Harbinger-of-spring	Erigenia bulbosa	SE
Hart's-tongue Fern	Asplenium scolopendrium var. americanum	FT, ST
Heart Sorrel	Rumex hastatulus	SE
Hidden Spike-moss	Selaginella eclipes	SE
High-mountain Blueberry	Vaccinium boreale	ST
Hill's Pondweed	Potamogeton hillii	ST
Hoary Skullcap	Scutellaria incana var. incana	SE
Holly-leaved Naiad	Najas marina	SE
Hooker's Orchid	Platanthera hookeri	SE
Hop Sedge	Cyperus lupulinus ssp. lupulinus	ST
Houghton's Goldenrod	Oligoneuron houghtonii	FT, SE
Houghton's Sedge	Carex houghtoniana	ST
Hudson River Water-nymph	Najas guadalupensis ssp. muenscheri	SE
Hyssop-skullcap	Scutellaria integrifolia	SE
Inland Bluegrass	Poa interior	SE
Jacob's-ladder	Smilax pulverulenta	SE
James' Sedge	Carex jamesii	ST
Kentucky Coffee Tree	Gymnocladus dioicus	SE
Knotted Spikerush	Eleocharis equisetoides	ST
Lake-cress	Rorippa aquatica	ST
Lanceleaf Arnica	Arnica lanceolata ssp. lanceolata	SE
Lance-leaved Loosestrife	Lysimachia hybrida	SE
Lapland Rosebay	Rhododendron lapponicum var. lapponicum	SE
Large Grass-leaved Rush	Juncus biflorus	SE
Large Twayblade	Liparis liliifolia	SE
Large Yellow-eyed-grass	Xyris smalliana	ST
Large-calyx Goosefoot	Chenopodium berlandieri var. macrocalycium	SE
Leedy's Roseroot	Rhodiola integrifolia ssp. leedyi	FT, SE
Leiberg's Panic Grass	Dichanthelium leibergii	SE
Lesser Fringed Gentian	Gentianopsis virgata	SE
Lindley's Aster	Symphyotrichum ciliolatum	SE
Lined Sedge	Carex striatula	SE
Little-leaf Tick-trefoil	Desmodium ciliare	ST
Live-forever	Hylotelephium telephioides	SE
Livid Sedge	Carex livida	SE



Common Name	Scientific Name	Status
Log Fern	Dryopteris celsa	SE
Long's Bittercress	Cardamine longii	ST
Longstalk Starwort	Stellaria longipes	ST
Long-tubercled Spikerush	Eleocharis tuberculosa	ST
Low Nutrush	Scleria verticillata	SE
Low Sand-cherry	Prunus pumila var. pumila	SE
Lowland Fragile Fern	Cystopteris protrusa	SE
Lyre-leaf Sage	Salvia lyrata	SE
Many-head Sedge	Carex sychnocephala	SE
Marsh Arrow-grass	Triglochin palustre	ST
Marsh Fimbry	Fimbristylis castanea	ST
Marsh Horsetail	Equisetum palustre	ST
Marsh Straw Sedge	Carex hormathodes	ST
Marsh Valerian	Valeriana uliginosa	SE
Meadow Horsetail	Equisetum pratense	ST
Meadow-parsnip	Thaspium barbinode	SE
Mead's Sedge	Carex meadii	SE
Melic-oats	Trisetum melicoides	SE
Michaux's Blue-eyed-grass	Sisyrinchium mucronatum	SE
Michigan Lily	Lilium michiganense	SE
Midland Sedge	Carex mesochorea	ST
Mingan Moonwort	Botrychium minganense	SE
Minute Duckweed	Lemna perpusilla	SE
Mitchell's Sedge	Carex mitchelliana	SE
Mock-pennyroyal	Hedeoma hispida	ST
Moor-rush	Juncus stygius ssp. americanus	SE
Mountain Bellwort	Uvularia puberula	SE
Mountain Death Camas	Anticlea elegans ssp. glaucus	ST
Mountain Goldenrod	Solidago simplex var. racemosa	SE
Mountain Meadow-sweet	Spiraea septentrionalis	SE
Mountain Spleenwort	Asplenium montanum	ST
Mountain Watercress	Cardamine rotundifolia	SE
Musk Root	Adoxa moschatellina	SE
Nantucket Juneberry	Amelanchier nantucketensis	SE
Narrow-leaf Cottongrass	Eriophorum angustifolium ssp angustifolium	SE
Narrow-leaf Sea-blite	Suaeda linearis	SE



Common Name	Scientific Name	Status
Narrow-leaved Bush-clover	Lespedeza angustifolia	ST
Narrow-leaved Sedge	Carex amphibola	SE
Navel-fruited Corn-salad	Valerianella umbilicata	SE
New England Northern Reedgrass	Calamagrostis stricta ssp. inexpansa	ST
New England Violet	Viola novae-angliae	SE
Nieuwland's Blazing-star	Liatris scariosa var. nieuwlandii	SE
Nodding Pogonia	Triphora trianthophora	ST
Nodding Rattlesnake-root	Prenanthes crepidinea	SE
Nodding Trillium	Trillium flexipes	SE
Nodding Wild Onion	Allium cernuum var. cernuum	ST
Northeastern Bulrush	Scirpus ancistrochaetus	FE, SE
Northern Bentgrass	Agrostis mertensii	ST
Northern Blazing-star	Liatris scariosa var. novae-angliae	ST
Northern Bog Aster	Symphyotrichum boreale	ST
Northern Bog Sedge	Carex gynocrates	SE
Northern Bog Violet	Viola nephrophylla	SE
Northern Bristly Club-moss	Spinulum canadense	SE
Northern Clustered Sedge	Carex arcta	SE
Northern Dropseed	Sporobolus heterolepis	ST
Northern Gamma Grass	Tripsacum dactyloides	ST
Northern Holly-fern	Polystichum lonchitis	SE
Northern Monk's-hood	Aconitum noveboracense	FT, SE
Northern Pondweed	Potamogeton alpinus	ST
Northern Reedgrass	Calamagrostis stricta ssp. stricta	SE
Northern Running-pine	Diphasiastrum complanatum	SE
Northern Stickseed	Hackelia deflexa var. americana	SE
Northern Tansy-mustard	Descurainia pinnata ssp. brachycarpa	SE
Northern Wild Comfrey	Cynoglossum virginianum var. boreale	SE
Northern Wild-licorice	Galium kamtschaticum	SE
Nottoway Brome Grass	Bromus nottowayanus	SE
Nuttall's Milkwort	Polygala nuttallii	ST
Nuttall's Tick-clover	Desmodium nuttallii	SE
Oakes' Evening Primrose	Oenothera oakesiana	ST
Ogden's Pondweed	Potamogeton ogdenii	SE
Ohio Goldenrod	Oligoneuron ohioense	ST
Orange Fringed Orchis	Platanthera ciliaris	SE



Common Name	Scientific Name	Status
Orange Milkwort	Polygala lutea	SE
Ovate Spikerush	Eleocharis ovata	SE
Pale Beakrush	Rhynchospora pallida	SE
Pale Duckweed	Lemna valdiviana	SE
Pale Indian-plantain	Arnoglossum atriplicifolium	SE
Panic Grass	Dichanthelium scabriusculum	SE
Pawpaw	Asimina triloba	ST
Peanut Grass	Amphicarpum purshii	SE
Persimmon	Diospyros virginiana	ST
Pink Wild Bean	Strophostyles umbellata	SE
Pink Wintergreen	Pyrola asarifolia ssp. asarifolia	ST
Porter's Reedgrass	Calamagrostis porteri ssp. porteri	SE
Possum-haw	Viburnum nudum var. nudum	SE
Prairie Dunewort	Botrychium campestre	SE
Prairie Redroot	Ceanothus herbaceus	SE
Prairie Wedgegrass	Sphenopholis obtusata	SE
Prairie-smoke	Geum triflorum var. triflorum	ST
Prickly Rose	Rosa acicularis ssp. sayi	SE
Primrose-leaf Violet	Viola primulifolia	ST
Provancher's Fleabane	Erigeron philadelphicus var. provancheri	SE
Purple Bluets	Houstonia purpurea var. purpurea	SE
Purple Comandra	Geocaulon lividum	SE
Purple Cress	Cardamine douglassii	ST
Purple Crowberry	Empetrum atropurpureum	SE
Purple Milkweed	Asclepias purpurascens	ST
Purple Mountain-saxifrage	Saxifraga oppositifolia ssp. oppositifolia	SE
Purple Rock-cress	Boechera grahamii	ST
Puttyroot	Aplectrum hyemale	SE
Quill-leaf Arrowhead	Sagittaria teres	SE
Ram's-head Ladyslipper	Cypripedium arietinum	ST
Rand's Mountain Goldenrod	Solidago simplex var. monticola	ST
Rattlebox	Crotalaria sagittalis	SE
Red Pigweed	Chenopodium rubrum	ST
Reflexed Sedge	Carex retroflexa	ST
Reticulate Nutrush	Scleria muehlenbergii	SE
Retrorse Flatsedge	Cyperus retrorsus var. retrorsus	SE



Common Name	Scientific Name	Status
Reznicek's Sedge	Carex reznicekii	SE
Rhodora	Rhododendron canadense	ST
Riverbank Quillwort	Isoetes riparia	SE
Riverweed	Podostemum ceratophyllum	ST
Rock-cress	Draba arabisans	ST
Roland's Sea-blite	Suaeda rolandii	SE
Rose-pink	Sabatia angularis	SE
Roseroot	Rhodiola rosea	SE
Rough Avens	Geum virginianum	ST
Rough Hedge-nettle	Stachys hyssopifolia	ST
Rough Rush-grass	Sporobolus clandestinus	SE
Rough Veiny Vetchling	Lathyrus venosus	SE
Rough-leaf Dogwood	Cornus drummondii	SE
Round-leaf Boneset	Eupatorium rotundifolium var. rotundifolium	SE
Rugulose Grape Fern	Botrychium rugulosum	SE
Rush Bladderwort	Utricularia juncea	SE
Saltmarsh Aster	Symphyotrichum subulatum var. subulatum	ST
Saltmarsh Bulrush	Bolboschoenus novae-angliae	SE
Saltmarsh Loosestrife	Lythrum lineare	SE
Salt-marsh Spikerush	Eleocharis uniglumis var. halophila	ST
Salt-meadow Grass	Leptochloa fusca ssp. fascicularis	SE
Sand Blackberry	Rubus cuneifolius	SE
Sand Dune Willow	Salix cordata	ST
Sandplain Gerardia	Agalinis acuta	FE, SE
Sandplain Wild Flax	Linum intercursum	ST
Sartwell's Sedge	Carex sartwellii	SE
Scabrous Black Sedge	Carex atratiformis	SE
Scarlet Indian-paintbrush	Castilleja coccinea	SE
Schweinitz' Sedge	Carex schweinitzii	ST
Scirpus-like Rush	Juncus scirpoides	SE
Scotch Lovage	Ligusticum scothicum ssp. scothicum	SE
Screw-stem	Bartonia paniculata ssp. paniculata	SE
Sea Purslane	Sesuvium maritimum	SE
Seabeach Amaranth	Amaranthus pumilus	FT, ST
Seacoast Angelica	Angelica lucida	ST
Sea-pink	Sabatia stellaris	ST



Common Name	Scientific Name	Status
Seaside Bulrush	Bolboschoenus maritimus ssp. paludosus	ST
Seaside Crowfoot	Ranunculus cymbalaria	SE
Seaside Dock	Rumex persicarioides	SE
Seaside Gerardia	Agalinis maritima var. maritima	ST
Seaside Goldenrod	Solidago sempervirens var. mexicana	SE
Seaside Orach	Atriplex glabriuscula	SE
Seaside Plantain	Plantago maritima var. juncoides	ST
Serrate Round-leaf Boneset	Eupatorium pubescens	SE
Sheathed Pondweed	Stuckenia filiformis ssp. occidentalis	SE
Sheathed Sedge	Carex vaginata	SE
Sheep Fescue	Festuca saximontana var. saximontana	SE
Shining Bedstraw	Galium concinnum	SE
Short-beaked Beakrush	Rhynchospora nitens	ST
Short-fruit Rush	Juncus brachycarpus	SE
Shortleaf Pine	Pinus echinata	SE
Short's Sedge	Carex shortiana	SE
Showy Aster	Eurybia spectabilis	ST
Shrubby St. John's-wort	Hypericum prolificum	ST
Shumard Oak	Quercus shumardii var. shumardii	SE
Side-oats Grama	Bouteloua curtipendula var. curtipendula	SE
Silvery Aster	Symphyotrichum concolor var. concolor	SE
Sitka Clubmoss	Diphasiastrum sitchense	SE
Sky-blue Aster	Symphyotrichum oolentangiense var. oolentangiense	SE
Slender Blazing-star	Liatris cylindracea	SE
Slender Blue Flag	Iris prismatica	ST
Slender Bulrush	Schoenoplectus heterochaetus	SE
Slender Crabgrass	Digitaria filiformis	SE
Slender Marsh Bluegrass	Poa paludigena	SE
Slender Marsh-pink	Sabatia campanulata	SE
Slender Nutrush	Scleria minor	SE
Slender Pinweed	Lechea tenuifolia	ST
Slender Pondweed	Stuckenia filiformis ssp. alpina	SE
Slender Spikegrass	Chasmanthium laxum	SE
Slender Spikerush	Eleocharis tenuis var. pseudoptera	SE
Small Bur-reed	Sparganium natans	ST



Common Name	Scientific Name	Status
Small Floating Bladderwort	Utricularia radiata	ST
Small White Ladyslipper	Cypripedium candidum	SE
Small White Snakeroot	Ageratina aromatica var. aromatica	SE
Small Whorled Pogonia	Isotria medeoloides	FT, SE
Small Yellow Ladyslipper	Cypripedium parviflorum var. parviflorum	SE
Small-flowered Pearlwort	Sagina decumbens ssp. decumbens	SE
Small-flowered Tick-clover	Desmodium pauciflorum	SE
Small's Knotweed	Polygonum aviculare ssp. buxiforme	SE
Smartweed Dodder	Cuscuta polygonorum	SE
Smooth Blue Aster	Symphyotrichum laeve var. concinnum	SE
Smooth Bur-marigold	Bidens laevis	ST
Smooth Cliff Brake	Pellaea glabella ssp. glabella	ST
Smooth Cliff Fern	Woodsia glabella	SE
Smooth Rock-cress	Draba glabella	SE
Smooth Tick-clover	Desmodium laevigatum	SE
Snowline Wintergreen	Pyrola minor	SE
Soapwort Gentian	Gentiana saponaria	SE
Soft Fox Sedge	Carex conjuncta	SE
Southeastern Bracken	Pteridium aquilinum var. pseudocaudatum	SE
Southern Arrowwood	Viburnum dentatum var. venosum	ST
Southern Blue Flag	Iris virginica var. shrevei	SE
Southern Bluets	Houstonia purpurea var. calycosa	SE
Southern Dodder	Cuscuta obtusiflora var. glandulosa	SE
Southern Naiad	Najas guadalupensis ssp. olivacea	SE
Southern Twayblade	Listera australis	SE
Southern Wood Violet	Viola hirsutula	SE
Southern Yellow Flax	Linum medium var. texanum	ST
Sparse-flowered Sedge	Carex tenuiflora	SE
Spiked Woodrush	Luzula spicata	SE
Spongy Arrowhead	Sagittaria montevidensis var. spongiosa	ST
Spotted Pondweed	Potamogeton pulcher	ST
Spreading Chervil	Chaerophyllum procumbens	SE
Spreading Tick-clover	Desmodium humifusum	SE
Spring Ladies'-tresses	Spiranthes vernalis	SE
Spurred Gentian	Halenia deflexa	SE
Squashberry	Viburnum edule	ST



Common Name	Scientific Name	Status
St. Andrew's Cross	Hypericum hypericoides ssp. multicaule	SE
Stargrass	Aletris farinosa	ST
Sticky False Asphodel	Triantha glutinosa	SE
Stiff Cowbane	Oxypolis rigidior	SE
Stiff-leaf Goldenrod	Oligoneuron rigidum var. rigidum	ST
Straight-leaf Pondweed	Potamogeton strictifolius	SE
Straw Sedge	Carex straminea	SE
Striped Coralroot	Corallorhiza striata var. striata	SE
Swamp Aster	Eurybia radula	SE
Swamp Birch	Betula pumila	ST
Swamp Buttercup	Ranunculus hispidus var. nitidus	SE
Swamp Cottonwood	Populus heterophylla	ST
Swamp Lousewort	Pedicularis lanceolata	ST
Swamp Oats	Sphenopholis pensylvanica	SE
Swamp Smartweed	Persicaria setacea	SE
Swamp Sunflower	Helianthus angustifolius	ST
Sweet Coltsfoot	Petasites frigidus var. palmatus	SE
Sweetbay Magnolia	Magnolia virginiana	SE
Sweet-scented Indian-plantain	Hasteola suaveolens	SE
Tall Bellflower	Campanulastrum americanum	SE
Tall Flat Panic Grass	Panicum rigidulum var. elongatum	SE
Tall Ironweed	Vernonia gigantea ssp. gigantea	SE
Tall White Aster	Symphyotrichum lanceolatum var. interior	SE
Terrestrial Starwort	Callitriche terrestris	ST
Thicket Sedge	Carex abscondita	SE
Thickleaf Orach	Atriplex dioica	SE
Three-ribbed Spikerush	Eleocharis tricostata	SE
Tidal Spikerush	Eleocharis aestuum	SE
Tinged Sedge	Carex tincta	SE
Tiny Blue-Curls	Trichostema setaceum	SE
Toad-shade	Trillium sessile	SE
Tooth-cup	Rotala ramosior	ST
Toothed Rock-cress	Boechera dentata	ST
Torrey's Mountain-mint	Pycnanthemum torrei	SE
Troublesome Sedge	Carex molesta	ST
Tundra Dwarf Birch	Betula glandulosa	SE



Common Name	Scientific Name	Status
Twin-leaf	Jeffersonia diphylla	ST
Veiny Meadow-rue	Thalictrum venulosum var. confine	SE
Velvet Panic Grass	Dichanthelium scoparium	SE
Velvety Bush-clover	Lespedeza stuevei	ST
Violet Wood-sorrel	Oxalis violacea	ST
Virginia Bunchflower	Melanthium virginicum	SE
Virginia False Gromwell	Onosmodium virginianum	SE
Virginia Ground-cherry	Physalis virginiana	SE
Virginia Pine	Pinus virginiana	SE
Virginia Snakeroot	Endodeca serpentaria	ST
Virginia Three-seeded Mercury	Acalypha virginica	SE
Wafer-ash	Ptelea trifoliata ssp. trifoliata	SE
Water Awlwort	Subularia aquatica var. americana	SE
Water Milfoil	Myriophyllum alterniflorum	ST
Water Pigmyweed	Crassula aquatica	SE
Water-horehound	Lycopus amplectens	ST
Water-plantain	Alisma gramineum	ST
Water-thread Pondweed	Potamogeton diversifolius	SE
Weak Rush	Juncus debilis	SE
Whip Nutrush	Scleria triglomerata	SE
White Basswood	Tilia american var. heterophylla	SE
White Bluegrass	Poa glauca ssp. glauca	SE
White Boneset	Eupatorium album var. album	SE
White Boneset	Eupatorium album var. subvenosum	ST
White Milkweed	Asclepias variegata	SE
White Mountain-saxifrage	Saxifraga paniculata ssp. neogaea	SE
White-bracted Boneset	Eupatorium leucolepis var. leucolepis	SE
White-edge Sedge	Carex debilis var. debilis	ST
Whorled Mountain-mint	Pycnanthemum verticillatum var. verticillatum	SE
Whorled-pennywort	Hydrocotyle verticillata	SE
Wiegand's Sedge	Carex wiegandii	SE
Wild Comfrey	Cynoglossum virginianum var. virginianum	SE
Wild Hydrangea	Hydrangea arborescens	ST
Wild Pink	Silene caroliniana ssp. pensylvanica	ST
Wild Potato-vine	Ipomoea pandurata	SE



Common Name	Scientific Name	Status
Wild Sweet-william	Phlox maculata ssp. maculata	SE
Willow Oak	Quercus phellos	SE
Winter Grape	Vitis vulpina	SE
Wood Reedgrass	Calamagrostis perplexa	SE
Woodland Agrimony	Agrimonia rostellata	ST
Woodland Bluegrass	Poa sylvestris	SE
Woodland Cudweed	Omalotheca sylvatica	SE
Woods-rush	Juncus subcaudatus	SE
Wooly Lip-fern	Cheilanthes lanosa	SE
Wright's Panic Grass	Dichanthelium wrightianum	SE
Wright's Spikerush	Eleocharis diandra	SE
Yellow Flatsedge	Cyperus flavescens	SE
Yellow Giant-hyssop	Agastache nepetoides	ST
Yellow Mountain-saxifrage	Saxifraga aizoides	ST
Yellow Wild Flax	Linum sulcatum	ST
Insects		
American burying beetle	Nicrophorus americanus	FE, SE
Arogos skipper	Atrytone arogo arogos	SE
Bog buckmoth	Hemileuca species 1	SE
Frosted Elfin	Callophrys irus	ST
Grizzled skipper	Pyrgus centaureae wyandot	SE
Hessel's hairstreak	Callophrys hesseli	SE
Karner blue butterfly	Kycaeides melissa samuelis	FE, SE
Little Bluet	Enallagma minisculum	ST
Northeastern Beach Tiger Beetle	Cicindela dorsalis dorsalis	FT, ST
Persius duskywing	Erynnis persius	SE
Pine Barrens Bluet	Enallagma recurvatum	ST
Pine pinion moth	Lithophane lepida lepida	SE
Regal fritillary	Speyeria idalia	SE
Scarlet Bluet	Enallagma pictum	ST
Tomah mayfly	Siphlonisca aerodromia	SE
Mammals		
Allegheny Woodrat	Neotoma magister	SE
Blue Whale	Balaenoptera musculus	FE, SE
Canada lynx	Lynx Canadensis	FT, ST
Eastern cougar	Felis concolor cougar	FE, SE



Common Name	Scientific Name	Status
Finback Whale	Balaenoptera physalus	FE, SE
Gray Wolf	Canis lupus	FE, SE
Humpback Whale	Megaptera novaeangliae	FE, SE
Indiana bat	Myotis sodalist	FE, SE
Northern long-eared bat	Myotis septentrionalis	FT, ST
Right Whale	Eubalaena glacialis	FE, SE
Sei Whale	Balaenoptera borealis	FE, SE
Sperm Whale	Physeter catodon	FE, SE
Reptiles and Amphibians		
Atlantic Hawksbill Sea Turtle	Eretmochelys imbricata	FE, SE
Kemp's Ridley Sea Turtle	Lepidochelys kempii	FE, SE
Blanding's Turtle	Emydoidea blandingii	ST
Bog turtle	Clemmys muhlenbergii	FT, SE
Eastern massasauga	Sistrurus catenatus	FT, SE
Eastern Fence Lizard	Sceloporus undulatus	ST
Green Sea Turtle	Chelonia mydas	FT, ST
Leatherback Sea Turtle	Dermochelys coriacea	FE, SE
Loggerhead Sea Turtle	Caretta caretta	FT, ST
Southeastern Mud turtle	Kinosternon subrubrum	SE
Northern Cricket Frog	Acris crepitans	SE
Queen Snake	Regina septemvittata	SE
Eastern Tiger Salamander	Ambystoma tigrinum	SE
Timber Rattlesnake	Crotalus horridus	ST
Fish		
Banded Sunfish	Enneacanthus obesus	ST
Bluebreast Darter	Etheostoma camurum	SE
Deepwater Sculpin	Myoxocephalus thompsoni	SE
Eastern Sand Darter	Ammocrypta pellucida	ST
Gilt Darter	Percina evides	SE
Gravel Chub	Acantharchus pomotis	ST
Lake Chubsucker	Erimyzon sucetta	ST
Lake Sturgeon	Acipenser fulvescens	ST
Longhead Darter	Percina macrocephala	ST
Mooneye	Hiodon tergisus	ST
Mud Sunfish	Acantharchus pomotis	ST
Northern Sunfish	Lepomis peltastes	ST



Common Name	Scientific Name	Status
Pugnose Shiner	Notropis anogenus	SE
Round Whitefish	Prosopium cylindraceum	SE
Shortnose Sturgeon	Acipenser brevirostrum	FE, SE
Silver Chub	Macrhybopsis storeriana	SE
Spoonhead Sculpin	Cottus ricei	SE
Spotted Darter	Etheostoma maculatum	ST
Swamp Darter	Etheostoma fusiforme	ST

Sources: (New York State Department of Environmental Conservation, n.d.; U.S. Fish and Wildlife Service, 2021a)FE = Federally EndangeredSE = State EndangeredFT = Federally ThreatenedST = State Threatened



# APPENDIX C. SUBASE NLON NATURAL RESOURCES PROJECT LIST



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APPENDIX C

Naval Submarine Base New London

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APPENDIX D Naval Submarine Base New London



# APPENDIX D. NSA SARATOGA SPRINGS INTEGRATED NATURAL RESOURCES COMPONENT MANAGEMENT PLAN



#### INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Support Activity Saratoga Springs Saratoga Springs, New York

2022 Plan

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (16 USC 670a et seq.) as amended and Department of Defense Instruction 4715.03 and Chief of Naval Operations Instruction 5090.1E. This document was prepared and reviewed in coordination with U.S. Department of Interior, Fish and Wildlife Service, National Oceanic and Atmospheric Administration – National Marine Fisheries Service, and the New York State Department of Environmental Conservation in accordance with the 2006 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

**Approving Official's Signature:** 

1. La

Installation Commanding Officer Naval Support Activity Saratoga Springs 27 Ju 2022

Date



# APPENDIX D. NSA SARATOGA SPRINGS INTEGRATED NATURAL RESOURCES COMPONENT MANAGEMENT PLAN

## **D.1 OVERVIEW**

The purpose and authority for this component management plan (CMP) is in Section 1.1 of SUBASE NLON's INRMP. In addition to the main installation areas in Connecticut (CT) covered in SUBASE NLON's INRMP, SUBASE NLON also supports Naval Support Activity Saratoga Springs (NSA Saratoga Springs), 69 acres, located in Saratoga Springs, New York (NY). The goal of this CMP is to include NSA Saratoga Springs in SUBASE NLON's overall INRMP. Please see Figure D-2 for the location of NSA Saratoga Springs within Saratoga County, New York.

This CMP includes a thorough review of the natural resources management programs in place at Saratoga Springs, incorporates the most up-to-date information and data available, and takes the most recent guidance into account, including *Integrated Natural Resources Management Plan Guidance for Navy Installations: How to Prepare, Implement, and Revise Integrated Natural Resources Management Plans (INRMP)* (U.S. Department of the Navy, 2006); the DOD memorandum, *Guidelines for Streamlined INRMP Review* (Office of the Assistant Secretary of Defense, 2015); *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers* (Benton et al., 2008) and DOD Manual (DODM) 4715.03: *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (Department of Defense, 2018).

### **D.2** ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY D.2.1 Supporting Sustainability of the Military Mission and Sustainable Land Use D.2.1.1 Integrating Military Mission and Sustainable Use

Although 31 percent of NSA Saratoga Spring's acreage is developed for mission activities and support functions (e.g., residential housing), its remaining natural resources provide practical ecosystem services. These natural resources include wetlands, streams, riparian buffers, and open space that provide critical ecosystem services. Key ecosystem services of these natural resources are stormwater management, pollutant removal, and biodiversity (refer to Section D.3.4 for further discussion). The installation's natural resources also provide opportunities for outdoor recreation and aesthetic benefits; this contributes to the installation's MWR Program, which aims to enhance the quality of life for military personnel, their family members, and civilian personnel.

## D.2.1.2 Define Impact on Military Mission

The core mission at NSA Saratoga Springs is to deliver consistently efficient and effective shore readiness and operational support to the Fleet, Fighter, and Family and perform host command functions in support of supported commands and the military community (Naval Support Activity Saratoga Springs, n.d.[a]). NSA Saratoga Springs supports Navy commands within the New York State Capital Region. NSA Saratoga Springs' main functions are administrative and there is a Navy Federal Credit Union, Navy Exchange, and Commissary located onsite (Naval Support Activity Saratoga Springs, n.d.[b]). Currently, natural resources management at NSA Saratoga Springs does not significantly affect military mission. As discussed further under



SUBASE NLON's INRMP Section 6.2, the installation is achieving no net loss in the capability of military lands to support the mission of the installation through the implementation of the INRMP.

# **D.2.1.3 Encroachment Partnering**

The Navy defines encroachment primarily as any non-Navy action, planned or executed, that inhibits, curtails, or possesses the potential to impede performance of Navy activities (U.S. Department of the Navy, 2020). Environmental constraints are constraints to the military mission and operations at NSA Saratoga Springs caused by natural resources and natural factors. Areas not designated as constraints are designated as continuing opportunities for military missions and encroachment partnering relative to environmental constraints.

Military services can compete for funds for encroachment partnering through the Readiness and Environmental Integration (REPI) Program. Encroachment partnering opportunities include projects for which the installation partners with one or more entities to acquire real estate interests from private landowners to address encroachment challenge related to incompatible land use or preservation of ecologically related land off the installation. Title 10, U.S.C. 2684a authorizes the military departments to enter into agreements with the state or local governments, or private conservation organizations, to acquire real estate interests from willing sellers who own land located in the vicinity of military installations, or land that is ecologically related to it (Department of Defense, Office of the Secretary of Defense, n.d.).

Environmental constraints shown in Figure D-1 are:

- Water Features
  - Limit land available for mission related activities
- Wetlands
  - Limit land available for mission related activities due to restoration and management

There are also environmental constraints, such as climate change, that do not have a spatial representation or there may not be data available for a specific constraint.



Figure D-1: Environmental Constraints and Opportunities of NSA Saratoga Springs


# **D.2.1.4** Relationship to Other Operational Management Plans

This CMP is not intended to replace existing installation policy, operations protocols, or military management plans. Rather, this CMP is meant to facilitate the integration and coordination of natural resources management actions with other plans and programs at the installation and, moreover, with NSA Saratoga Springs integration into SUBASE NLON's overall management area.

#### **D.2.2** Natural Resources Consultation Requirements

Section 7 of the ESA requires federal agencies to formally consult with the USFWS (inland fish and wildlife species) or NOAA National Marine Fisheries Service (NMFS) (marine species) when any proposed activity authorized, carried out, or conducted by that agency may significantly affect a listed species or designated critical habitat (16 USC § 1531 et seq. *"Endangered Species Act of* 1973"). As a result of consultation, the USFWS or NOAA NMFS will issue a biological opinion including actions that the federal agency must complete in order to conduct the proposed activity. If critical habitat is located on federal property and adequate protection and management of the critical habitat from the biological opinion. However, in order for the critical habitat to be excluded, 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. For minor or less-than-significant impacts on ESA-listed species or designated critical habitat, informal consultation with the USFWS and NOAA NMFS may be appropriate. Section 7 consultation (formal or informal) is not expected to be required for any of the natural resources management projects recommended in this INRMP.

No federal or state TES are known to occur at NSA Saratoga Springs, although migratory species do use the natural habitats and open space for transient use. In addition, bats are increasingly becoming species of concern. The northern long-eared bat (*Myotis septentrionalis*), listed as threatened, and the Indiana bat (*Myotis sodalis*), listed as endangered by the USFWS, have both been confirmed in Saratoga County, New York (U.S. Fish and Wildlife Service, 2012). In addition, the Karner blue butterfly (*Lycadeides melissa samuelis*) (federally endangered, state endangered) is known to occur in the city of Saratoga Springs, New York (New York State Department of Environmental Conservation, 2021a; U.S. Fish and Wildlife Service, 2021).

#### **D.2.3 NEPA Compliance**

Please see Section 2.3 in SUBASE NLON's INRMP for details.

# **D.3** CURRENT CONDITIONS AND USE

#### **D.3.1 Installation Description**

#### **D.3.1.1 General Location Description**

NSA Saratoga Springs is in Saratoga Springs, New York (NY), along State Route 29. NSA Saratoga Springs is 69 acres and is comprised of the Fleet and Family Support Center (FFSC) and other administrative offices. See Figure D-2 depicting the installation boundary for Saratoga Springs.





Figure D-2: Installation Boundary of NSA Saratoga Springs



# **D.3.1.2 Regional Land Uses**

The city of Saratoga Springs is located northwest of Saratoga Lake in NY. Saratoga Springs is approximately 35 miles north of New York's capital, Albany (Naval Support Activity Saratoga Springs, n.d.[b]). The land area adjacent to the NSA Saratoga Springs installation boundary mostly consists of varying levels of developed land along the northeast with woody wetlands and deciduous forests along the northwest, southwest, and south. See Figure D-3 for the regional land cover of the city of Saratoga Springs.

#### D.3.1.3 Historic and Pre-Military Land Use

NSA Saratoga Springs was originally located in Scotia, New York, as a Naval Administrative Unit (NAU) in 1974. In 1999, the unit was relocated to its current location in Saratoga Springs, New York. In 2010 NAU Saratoga Springs was changed to Naval Support Activity (NSA) Saratoga Springs (Naval Support Activity Saratoga Springs, n.d.[b]).

#### D.3.1.4 Natural Resources Necessary to Support NSA Saratoga Springs' Mission

The core mission at NSA Saratoga Springs is to deliver consistently efficient and effective shore readiness and operational support to the Fleet, Fighter, and Family and perform host command functions in support of supported commands and the military community (Naval Support Activity Saratoga Springs, n.d.[a]). Natural resources within the installation complex, such as land areas, soils, hydrology, and vegetation, support the mission in practical ways (i.e., soil stabilization, decreasing stormwater runoff, and providing sites suitable for facilities). Slade Creek runs through the western side of the installation and provides aesthetics as well as ecosystem services to the installation.

#### D.3.1.5 Operations and Activities that may Affect Natural Resources

NSA Saratoga Springs' ability to accomplish its mission requires operations to occur in facilities located in Saratoga Springs, New York. NSA Saratoga Springs needs to ensure compliance with all legal environmental requirements, and work to minimize the environmental impact of its operations. Impacts on natural resource assets from installation activities would be those associated with

- large areas of impervious surfaces (increased surface runoff, degradation of stormwater runoff quality);
- landscaping (introduction of non-native plant species, degraded wildlife habitat, use of pesticides and fertilizers); and
- construction (erosion, increased permanent impervious surface area).



Figure D-3: Regional Land Cover of NSA Saratoga Springs



Any construction planned on NSA Saratoga Springs will need to be identified in SUBASE NLON documentation or a location specific Master Plan. Construction may present environmental challenges such as minimizing impacts on wetlands and surface waters as well as preventing erosion along floodplains. See Figure D-1 for the environmental constraints and opportunities at NSA Saratoga Springs.

#### **D.3.2** Physical Environment **D.3.2.1** Geology and Topography

Saratoga County is in east-central New York. Saratoga County is part of two physiographic provinces, the Adirondack Highlands Physiographic province, and the Hudson-Mohawk Lowlands province. The boundary of the two provinces is a series of northeast trending block faults that are marked by long, straight valleys. The Sacandage Reservoir and Lake George occupy two of these defined valleys. Bedrock within Saratoga County is mostly crystalline in the Adirondack Highlands province and mostly sedimentary rocks in the Hudson-Mohawk Lowlands province. The sedimentary rocks can include shale, sandstones, dolostones, and some limestone. Overall topography for Saratoga Springs County ranges from 60 feet above sea level to 2,600 feet in the Adirondack foothills (U.S. Department of Agriculture, Natural Resources Conservation Service, 1993).

NSA Saratoga is in the Hudson-Mohawk Lowlands province with bedrock consisting of Canajoharie shale and Mohawk Valley limestone groups (U.S. Department of Agriculture, Natural Resources Conservation Service, 1993). NSA Saratoga Springs topography ranges from 290 feet to 320 feet above sea level. The western side of the installation is slightly steeper sloped then the remainder of the installation, as seen in Figure D-4.





Figure D-4: Topography of NSA Saratoga Springs



# D.3.2.2 Soils

As seen in Figure D-5 and Table D-1, there are four major soil types within NSA Saratoga Springs installation boundary: (1) Deerfield loamy fine sand, undulating (2) Oakville loamy fine sand with a nearly level slope (3) Windsor loamy sand between 25 to 35 percent slopes and (4) Windsor loamy sand between 3 to 8 percent slopes. The four soil types are all loamy sands which are all very deep and moderately well to excessively drained sands (U.S. Department of Agriculture, Natural Resources Conservation Service, 1993).

Symbol	Soil Type	Area (acre)
DeB	Deerfield loamy fine sand, undulating	6.82
OaA	Oakville loamy fine sand, nearly level	32.37
OeE	Windsor loamy sand, 25 to 35 percent slopes	5.29
WnB	Windsor loamy sand, 3 to 8 percent slopes	24.47

#### Table D-1: Soil Composition and Acreage Breakdown of NSA Saratoga Springs

Source: (U.S. Department of Agriculture, Natural Resources Conservation Service, 2007)

NSA Saratoga Springs is within a carbonate-rock aquifer. These aquifers are in three principal types of rocks: carbonate rocks, sandstone, and crystalline rocks. Ground water is stored in and transferred nearly exclusively by secondary openings in the carbonate-rock aquifer. Fault lines are important where the faults consist of broken rock fragments. These areas provide a large, extremely permeable conduit for water that extends to land surface and interconnects with fractures, joints, and bedding planes at depth (Olcott, 1995).

The main surface water on NSA Saratoga Springs is a freshwater creek, Slade Creek, which runs north to south through the western side of the installation. See Section D.3.3.3 for more details.





Figure D-5: Soil Composition of NSA Saratoga Springs



#### D.3.3 Biotic Environment D.3.3.1 Ecoregion

Saratoga County falls within three USEPA ecoregions: (1) Northeastern Highlands, (2) Northeastern Coastal Zone, and (3) Eastern Great Lakes and Hudson Lowlands. NSA Saratoga Springs falls within the Northeastern Coastal Zone ecoregion.

The Northeastern Coastal Zone comprises much of eastern New York, southern New England, and the coast of New Hampshire and southern Maine, excluding Cape Cod. It is mainly characterized by irregular plains and plains with low to high hills. Predominant natural vegetation is Appalachian oak forests and northeastern oak-pine forests, with mostly mesic Inceptisol soils (Griffith et al., 2009). Current land use in the ecoregion is largely forests, woodlands, and urban and suburban development, as well as minor areas of pasture and cropland.

#### D.3.3.2 Watershed

NSA Saratoga Springs is within the Upper Hudson River Basin. The Upper Hudson River basin is composed of 4,620 square miles, 88 percent of that falling within New York State. The remaining 22 percent of the basin is within southwestern Vermont. The Upper Hudson River Basin represents approximately one-third of the Hudson/Mohawk River drainage area. Overall water quality of the Upper Hudson River Basin is good to excellent. Within the larger basin, NSA Saratoga Springs is located within the Hudson/Hoosic Sub-Basin, and the Fish Creek Watershed (New York State Department of Environmental Conservation, 2007).

#### D.3.3.3 Water Resources

Water resources consist of surface and ground water resources. Surface water features include streams, lakes, rivers, reservoirs, wetlands, and estuaries. Ground water includes subsurface hydrogeologic resources such as aquifers. Since surface and groundwater are linked, effective land and water management requires clear understanding of both water resource types and how they are linked in any setting. For example, pollution of surface water can cause degradation of ground water quality, and vice versa.

# D.3.3.3.1 Surface Water and Wetlands

The main surface water on NSA Saratoga Springs is Slade Creek, a freshwater creek, which runs north to south through the western side of the installation. Slade Creek runs into Rowland Hollow Creek which then ultimately feeds into Saratoga Lake. The last time Slade Creek, other smaller tributaries, and Saratoga Lake were classified for water quality was in 2006 and it was determined that Slade Creek and the tributaries need further studies. Saratoga Lake had minor impacts due to aquatic weed growth and slightly elevated nutrient levels. A management strategy has been developed and is currently being implemented for Saratoga Lake's impairments (New York State Department of Environmental Conservation, 2018).

Wetlands are defined under the CWA as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil



conditions" (U.S. Environmental Protection Agency, n.d.[a]). The USEPA categorizes four main types of wetlands (with several sub-types) (U.S. Environmental Protection Agency, n.d.[b]):

- marshes characterized by non-woody vegetation
  - tidal coastal marshes
  - non-tidal inland marshes includes wet meadows, prairie potholes, vernal pools, and playa lakes
- swamps dominated by woody vegetation
  - o forested includes bottomland hardwoods
    - shrub includes mangrove swamps
- bogs freshwater wetlands, characterized by spongy peat deposits, acidic waters, and sphagnum moss (rainwater is the only water source)
- fens freshwater, peat-forming wetlands, covered largely by grasses, sedges, reeds, and wildflowers (groundwater-fed)

Both bogs and fens tend to occur in the glaciated areas of the northeast United States.

Wetlands provide habitat for thousands of aquatic and terrestrial plants and animals, as well as being important stops for migrating birds. They function as a means for flood control and storm damage reduction, protect and improve water quality naturally, and provide recreational and aesthetic value.

There are 1.62 acres of freshwater forested/shrub wetlands in the southwest area of the installation. In addition to the currently mapped wetlands, New York's DEC also maintains "check zones" for wetlands. These zones are defined as areas that will need the wetland boundaries to be verified and possibly have a biologist perform wetland delineation in the area for exact wetland boundaries. Due to the definition of these check zones being a 100-foot buffer from currently mapped wetlands, a large portion of the western side of NSA Saratoga Springs is within a check zone (New York State Department of Environmental Conservation, n.d.[a]; Sustainable Saratoga, n.d.).

#### D.3.3.3.2 Ground Water

NSA Saratoga Springs is within a carbonate-rock aquifer. Carbonate rock aquifers generally produce the highest yields within the Upper Hudson River Basin due to the ability for water to be transmitted successfully. The groundwater quality of the overall basin is generally good, with a few concentrated areas of high nitrate and mineral content. The sample area that includes NSA Saratoga Springs was not a part of these concentrated areas (Nystrom, 2009).





Figure D 6: Wetlands and Surface Water of NSA Saratoga Springs



#### D.3.3.4 Flora

As shown in Figure D-3, the land areas immediately adjacent to NSA Saratoga Springs consist mostly of woody wetlands and deciduous forest. Woody wetlands consist of forest or shrubland vegetation while deciduous forests consist of trees that are generally more than five meters tall and contain species that shed foliage in response to seasonal change (Multi-Resolution Land Characteristics Consortium, 2019).

As noted in Section D.5, a flora species survey needs to be conducted on NSA Saratoga Springs to determine what flora species are located on the installation.

#### D.3.3.4.1 Invasive Species

According to the Cornell University Cooperative Extension, Saratoga County is occupied by the following invasive species (Table D-2, Cornell Cooperative Extension, 2021). Invasive plant species identified in Saratoga County occupy aquatic and terrestrial habitats. These invasive species have not been recorded at NSA Saratoga Springs. As noted in Section D.5, an invasive species survey needs to be conducted on NSA Saratoga Springs to determine if there are any invasive flora species located on the installation.

Common Name	Scientific Name	Habitat
Common Reed	Phragmites australis	Aquatic
Japanese Knotweed	Fallopia japonic	Terrestrial
Water Chestnut	Eleocharis dulcis	Aquatic
Buckthorn	Rhamnus cathartica	Terrestrial
Garlic Mustard	Alliaria petiolata	Terrestrial
Giant Hogweed	Heracleum mantegazzianum	Terrestrial
Honeysuckle	Lonicera spp.	Terrestrial
Multiflora Rose	Rosa multiflora	Terrestrial
Wild Parsnip	Pastinaca sativa	Terrestrial

#### Table D-2: Invasive Species occurring in Saratoga County, New York

# D.3.3.5 Fauna

Mammals generally found in New York State include bobcats (*Lynx rufus*), woodchucks (*Marmota monax*), black bears (*Ursus americanus*), beavers (*Casto spp.*), white tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), striped skunk (*Mephitis mephitis*), and others. Common bird species located in NY State include pheasants (*Phasianus colchicus*), wild turkey (*Meleagris gallopavo*), wood ducks (*Aix sponsa*), Canada goose (*Branta canadensis*), bald eagles (*Haliaeetus leucocephalus*), great horned owls (*Bubo virginianus*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), black-capped chickadee (*Poecile atricapillus*), and many others. Other animal species in NY State include salamanders (*Caudata spp.*), toads (*Bufo spp.*), frogs (*Anura spp.*), lizards



(*Lacertilia* spp.), snakes (*Serpentes* spp.), and turtles (*Testudines* spp.) (New York State Department of Environmental Conservation, n.d.[b]).

None of the above have been documented on NSA Saratoga Springs. As noted in Section D.5, a fauna species survey is required to determine what fauna species are located on the installation.

#### D.3.3.5.1 Migratory Birds

Twenty-one bird species covered by the Migratory Bird Treaty Act (MBTA), and also on the Birds of Conservation Concern (BCC) or Bald and Golden Eagle Protection Act (BGEPA) are typically found in Saratoga County, and thus have the potential to occur on NSA Saratoga Springs. These species are outlined in Table D-3.

Common Name	Scientific Name	Season
American Golden-plover	Pluvialis dominica	Non-breeding
Bald eagle	Haliaeetus leucocephalus	Year-Round
Black-billed Cuckoo	Coccyzus erythropthalmus	Breeding
Blue-winged warbler	Vernivora pinus	Breeding
Bobolink	Dolichonyx oryzivorus	Breeding
Canada warbler	Cardellina canadensis	Breeding
Cap May Warbler	Cardellina canadensis	Breeding
Cerulean Warbler	Dendroica cerulea	Breeding
Eastern Whip-poor-will	Antrostomus vociferus	Breeding
Evening Grosbeak	Coccothraustes vespertinus	Breeding
Golden Eagle	Aquila chrysaetos	Breeding
Golden-winged warbler	Vernivora chrysoptera	Breeding
Lesser Yellowlegs	Tringa flavipes	Non-breeding
Long-eared Owl	Asio otus	Breeding
Olive-sided flycatcher	Contopus cooperi	Breeding
Prairie Warbler	Dendroica discolor	Breeding
Red-headed woodpecker	Melanerpes erythrocephalus	Breeding
Ruddy Turnstone	Arenaria interpres morinella	Breeding
Short-billed Dowitcher	Limnodromus griseus	Breeding
Willet	Tringa semipalmata	Breeding
Wood thrush	Hylocichla mustelina	Breeding

#### Table D-3: Migratory Birds on the BCC/BGEPA list in Saratoga County, New York

Source: (U.S. Fish and Wildlife Service, 2021)



# D.3.3.5.2 Invasive Species

Invasive species identified in Saratoga County include aquatic and terrestrial animals as well as insects. According to the Cornell University Cooperative Extension, Saratoga County is occupied by the following invasive species (Table D-4, Cornell Cooperative Extension, 2021).

Common Name	Scientific Name	Habitat
Asian Carp	Cyprinus carpio	Aquatic
Asian Clam	Corbicula fluminea	Aquatic
Mute Swan	Cygnus olor	Semi-aquatic
Round Goby	Neogobius melanostomus	Aquatic
Spiny Waterflea	Bythotrephes longimanus	Aquatic
Asian Longhorned Beetle	Anoplophora glabripennis	Terrestrial
Emerald Ash Borer	Agrilus planipennis	Terrestrial
European Crane Fly	Tipula paludosa	Terrestrial
Hemlock Woolly Adelgid	Adelges tsugae	Terrestrial
Sirex Woodwasp	Sirex noctilio	Terrestrial
Spotted Wing Drosophila	Drosophila suzuki	Terrestrial
Swede Midge	Contarinia nasturtii	Terrestrial
Feral Swine	Sus scrofa	Terrestrial

 Table D-4: Invasive Species occurring in Saratoga County, New York

As noted in Section D.5, an invasive species survey needs to be conducted on NSA Saratoga Springs to determine if there are any invasive fauna species located on the installation.

# D.3.3.6 Rare, Threatened, and Endangered Species

No federal or state TES are known to occur at NSA Saratoga Springs, although migratory species do use the natural habitats and open space for transient use. In addition, bats are increasingly becoming species of concern. The northern long-eared bat (*Myotis septentrionalis*), listed as threatened, and the Indiana bat (*Myotis sodalis*), listed as endangered by the USFWS, have both been confirmed in Saratoga County, New York (U.S. Fish and Wildlife Service, 2012). Please see Section 3.3.7 in SUBASE NLON's INRMP for more information on the northern long-eared bat and other bat species of concern.

In addition, the Karner blue butterfly (*Lycadeides melissa samuelis*) (federally endangered, state endangered) is known to occur in the city of Saratoga Springs, New York (New York State Department of Environmental Conservation, 2021a; U.S. Fish and Wildlife Service, 2021). The Karner blue butterfly has not been documented on NSA Saratoga Springs.

As noted in Section D.5, a TES survey is required to determine if there are any TES located on the installation. Table D-4 shows the TES that have been documented in Saratoga County, New York.



Common Name	Scientific Name	Status
Karner blue butterfly	Lycaeides melissa samuelis	FE
Indiana bat	Myotis sodalis	FE
Northern long-eared bat	Myotis septentrionalis	FT

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Sources: (U.S. Fish and Wildlife Service, 2021)

FE = Federally Endangered SE = State Endangered

FT = Federally Threatened ST = State ThreatenedST = State Threatened

FC = Federal Candidate

SI = State InreatenedSC = State Special Concern

# **D.3.4** Ecosystem Services

An ecosystem is an ecological unit of living organisms, abiotic factors, and their interactions, which are found in a similar environment and influenced by similar processes like fire or flooding (Benton et al., 2008). Ecosystem services are the collective direct and indirect benefits that humans derive from ecological processes and the resultant resources occurring in ecosystems. These include "provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life" (Department of Defense, 2018) For example, wetlands play a major role in water purification and flood control; forests and coastal wetlands play a major role in carbon sequestration; and bees, butterflies, and moths pollinate many plants to enable their reproduction, including agricultural crops. Ecosystem services also provide potential economic value and thus present an opportunity to reduce installation costs in grey (or built) infrastructure for things such as stormwater management, drinking water filtration, and storm-surge buffering.

In recognition of the importance of ecosystem services, DODI 4715.03 requires that all DOD natural resources conservation program activities include consideration of ecosystem services to foster their long-term ecological integrity and sustainability (Department of Defense, 2018). Stewardship of ecological resources (e.g., wetlands, forests, and aquatic resources) on DOD lands through an ecosystem-based management approach protects the ecosystem services associated with these resources.

Conserving, enhancing, and further incorporating ecosystem services into the planning vision of NSA Saratoga Springs and the surrounding region will provide lasting benefits, including support of NSA Saratoga Springs' current and future sustainability and the ability to prevent, or at least minimize, the impacts of encroachment. Furthermore, leveraging ecosystem credits or assets such as wetlands, carbon sequestration, or biodiversity, can provide the flexibility to meet new and changing mission requirements, as well as create natural buffers against development and other encroachment. NSA Saratoga Springs ecosystems services are summarized in Table D-6.



Table D-6. Key Ecosystem Services Provided by the Ecological Resources of NSA Sarate	oga
Springs.	

Ecological Resources	Ecosystem Services	Military Benefits	Regional Benefits
Wetlands and riparian habitats: emergent marshes, shrub swamp	<ul> <li>Storm protection</li> <li>Flood control</li> <li>Water retention and purification</li> <li>Absorbs and cleans pollution from stormwater</li> <li>Erosion control</li> <li>Maintains hydrologic cycle</li> <li>Carbon sequestration</li> <li>Biodiversity</li> <li>Habitat corridor</li> <li>Climate regulation</li> </ul>	<ul> <li>Buffers installation from storm surges and flooding, thus reducing risk to infrastructure</li> <li>Reduces costs for hardened shoreline protection infrastructure</li> <li>Reduces stormwater management and flood control costs</li> <li>Reduces water treatment costs</li> <li>Reduces pollution prevention costs</li> </ul>	<ul> <li>Supports regional biodiversity by protecting habitats for wildlife, pollinators, fish, and shellfish</li> <li>Supports Narragansett Bay fish and shellfish industries</li> <li>Provides open space in an otherwise developed landscape</li> </ul>
Upland habitats: old fields, northern hardwood forests, mixed oak/white pine forests	<ul> <li>Absorbs and cleans pollution from stormwater</li> <li>Carbon sequestration</li> <li>Oxygen production</li> <li>Biodiversity</li> <li>Habitat corridor</li> <li>Climate regulation</li> <li>Recreation</li> </ul>	<ul> <li>Reduces stormwater management costs</li> <li>Reduces water treatment costs</li> <li>Reduces pollution prevention costs</li> <li>Provides lands for hunting deer at the tank farms</li> </ul>	<ul> <li>Supports regional biodiversity by protecting habitats for wildlife and pollinators</li> <li>Provides open space in an otherwise developed landscape</li> </ul>

#### D.3.5 Climate

# D.3.5.1 Historical and Current Climate Trends

Historically, New York's climate has been defined by its geography. Difference in latitude throughout the state and the type of topography have defined the climate variables. Overall, the state is of the humid continental type of climate, which is the same as most of the northeastern United States. Large, warm, humid, air masses frequent New York State from prevailing south and southwesterly winds while large cold, dry, masses arrive from the north. Some air masses



come in from the northern Atlantic Ocean, which produces cool, cloudy, and damp weather conditions (New York State Department of Environmental Conservation 2021b).

Numerous climate-driven changes have been documented in New York:

Storms and Flooding: Saratoga County, New York, gets 45 inches of rain per year, with a maximum of 58 inches in 2006 and a minimum of 26 inches in 1965 (U.S. Climate Data, 2021). No significant trend in annual precipitation was observed in Saratoga County from 1896 through 2021 ( $R^2 = 0.09$ ). The frequency and intensity of extreme precipitation and coastal flooding events are increasing in New York (New York State Department of Environmental Conservation 2021b).

*Air Temperature Extremes*: Average temperatures across the northeast U.S. have risen approximately 0.25°F per decade since 1900 (New York State Department of Environmental Conservation, 2021b). Daily average temperature in the summer months (June-August) for Saratoga County is 67°F, and the daily average for the winter months (Nov-Jan) is 27°F (U.S. Climate Data, 2021).

#### **D.3.5.2** Future Climate Change Trends

Regarding the current climate trends in the previous section, there are future predictions for climate change to continue to affect New York's overall weather patterns

*Storms and Flooding*: Extreme precipitation events are expected to become more frequent, and annual average precipitation is increasing across New York State (New York State Department of Environmental Conservation 2021b). Sea level along New York's coastline has risen more than one foot since 1900, exacerbating flooding associated with storm surge and high tides.

*Air Temperature Extremes*: Climate change is expected to continue to increase temperatures across New York State, with the frequency of extreme temperature events becoming more frequent and extreme cold temperature events becoming less frequent (New York State Department of Environmental Conservation 2021b).

# D.3.5.3 Ecological Impacts of Climate Change

Overall ecological impacts to Connecticut due to climate change include impacts on species, habitats, ecosystems, and ecological processes.

*Wildlife Species*: For bats, climate change research is in its early stages, but changing climates may cause species to shift northward (e.g., models for the little brown bat point to this distribution shift) (Parham, 2011). Birds, bats, and pollinators all may experience asynchronous phenology with their prey and forage-base species (e.g., spring arrival for some migratory bird species may occur earlier than the emergence of their prey insects) (Heffner, et al.; Rhode Island Coastal Resources Management Council, 2010).

*Invasive Species*: Temperature and precipitation changes are projected to stress native species, leaving them vulnerable to competition from invasive species. Warming temperatures may result



in more southern invasive species expanding northward, likely causing invasive species management to be a continuing problem for the region.

#### **D.3.5.4** Implications for Natural Resource Management

Adaptation strategies for NSA Saratoga Springs can focus on promoting climate change resiliency to enable natural resources sustainability. Adaptation strategies can include the following types, as examples:

*Decrease Stressors*: Decrease other stressors that negatively affect at-risk species, priority habitats, and wetlands, such as the stressors of invasive species, disease vectors, polluted runoff, and future development of remaining natural areas and open space.

*Restore Habitat*: Continue to restore priority habitats and ecosystems including habitat for at-risk species. Undertake restoration, creation, and enhancement of wetlands and other natural habitats that are most threatened by climate change. Stabilize stream banks and restore riparian forest habitats to decrease sediment and nutrient loads into Long Island Sound.

*Education and Outreach*: Educate NSA Saratoga Springs' personnel and surrounding communities on the threat climate change poses to natural resources and resulting impacts on property, structures, and infrastructure.

A climate change vulnerability assessment project, as described in Chapter 5 of SUBASE NLON's INRMP, will provide a detailed analysis of installation natural resources that are at-risk from climate change. This vulnerability assessment can then be used to devise installation-specific climate adaptation strategies.

#### **D.3.6** Partnerships and Collaboration

Effective communication among personnel from different offices is vital for ensuring that site activities are implemented as planned under the INRMP. An ecosystem approach to natural resources management also requires managers to look beyond site boundaries to non-DOD partners. There are many agencies, organizations, and other institutions that can assist in implementing an INRMP; thus, local and regional partnerships should be encouraged. Both DOD and Navy policy call for installations to form partnerships to facilitate the implementation of many of the natural resources initiatives presented in this CMP. Installations can enter into cooperative agreements with federal agencies, states, local governments, NGOs, and individuals for a variety of reasons such as biological inventories, monitoring, research, minor construction and maintenance, public outreach and education, natural resources program support, or conservation law enforcement. Navy installations are encouraged to use partnerships and volunteers to complete projects under the direction and supervision of Navy natural resources managers. The use of volunteers must be in accordance with DODI 1100.21, *Voluntary Services in the Department of Defense* (Department of Defense, 2019).

The potential agencies and organizations that could provide support with INRMP implementation are listed and described in Table 3-15 in the NSBNL INRMP, Section 3.6. These partnerships can be very beneficial because they make it easier and more cost effective for installations to fund natural resources research and improvement projects. In addition, several



local agencies and organizations could provide support specific to NSA Saratoga Springs. The New York State Department of Conservation (NYSDEC) works to preserve the quality of New York's environment, maintain the health and safety of New York residents, and protect the natural systems upon which life depends. The Sikes Act requires that installations consult with the state fish and wildlife agency when preparing an INRMP. For SUBASE NLON, the appropriate state agency is CT DEEP, but for NSA Saratoga Springs NYSDEC should be consulted. There are NYSDEC programs that may be of interest to NSA Saratoga Springs, such as wetlands and watershed programs.

The Hudson River-Black River Regulating District is a New York State public benefit corporation that protects public health and safety by regulating the flow of waters in two great neighboring watersheds in the Adirondack Region: the Upper Hudson River and the Black River (Hudson River-Black River Regulating District, n.d.). Slade Creek, which is a tributary of the Hudson River, runs through NSA Saratoga Springs.

Both the University at Albany and SUNY Empire State College are near NSA Saratoga Springs. These universities host robust environmental and engineering research programs and could potentially offer technical assistance in natural resources management activities. There may be opportunities for university researchers to conduct investigations on, or near, NSA Saratoga Springs, which could help shed light on the condition of the installation's natural resources. This could potentially be funded through the DOD's SERDP, which funds research to solve the DOD's environmental challenges.

There are many NGOs operating in the vicinity of NSA Saratoga Springs that are dedicated to conserving natural resources in New York. These organizations can potentially provide technical expertise, as well as funding and volunteers to carry out management and restoration activities. Some organizations to consider include the following:

- Adirondack Council
- Audubon New York
- Cornell Lab of Ornithology
- NYS Conservation Council
- New York Chapter of The Nature Conservancy

#### **D.3.7** Public Access and Outreach **D.3.7.1** Public Access and Outdoor Recreation

Although the provision of public access is addressed in the Sikes Act, security concerns in the aftermath of 11 September 2001 ("September 11th") have greatly restricted public access on DOD facilities. Access to NSA Saratoga Springs outdoor recreation facilities is restricted to authorized personnel, which include active duty military personnel and their dependents, DOD civilian employees at NSA Saratoga Springs and their dependents, active duty reservists at NSA Saratoga Springs, and retired military.



Access to the installation is granted through obtaining proper identification and documentation as accepted by NSA Saratoga Springs. Access requests for natural resources-related events taking place at NSA Saratoga Springs are managed through the NSA Saratoga Springs PWD personnel.

#### **D.3.7.2** Public Outreach and Environmental Education

The Public Affairs Office is responsible for publicizing NSA Saratoga Springs stewardship activities within the local community. Outreach vehicles include the newsletter, TV channels, and websites pages. Outreach to the public outside of the local community is accomplished via partnering on natural resources projects both inside and outside the installation boundary and making natural resources information available to interested agencies (i.e., USFWS and NYSDEC). Outreach is also accomplished through demonstration projects involving volunteer groups, dissemination of information brochures about natural resources, and through placement of interpretive signs.

Although public access is restricted due to national security reasons, the installation is receptive to, and has participated in, public outreach events.

This INRMP includes projects for additional public outreach events and activities, including continuing Earth Day and other volunteer-oriented events (e.g., National Public Lands Day) to support habitat enhancement and restoration projects such as

- controlling invasive species,
- planting native plants,
- planting flowers to create pollinator habitat, and
- installing interpretive signs about the natural resources.

Many of the proposed projects above provide excellent environmental education opportunities. The installation will consider partnering with the installation tenants, agencies and NGOs, Boy Scouts and Girl Scouts, and nearby schools to accomplish these projects. Refer to Section D.5 for more details.

#### D.3.8 State Wildlife Action Plan and USFWS Conservation Strategy

Congress created a State Wildlife Grants (SWG) program in 2000 to fund actions to, and programs that, benefit wildlife and their habitats to conserve declining species before they become threatened or endangered. Priority is placed on projects that benefit species of greatest conservation need. To be eligible for funding under the SWG program, a state must develop a WAP. WAPs present an assessment of the health of wildlife and habitats within a state, identifies the problems they face, and outlines conservation actions. In the August 2006 memorandum that provided DOD's official INRMP template, the DOD identified the incorporation of WAPs into INRMPs, and vice versa, as a critical element of the environmental management strategy and mission sustainability. The DOD is listed as a federal partner from whom the state of New York solicited input during the development of its WAP.

In 2012, the USFWS completed a strategic adaptive management conservation plan for New York and Long Island. The WAP builds off this CMP by incorporating local, state, and federal stakeholders input to the overall status of New York's wildlife and habitats. The WAP has eight



elements: distribution and abundance of species, location and relative condition of key habitats, threats to species and habitats, conservation actions and implementation guidelines, monitoring plans, procedure to review and update the WAP, coordinating with stakeholders for the current WAP and any future revisions, and lastly, public participation in developing and implementing the WAP (New York State Department of Environmental Conservation, 2015). Conservation actions of the WAP are grouped into five categories:

- Address Threats
- Direct Species Benefit
- Population Surveillance/Monitoring
- Planning
- Research

The natural resources management programs presented in Section D.5 may be concurrent with the above WAP actions. NSA Saratoga Springs should incorporate the actions above into its natural resource management where applicable. Furthermore, the GIS data that gets collected during surveys recommended in Section D.5 should be shared with NYSDEC.

#### D.4 NATURAL RESOURCES PROGRAM OVERVIEW

The Natural Resource Program at NSA Saratoga Springs is under the management of SUBASE NLON. When applicable, the Natural Resource staff should refer to the appropriate corresponding management sections in Chapter 4 of SUBASE NLON's INRMP.

In annual reviews of this INRMP, if there is a change such that natural resources are managed differently at NSA Saratoga Springs than detailed in SUBASE NLON's INRMP, those management actions will be listed in this section.

# **D.5 MANAGEMENT RECOMMENDATIONS SUMMARY**

This chapter provides the descriptions for NSA Saratoga Springs proposed projects. The INRMP Project Summary Table contains a combined listing of the SUBASE NLON and NSA Saratoga Springs projects with their applicable project codes, implementation schedule, the legal driver, the Navy assessment level, funding priorities, cost estimates, funding sources, and the targeted dates for completion. The projects are intended to develop, enhance, and maintain natural resources management practices at NSA Saratoga Springs, and have been prioritized for implementation. The DOD funding priority classifications are explained in SUBASE NLON INRMP's Section 6.1.1.

#### **D.5.1 Project Descriptions**

The INRMP project descriptions below address relevant INRMP goals and objectives that each project supports, in addition to details such as anticipated location, potential collaborators, timeframe for implementation, and recurrence. The project numbers reference the INRMP Project Summary Table.



Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
	Objective 3.2. Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species, as well as bats, to minimize "takes" of these species resulting from military readiness activities.
Location	Installation-wide
Potential	USFWS, NYSDEC
Collaborators	
Project Description	Conduct migratory bird surveys to obtain data on migratory bird utilization in support of the Migratory Bird Treaty Act and EO 13186 for federal agencies to promote the conservation of migratory bird populations. Conduct Migratory Bird Stopover Habitat Surveys help to identify New York's priority sites and help guide conservation efforts at state and local levels. Conduct breeding bird surveys using the North American Breeding Bird Survey (BBS) protocol to assess breeding bird utilization and potential impacts on breeding birds.

# **Project 1. Migratory Bird Surveys.**

# Project 2. Survey for the presence of the Northern Long-Eared Bat, Indiana Bat, and other bat species.

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
Location	Installation-wide
Potential Collaborators	USFWS, NYSDEC



Project Description	Acoustic bat detector stations should be set up, to monitor for bat activity at NSA Saratoga Springs. Collected data will provide year-to-year trends in bat populations at NSA Saratoga Springs will build upon previously collected datasets.
	Conduct an emergence count at least three times a year (spring, summer, fall) at a variety of sites (i.e., abandoned buildings, large trees with cavities, underground storage, etc.) to document the presence of any bat roosts on the installation. Conduct preliminary roost assessment to identify locations where emergence counts would be most effective. Surveys should begin 45 minutes before sunset and continue for approximately two hours, with the approximate number of bats counted.

# **Project 3. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.**

Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
	communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	<ul> <li>Objective 1.1. Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and non-point source pollution, and/or erosion and sedimentation.</li> <li>Objective 1.4. Promote and implement alternative stormwater management approaches, including low-impact development and rain gardens, to minimize adverse impacts of surface runoff from impervious areas, and to promote water quality within the watershed.</li> <li>Objective 3.3. Restore and enhance wildlife habitats.</li> </ul>
Location	NSA Saratoga Springs Installation-wide
Potential Collaborators	USACE, NYSDEC
Project Description	The condition of wetlands will be evaluated to identify habitat areas in need of restoration. Condition of wetlands will be assessed based on criteria such as presence/density of invasive species, hydrologic function, human-made materials (e.g., culverts), pollution, and loss of acreage.



Applicable INRMP Goal(s)	Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.
Applicable INRMP Objective(s)	Objective 1.3. Enhance the function(s) and value(s) of aquatic freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.
Location	Installation-wide
Potential Collaborators	USACE, NYSDEC
Project Description	The Wetland Restoration Plan document will outline various conservation measures, mitigation techniques, and restoration activities that will enhance wetland health and function across NSA Saratoga Springs.

# Project 4. Develop a Wetlands Restoration Plan.

# **Project 5. Wetland Restoration Plan Implementation.**

Applicable INRMP Goal(s)	<ul><li>Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.</li><li>Goal 3. Assess, sustain, and enhance the health of natural vegetation</li></ul>
	communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 1.3. Enhance the function(s) and value(s) of aquatic freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.
	Objective 1.5. Avoid and protect wetlands in accordance with state regulations (at a minimum) and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.
	Objective 3.3. Restore and enhance wildlife habitats.
	Objective 3.5. Maintain and enhance native vegetation to promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.
Location	Wetland Habitats
Potential Collaborators	USFWS, US Army Corps, NYSDEC



Project Description	Restoration of wetlands will follow the Wetland Restoration Plan and will result in a multitude of ecological benefits including water quality improvement, habitat for native flora and fauna, sequestration of carbon, and absorption of floodwaters. Wetlands in need of restoration will be identified by the findings of the jurisdictional wetlands delineation and the wetlands condition assessment. The NSA Saratoga Springs wetlands capture stormwater runoff from developed lands.
	Establishing native vegetation within installation wetlands will improve existing wetland values and functions and to prevent establishment of invasive species (e.g., <i>Phragmites</i> ).

# Project 9. Promote pollinator habitat.

A Re LL- INDN/D	
Applicable INRMP	Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees,
Goal(s)	using native plants in landscaping, and conserving riparian areas.
	Cool 2 Assess metals and enhance the health of notional monetation
	Goal 5. Assess, sustain, and ennance the health of natural vegetation
	communities, wildlife species populations, and suitable habitats.
	Goal 4 Provide sustainable natural resources-related outdoor recreation
	annostunities
	opportunities.
Applicable INRMP	Objective 2.2. Design and maintain landscaped areas using native trees,
Objective(s)	shrubs, and herbaceous plants to reduce maintenance requirements.
5 ()	
	Objective 2.4. Evaluate existing habitat for pollinators and encourage the use
	of pollinator plants in landscaping.
	Objective 3.3 Restore and enhance wildlife habitats
	objective 5.5. Restore and enhance whenne naorats.
	Objective 3.5. Maintain and enhance native vegetation to promote community
	diversity, and to eradicate or control and monitor noxious, invasive, and
	exotic plant species.
	Objective 4.2 Develop and promote additional opportunities/sites for passive
	subless respective in shall be setablishered of such able wildlife energy and
	outdoor recreation, including establishment of watchable wildlife areas and
	nature trails.
Location	TBD
Potential	NYSDEC, Navy
Collaborators	

Naval Submarine Base New London



<b>Figure 2 events</b> This part of the instantation Conservation Design Than, SOBASE REFORMENT increase habitat for valuable pollinators such as bees and butterflies. To provide habitat for native pollinators, diverse floral sources that provide a succession of flowers throughout the spring, summer and fall are needed so nectar and pollen are available to insects for the entire growing season. Flowers of different shapes also are needed to attract pollinators with different body sizes and mouthparts. Wildflower gardens will be created using native plants adapted to Connecticut's growing conditions and native pollinators. Certain areas may need to be designated as no-mow areas in order to allow flowering plants to flourish. Once established, these sites also can b utilized as future watchable wildlife viewing areas.
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# Project 20. Develop and print educational brochures or factsheets.

Applicable INRMP Goal(s)	Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receives adequate training and resources, and by promoting environmental awareness, education, and outreach among internal and external stakeholders.
Applicable INRMP Objective(s)	Objective 5.2. Implement training, education, outreach, and stewardship initiatives for ecosystem management.
Location	n/a
Potential Collaborators	USFWS, NYSDEC
Project Description	NSA Saratoga Springs will develop and print educational brochures and factsheets to share with installation residents, personnel, and visitors. These resources can be used to increase awareness of the installation's natural resources and the programs in place to conserve them.

# Project 21. Attend Training.

Applicable INRMP Goal(s)	Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receives adequate training and resources, and by promoting environmental awareness, education, and outreach among internal and external stakeholders.
	Goal 7. Assess the potential impacts of climate change to natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.
Applicable INRMP Objective(s)	Objective 5.1. Provide adequate staffing, equipment, technology, and training for the NRP to ensure proper implementation of this INRMP.



	Objective 7.1. Participate in, contribute to, or at least monitor the findings of regional partnerships focused on regional or landscape-scale assessment, monitoring, and adaptation of natural resources to climate change.
Location	n/a
Potential	n/a
Collaborators	
<b>Project Description</b>	The Natural Resource Manager will attend trainings on natural resource
	issues, applicable laws and regulations, and other subjects relevant to natural
	resource management and conservation.

#### Project 22. Develop a climate change vulnerability assessment and adaptation plan.

Applicable INRMP Goal(s)	Goal 7. Assess the potential impacts of climate change to natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea-level rise; and identify and implement adaptive management strategies to ensure the long- term sustainability of those resources and the military mission.
Applicable INRMP Objective(s)	Objective 7.2. Conduct a vulnerability assessment of how climate change may affect the natural resources of interest and develop and implement a climate adaptation plan.
Location	Installation-wide
Potential Collaborators	NYSDEC, University of Connecticut, CT DEEP
Project Description	A climate change vulnerability assessment project for SUBASE NLON will provide a detailed analysis of installation natural resources that are at-risk from climate change. This vulnerability assessment can then be used to devise installation-specific climate adaptation strategies. The vulnerability assessment and adaptation plan also will address the following factors:
	• sea-level rise scenarios
	• potential flood zone shifts caused by sea-level-rise scenarios
	• evaluating the risk to hazardous waste and oil locations from sea- level rise, storm surge, and flood zone shifts
	Incorporate NSA Saratoga Springs into the assessment and plan, as needed.

# **Project 23. Department of the Navy Annual Natural Resources Program Data-Call and Metrics.**

Applicable INRMP	n/a
Goal(s)	
Applicable INRMP	n/a
Objective(s)	
Location	Installation-wide

Naval Submarine Base New London



Potential	n/a
Collaborators	
Project Description	Annual review and update of the NSA Saratoga Springs CMP and completion of Department of Defense data calls

#### Project 25. Fauna Surveys.

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
Location	Installation-wide
Potential Collaborators	USFWS, NYSDEC
Project Description	Conduct a survey of fauna across NSA Saratoga Springs to confirm the species that are present on the installation. The surveys should specifically note if any of the species found are a TES or invasive species. The surveys should note geographic locations of TES or invasive species through the use of GIS.

#### **Project 26. Flora Surveys.**

Applicable INRMP Goal(s)	Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable habitats.
Applicable INRMP Objective(s)	Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and nearshore environments.
Location	Installation-wide
Potential Collaborators	USFWS, NYSDEC
Project Description	Conduct a survey of flora across NSA Saratoga Springs to confirm the species that are present on the installation. The surveys should specifically note if any of the species found are a TES or invasive species. The surveys should note geographic locations of TES or invasive species through the use of GIS.

#### **D.5.2** Project Relationships to Goals and Objectives

Table D-7 is a cross-reference table showing the alignment of projects to INRMP goals/objectives. Note that projects are activities that require programmed or external funding. In Chapter 4, additional management actions are described for the implementation of the INRMP goals and objectives.



Table D-7: NSA Saratoga Springs Projects and	l Goals/Objectives Cross-Reference Table
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Goals/Objectives	Applicable Projects		
Goal 1. Manage water resources to sustain and enhance water quality of surface waters, wetlands, the nearshore environment, and other aquatic ecosystems, using a watershed approach.			
Objective 1.1. Assess biological conditions, including water quality, of aquatic ecosystems, and shorelines, focusing on areas that have the potential to be affected by stormwater runoff, point and non-point source pollution, and/or erosion and sedimentation.	• Project 4. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.		
Objective 1.2. Apply best management practices for protecting water quality in order to minimize sediment inputs from erosion areas and shorelines, and to eliminate potential sources of direct and non-point source pollutant discharges.	(no NSA Saratoga Springs project identified)		
<i>Objective 1.3. Enhance the function(s) and value(s) of aquatic</i>	Project 4. Develop a Wetlands Restoration Plan.		
freshwater, ecosystems through the protection and restoration of wetlands and riparian areas.	• Project 5. Wetland Restoration Plan Implementation.		
Objective 1.4. Promote and implement alternative stormwater management approaches, including low-impact development and rain gardens, to minimize adverse impacts of surface runoff from impervious areas, and to promote water quality within the watershed.	• Project 3. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.		
<i>Objective 1.5. Avoid and protect wetlands in accordance with state regulations (at a minimum), and enhance these areas consistent with other management objectives (e.g., water quality, habitat requirements) to the extent practicable.</i>	• Project 5. Wetland Restoration Plan Implementation.		
Goal 2. Sustain and enhance terrestrial habitats by preserving urban trees, using native plants in landscaping, and			
conserving riparian areas.			
<i>Objective 2.1. Increase urban tree canopy, and conserve individual trees and groups of trees within the urban environment.</i>	(no NSA Saratoga Springs project identified)		
<i>Objective 2.2. Design and maintain landscaped areas using native trees, shrubs, and herbaceous plants to reduce maintenance requirements.</i>	• Project 9. Promote pollinator habitat.		

#### APPENDIX D



Goals/Objectives	Applicable Projects	
<i>Objective 2.3. Implement a tree replacement policy during reviews of projects under the National Environmental Policy Act (NEPA)</i>	(no NSA Saratoga Springs project identified)	
<i>Objective 2.4. Evaluate existing habitat for pollinators and encourage the use of pollinator plants in landscaping.</i>	• Project 9. Promote pollinator habitat.	
Goal 3. Assess, sustain, and enhance the health of natural vegetation communities, wildlife species populations, and suitable		
	habitats.	
<i>Objective 3.1. Identify, monitor, and manage rare, threatened, and endangered species (TES) in the terrestrial, aquatic, and</i>	• Project 2. Survey for the presence of the Northern Long Eared Bat and other bat species.	
nearshore environments.	Project 25. Fauna Surveys.	
	• Project 26. Flora Surveys.	
	• Project 1. Migratory Bird Surveys.	
Objective 3.2. Identify, monitor, and manage shorebird and migratory bird populations, including waterfowl and neotropical species, as well as bats, to minimize "takes" of these species resulting from military readiness activities.	• Project 1. Migratory Bird Surveys.	
<i>Objective 3.3. Restore and enhance wildlife habitats.</i>	• Project 3. Evaluate condition of wetlands and prioritize areas in need of wetlands restoration.	
	Project 5. Wetland Restoration Plan Implementation.	
	Project 9. Promote pollinator habitat.	
<i>Objective 3.4. Monitor populations and herd health of select game species to adjust harvest limits, as needed.</i>	(no NSA Saratoga Springs project identified)	
Objective 3.5. Maintain and enhance native vegetation to	Project 5. Wetland Restoration Plan Implementation.	
promote community diversity, and to eradicate or control and monitor noxious, invasive, and exotic plant species.	• Project 9. Promote pollinator habitat.	
<i>Objective</i> 3.6. <i>Implement integrated pest management controls</i> <i>to reduce or eliminate invasive or nuisance species, and</i> <i>species that pose a potential threat to human health.</i>	(no NSA Saratoga Springs project identified)	



Goals/Objectives	Applicable Projects		
Goal 4. Provide sustainable natural resources-related outdoor recreation opportunities.			
Objective 4.1. Manage SUBASE NLON's hunting program to allow for the maximum participation possible without compromising the military mission, and to enable hunters to harvest the annual quotas recommended to maintain sustainable populations.	(no NSA Saratoga Springs project identified)		
<i>Objective 4.2. Develop and promote additional opportunities/sites for passive outdoor recreation, including establishment of watchable wildlife areas and nature trails.</i>	• Project 9. Promote pollinator habitat.		
Goal 5. Integrate the various activities conducted under this INRMP by ensuring that natural resource staff receives			
adequate training and resources, and by promoting environmental awareness, education, and outreach among internal and			
external stakeholders.			
<i>Objective 5.1. Provide adequate staffing, equipment, technology, and training for the NRP to ensure proper implementation of this INRMP.</i>	• Project 21. Attend Training.		
<i>Objective 5.2. Implement training, education, outreach, and stewardship initiatives for ecosystem management.</i>	• Project 20. Develop and print educational brochures or factsheets.		
Objective 5.3. Provide opportunities for public access among regional stakeholders for environmental education and scientific research and study consistent with resource conservation, in coordination with SUBASE NLON's NRP.	(no NSA Saratoga Springs project identified)		
Objective 5.4. Educate employees, tenants, housing residents, contractors, and academic institutions about natural resources issues and best management practices to protect the Thames River watershed and engage these parties in conservation initiatives.	(no NSA Saratoga Springs project identified)		



Goals/Objectives	Applicable Projects			
Goal 6. Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with resource and regulatory agencies, regional partnerships, nongovernmental organizations (NGOs), universities, and the public, to sustain the military mission.				
<i>Objective 6.1. Maintain interagency cooperation with the USFWS, Connecticut Department of Energy and Environmental Protection (CT DEEP), New York State Department of Environmental Conservation (NYSDEC) and NY Department of the State (for coastal issues in Long Island Sound).</i>	(no NSA Saratoga Springs project identified)			
Objective 6.2. Develop partnerships with the National Oceanic And Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), DOD Partners in Flight (PIF), academic institutions, and other local agencies and organizations to implement wildlife monitoring and protection programs and habitat restoration projects.	(no NSA Saratoga Springs project identified)			
<i>Objective 6.3. Maintain Naval Branch Health Clinic (NBHC)</i> <i>Groton's continued work with the Connecticut Department of</i> <i>Agriculture for mosquito surveillance on and off base.</i>	(no NSA Saratoga Springs project identified)			
Goal 7. Assess the potential impacts of climate change to natural resources; identify significant natural resources at the installation that are likely to be affected by potential changes in climate and respective sea-level rise; and identify and implement adaptive management strategies to ensure the long-term sustainability of those resources and the military mission.				
Objective 7.1. Participate in, contribute to, or at least monitor the findings of regional partnerships focused on regional or landscape-scale assessment, monitoring, and adaptation of natural resources to climate change.	Project 21. Attend Training			
<i>Objective 7.2. Conduct a vulnerability assessment of how climate change may affect the natural resources of interest and develop and implement a climate adaptation plan.</i>	• Project 22. Develop a climate change vulnerability assessment and adaptation plan.			
Objective 7.3. Implement natural resource management strategies and best management practices that provide conservation benefits to the ecosystem and are intended to address risks posed by climate change.	(no NSA Saratoga Springs project identified)			



Goals/Objectives	Applicable Projects
All goals applicable	
All Objectives applicable	<ul> <li>Project 23. Department of the Navy Annual Natural Resources Program Data-Call and Metrics.</li> </ul>



#### **D.6** APPENDIX D REFERENCES

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# APPENDIX E. FEDERAL AND STATE AGENCY CORRESPONDENCE



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**CT DEEP Correspondence** 

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	jenny.dickson@ct.gov; dawn.mckay@ct.gov
Cc:	robin.blum@ct.gov
Subject:	SUBASE NLON INRMP - review for operation and effect
Date:	Wednesday, January 19, 2022 9:12:00 AM

Good morning, Ms. Dickson and Ms. McKay -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

We recently completed a comprehensive update to SUBASE NLON'S INRMP. The INRMP updates focused primarily on incorporating new information, updating project lists, and expanding the original tree mitigation policy (Appendix J). Due to the large file size, I will be transmitting the INRMP to you via DoDSafe, the Navy's FTP service. You will receive a separate email directly from DoDSafe with a link and a password that will allow you to download the file.

We respectfully request your review of the revised INRMP for operation and effect by March 21, 2022. If you have any questions or need additional information, please feel free to contact me.

Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

From:	<u>McKay, Dawn</u>
To:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Dickson, Jenny
Subject:	[URL Verdict: Neutral][Non-DoD Source] Fw: [DoD SAFE] URBAN.JANE.M has dropped off a file for you
Date:	Wednesday, February 2, 2022 1:43:24 PM
Attachments:	Outlook-asazrd5t.png

Jane,

Thank you for updating the link to the file. You can direct all your inquires and file transfers to our Director of Wildlife, Jenny Dickson (jenny.dickson@ct.gov). I have been informed that she is the authority to review and sign your documents. She has been provided with your links/information from your past emails. I am sorry I cannot be of any more help and you should write to her directly.

Take care,

Dawn

Dawn M McKay Environmental Analyst 3 Natural Diversity Data Base Program Wildlife Division Bureau of Natural Resources Connecticut Department of Energy and Environmental Protection 79 Elm Street, Hartford, CT 06106-5127 P: 860.424.3592 | | E: dawn.mckay@ct.gov



www.ct.gov/deep

Conserving, improving and protecting our natural resources and environment; Ensuring a clean, affordable, reliable, and sustainable energy supply.

From: NoReplyTo@mail.mil <NoReplyTo@mail.mil>
Sent: Wednesday, February 2, 2022 11:59 AM
To: McKay, Dawn <Dawn.McKay@ct.gov>
Subject: [DoD SAFE] URBAN.JANE.M has dropped off a file for you

EXTERNAL EMAIL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

This is an automated message sent to you by the DoD SAFE service.

URBAN.JANE.M <jane.m.urban.civ@us.navy.mil> has dropped off a file for you.

**IF YOU TRUST THE SENDER** and are expecting to receive a file from them, you may choose to retrieve the drop-off by clicking the following link (or copying and pasting it into your web browser):

https://safe.apps.mil/pickup.php?claimID=JyQqvZeFAtYUBHqt&recipCode=WRupD4

You will be required to enter the claim passcode, which is: **XKHBMusDjYtZNkqz** 

You have 7 days to retrieve the drop-off; after that the link above will expire.

The sender has left you a note:

Good morning.

I am resending SUBASE New London's Integrated Natural Resource Management Plan for CT DEEP's review for operation and effect. The links sent via this system are valid for only 7 days so the link I sent earlier this month will no longer work.

Please let me know if you have any questions or need additional information. Thank you. - Jane Urban

Full information about the drop-off:Claim ID:JyQqvZeFAtYUBHqtRecipient Code:WRupD4Claim Passcode:XKHBMusDjYtZNkqzDrop-off Submitted:2022-02-02 16:59:32 UTCDrop-off Completed:2022-02-02 16:59:37 UTC

Sender —
 Name: URBAN.JANE.M
 Organization: USN
 Email Address: jane.m.urban.civ@us.navy.mil

File —
 Name: SUBASE\_NLON\_INRMP\_Jan22.pdf
 Size: 23.1 MB
 SHA-256
 Checksum: Content Type: application/pdf

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
To:	<u>McKay, Dawn</u>
Cc:	Dickson, Jenny
Subject:	RE: [DoD SAFE] URBAN.JANE.M has dropped off a file for you
Date:	Wednesday, February 2, 2022 2:06:00 PM
Attachments:	image001.png

Dawn -

Thank you for communicating this. I was directed to send the INRMP to Ms. Dickson, Robin Blum, and you. I will make sure that you do not receive future correspondence related to the INRMP review.

Thanks again. All the best, Jane

From: McKay, Dawn <Dawn.McKay@ct.gov>
Sent: Wednesday, February 2, 2022 1:43 PM
To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Cc: Dickson, Jenny <Jenny.Dickson@ct.gov>
Subject: [URL Verdict: Neutral][Non-DoD Source] Fw: [DoD SAFE] URBAN.JANE.M has dropped off a file for you

Jane,

Thank you for updating the link to the file. You can direct all your inquires and file transfers to our Director of Wildlife, Jenny Dickson (jenny.dickson@ct.gov). I have been informed that she is the authority to review and sign your documents. She has been provided with your links/information from your past emails. I am sorry I cannot be of any more help and you should write to her directly.

Take care,

Dawn

Dawn M McKay Environmental Analyst 3 Natural Diversity Data Base Program Wildlife Division Bureau of Natural Resources Connecticut Department of Energy and Environmental Protection 79 Elm Street, Hartford, CT 06106-5127 P: 860.424.3592 | | E: dawn.mckay@ct.gov

?	

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Conserving, improving and protecting our natural resources and environment;

From: NoReplyTo@mail.mil <NoReplyTo@mail.mil>
Sent: Wednesday, February 2, 2022 11:59 AM
To: McKay, Dawn <Dawn.McKay@ct.gov>
Subject: [DoD SAFE] URBAN.JANE.M has dropped off a file for you

EXTERNAL EMAIL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

This is an automated message sent to you by the DoD SAFE service.

URBAN.JANE.M <<u>jane.m.urban.civ@us.navy.mil</u>> has dropped off a file for you.

**IF YOU TRUST THE SENDER** and are expecting to receive a file from them, you may choose to retrieve the drop-off by clicking the following link (or copying and pasting it into your web browser):

https://safe.apps.mil/pickup.php?claimID=JyQqvZeFAtYUBHqt&recipCode=WRupD4

You will be required to enter the claim passcode, which is: **XKHBMusDjYtZNkqz** 

You have 7 days to retrieve the drop-off; after that the link above will expire.

The sender has left you a note:

Good morning.

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Please let me know if you have any questions or need additional information. Thank you. - Jane Urban

Full information about the drop-off:Claim ID:JyQqvZeFAtYUBHqtRecipient Code:WRupD4Claim Passcode:XKHBMusDjYtZNkqzDrop-off Submitted:2022-02-02 16:59:32 UTCDrop-off Completed:2022-02-02 16:59:37 UTC

— Sender —
 Name: URBAN.JANE.M
 Organization: USN
 Email Address: jane.m.urban.civ@us.navy.mil

— File — Name: SUBASE\_NLON\_INRMP\_Jan22.pdf Size: 23.1 MB

SHA-256 Checksum: ECA5DF286C9001C009608F0605EEAFC36074BC61E50BBE13476812EDA05F7352 Content Type: application/pdf

From:	Dickson, Jenny
To:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA); McKay, Dawn
Cc:	Blum, Robin
Subject:	[Non-DoD Source] RE: SUBASE NLON INRMP - review for operation and effect
Date:	Wednesday, February 9, 2022 2:08:35 PM

Good afternoon, Jane.

I've noted a few areas in the INRM that may warrant some correction or clarification, but overall the report is comprehensive as usual.

Here are a few things I would recommend adjusting.

Page 63: indicates the least shrew is common. It is actually a state endangered species, extremely uncommon, and does not occur on SUBASE NLON. The mammal section also indicates the southern bog lemming is a common species; it is a state species of special concern and perhaps better listed as uncommon.

Page 64: is it worth noting in this section that all bat species with the exception of big brown are state listed (most are endangered)?

In Appendix B under mammals observed you list Northern long-eared bat (B-24) and yet in the information provided in the earlier text, you clearly state that NLEB is one of only two species not detected on the installation. Given their legal status at the state and federal level, this is an important issue to resolve. That same table omits little brown bat which was detected in your surveys. It is certainly possible there was a mix up in Myotis species, but I would like to see that information corrected as it does have legal implications for us.

One suggestion you may wish to consider is how the invasive MAM vine is viewed. This invasive species has resulted in tremendous habitat loss in western areas of Long Island Sound and has actually surpassed things like bittersweet as an invasive threat on some of our state properties in coastal areas. If you have a small population that can be controlled mechanically or chemically, it may be worth considering while that is still a viable option. We have also utilized beetles for natural control and as you indicate, they have had very mixed success in controlling this species.

If you have additional questions, please let me know. When you've completed the requested modifications, I will be happy to sign the review page.

Hope all is well. Jenny

Jenny Dickson, Director CT DEEP Wildlife Division 79 Elm Street, 6<sup>th</sup> Floor Hartford, CT 06106-5127 C: 860-593-5588 | E: jenny.dickson@ct.gov #RecoverWildlife

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) < jane.m.urban.civ@us.navy.mil>

Sent: Wednesday, January 19, 2022 9:14 AM
To: Dickson, Jenny <Jenny.Dickson@ct.gov>; McKay, Dawn <Dawn.McKay@ct.gov>
Cc: Blum, Robin <Robin.Blum@ct.gov>
Subject: SUBASE NLON INRMP - review for operation and effect

Good morning, Ms. Dickson and Ms. McKay -

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Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil Jenny –

Thank you very much for reviewing the INRMP and forwarding us these comments. I will pass this information along to our contractor so he can address. We are waiting for responses from USFWS and NOAA and will issue a revised document for signature once all agency reviews are complete.

Thanks again. – Jane

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Sent: Wednesday, February 9, 2022 2:07 PM
To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>; McKay, Dawn <Dawn.McKay@ct.gov>
Cc: Blum, Robin <Robin.Blum@ct.gov>
Subject: [Non-DoD Source] RE: SUBASE NLON INRMP - review for operation and effect

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Hope all is well. Jenny

Jenny Dickson, Director CT DEEP Wildlife Division 79 Elm Street, 6<sup>th</sup> Floor Hartford, CT 06106-5127 C: 860-593-5588 | E: jenny.dickson@ct.gov #RecoverWildlife

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То:	"Dickson, Jenny"
Cc:	<u>"Blum, Robin"</u>
Subject:	RE: SUBASE NLON INRMP - review for operation and effect
Date:	Friday, April 29, 2022 8:47:00 AM
Attachments:	CTDEEP-sign.pdf

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Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Dickson, Jenny <Jenny.Dickson@ct.gov>

Sent: Wednesday, February 9, 2022 2:07 PM

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То:	Dickson, Jenny
Cc:	<u>Blum, Robin</u>
Subject:	RE: SUBASE NLON INRMP - review for operation and effect
Date:	Friday, May 13, 2022 1:05:00 PM

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Jane M. Urban

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From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Friday, April 29, 2022 8:49 AM
To: 'Dickson, Jenny' <Jenny.Dickson@ct.gov>
Cc: 'Blum, Robin' <Robin.Blum@ct.gov>
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From:	<u>Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)</u>
То:	Dickson, Jenny
Cc:	Blum, Robin
Subject:	FW: SUBASE NLON INRMP - review for operation and effect
Date:	Thursday, May 26, 2022 8:59:00 AM
Attachments:	sign-CTDEEP.pdf
Importance:	High

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From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Friday, May 13, 2022 1:06 PM
To: Dickson, Jenny <Jenny.Dickson@ct.gov>
Cc: Blum, Robin <Robin.Blum@ct.gov>
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То:	"Dickson, Jenny"
Cc:	<u>"Blum, Robin"</u>
Subject:	SUBASE NLON INRMP - review for operation and effect
Date:	Wednesday, June 8, 2022 9:08:00 AM
Attachments:	sign-CTDEEP.pdf
Importance:	High

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From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Thursday, May 26, 2022 9:01 AM
To: Dickson, Jenny <Jenny.Dickson@ct.gov>
Cc: Blum, Robin <Robin.Blum@ct.gov>
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If you have additional questions, please let me know. When you've completed the requested modifications, I will be happy to sign the review page.

Hope all is well. Jenny

Jenny Dickson, Director CT DEEP Wildlife Division 79 Elm Street, 6<sup>th</sup> Floor Hartford, CT 06106-5127 C: 860-593-5588 | E: jenny.dickson@ct.gov #RecoverWildlife

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) < jane.m.urban.civ@us.navy.mil>

Sent: Wednesday, January 19, 2022 9:14 AM
To: Dickson, Jenny <Jenny.Dickson@ct.gov>; McKay, Dawn <Dawn.McKay@ct.gov>
Cc: Blum, Robin <Robin.Blum@ct.gov>
Subject: SUBASE NLON INRMP - review for operation and effect

Good morning, Ms. Dickson and Ms. McKay -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

We recently completed a comprehensive update to SUBASE NLON'S INRMP. The INRMP updates focused primarily on incorporating new information, updating project lists, and expanding the original tree mitigation policy (Appendix J). Due to the large file size, I will be transmitting the INRMP to you via DoDSafe, the Navy's FTP service. You will receive a separate email directly from DoDSafe with a link and a password that will allow you to download the file.

We respectfully request your review of the revised INRMP for operation and effect by March 21, 2022. If you have any questions or need additional information, please feel free to contact me.

Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

Harter, Grant Eaton CIV USN NAVFAC MIDLANT NOR (USA)
Dickson, Jenny
emmett.carawan; Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA); dawn.mckay@ct.gov; Blum, Robin
Action Needed - Request for compliance with NLON''s INRMP
Monday, June 13, 2022 8:13:58 AM
sign-CTDEEP.pdf
FW SUBASE NLON INRMP - review for operation and effect (240 KB).msg
High

Good morning Ms. Dickson,

The Navy is needing your concurrence with Navy SUBASE NLON's recently updated INRMP. Back on February 9<sup>th</sup> (attached email-review for O&E) you provided review and comment that has since been updated and incorporated in the INRMP. Thank you for your review and collaboration .

In order for the INRMP to be in operation and effect or simply, compliant, we need your signature.

I've sent you a DOD SAFE LINK with NLON's updated INRMP for your reference and files.

### Please sign attached signature page so the Navy can close the book on this request.

Thank you.

V/r,

Grant Harter, CWB Natural Resources Specialist

NAVFAC MIDLANT Planning and Conservation Branch (EV22) Norfolk Naval Station, VA

\*NEW PHONE\*: 757-341-2109 grant.e.harter.civ@us.navy.mil

From:	Harter, Grant Eaton CIV USN NAVFAC MIDLANT NOR (USA)
To:	Blum, Robin; dawn.mckay@ct.gov
Cc:	Dickson, Jenny; emmett.carawan; Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Subject:	FW: Action Needed - Request for compliance with NLON"s INRMP
Date:	Tuesday, June 21, 2022 8:55:49 AM
Attachments:	sign-CTDEEP.pdf
	FW SUBASE NLON INRMP - review for operation and effect (240 KB).msg
Importance:	High

Good Morning Robin and Dawn,

After several attempts of getting this to Jenny and no acknowledgement of receipt or call back, can one of you please provide confirmation that she receives it and can return with a signature?

Time is of the essence and we'd really appreciate acknowledgment and a signed copy of the attached signature page so this INRMP is compliant in accordance with the Sikes Act.

Please advise if you have any questions at all or which to discuss the document further with myself and/or NLON's Natural Resource Manager, Jane Urban.

Thank you.

V/r,

Grant Harter, CWB Natural Resources Specialist

NAVFAC MIDLANT Planning and Conservation Branch (EV22) Norfolk Naval Station, VA

\*NEW PHONE\*: 757-341-2109 grant.e.harter.civ@us.navy.mil

From: Harter, Grant Eaton CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Monday, June 13, 2022 8:14 AM
To: Dickson, Jenny <Jenny.Dickson@ct.gov>
Cc: Emmett Carawan <emmett.carawan@navy.mil>; Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>; dawn.mckay@ct.gov; Blum, Robin <Robin.Blum@ct.gov>
Subject: Action Needed - Request for compliance with NLON's INRMP
Importance: High

Good morning Ms. Dickson,

The Navy is needing your concurrence with Navy SUBASE NLON's recently updated INRMP. Back on February 9<sup>th</sup> (attached email-review for O&E) you provided review and comment that has since been updated and incorporated in the INRMP. Thank you for your review and collaboration.

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I've sent you a DOD SAFE LINK with NLON's updated INRMP for your reference and files.

## Please sign attached signature page so the Navy can close the book on this request.

Thank you.

V/r,

Grant Harter, CWB Natural Resources Specialist

NAVFAC MIDLANT Planning and Conservation Branch (EV22) Norfolk Naval Station, VA

\*NEW PHONE\*: 757-341-2109 grant.e.harter.civ@us.navy.mil

From:	Dickson, Jenny
То:	Harter, Grant Eaton CIV USN NAVFAC MIDLANT NOR (USA); Blum, Robin; Ganzer, Sara
Cc:	emmett.carawan; Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Subject:	[Non-DoD Source] RE: Action Needed - Request for compliance with NLON"s INRMP
Date:	Thursday, June 30, 2022 11:39:01 AM
Attachments:	2022 INRMP SUBBASE NEW LONDON-CTDEEP.pdf

Grant,

Attached please find the signed compliance form for NLON's INRMP. If you require additional information or my signature on additional documents, please copy Sara Ganzer (sara.ganzer@ct.gov) as she can greatly facilitate the process. We've had several staff retire recently within the agency recently and things are chaotic at best. Sara can help keep key items on the radar.

Thank you for your patience.

Jenny

Jenny Dickson, Director CT DEEP Wildlife Division 79 Elm Street, 6th Floor Hartford, CT 06106-5127 C: 860-593-5588(E: jenny.dickson@ct.gov #RecoverWildlife

-----Original Message-----From: Harter, Grant Eaton CIV USN NAVFAC MIDLANT NOR (USA) <grant.e.harter.civ@us.navy.mil> Sent: Tuesday, June 28, 2022 10:14 AM To: Blum, Robin <Robin.Blum@ct.gov>; McKay, Dawn <Dawn.McKay@ct.gov> Cc: Dickson, Jenny <Jenny.Dickson@ct.gov>; emmett.carawan <emmett.carawan@navy.mil>; Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Subject: RE: Action Needed - Request for compliance with NLON's INRMP

EXTERNAL EMAIL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

NOAA Correspondence

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	Jennifer.anderson@noaa.gov; Lou.chiarella@noaa.gov
Cc:	brian.d.hopper@noaa.gov; shannon.dionne@noaa.gov
Subject:	SUBASE NLON INRMP - review for operation and effect
Date:	Wednesday, January 19, 2022 9:18:00 AM

Good morning, Ms. Anderson and Mr. Chiarella -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

We recently completed a comprehensive update to SUBASE NLON'S INRMP. The INRMP updates focused primarily on incorporating new information, updating project lists, and expanding the original tree mitigation policy (Appendix J). Due to the large file size, I will be transmitting the INRMP to you via DoDSafe, the Navy's FTP service. You will receive a separate email directly from DoDSafe with a link and a password that will allow you to download the file.

We respectfully request your review of the revised INRMP for operation and effect by March 21, 2022. If you have any questions or need additional information, please feel free to contact me.

Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil Good afternoon.

\_\_\_\_

I am writing to follow up regarding our request for NOAA review of SUBASE's revised INRMP. I'd appreciate it if you could let know if you will be submitting comments and, if so, your timeline for completing your review.

Thank you, and all the best. - Jane

Jane M. Urban Biologist, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Wednesday, January 19, 2022 9:20 AM
To: Jennifer.anderson@noaa.gov; Lou.chiarella@noaa.gov
Cc: brian.d.hopper@noaa.gov; shannon.dionne@noaa.gov
Subject: SUBASE NLON INRMP - review for operation and effect

Good morning, Ms. Anderson and Mr. Chiarella -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

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Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

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From:	Brian D Hopper - NOAA Federal
То:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Anderson, Jennifer L CIV (USA); Chiarella, Louis A CIV (USA); Dionne, Shannon CIV (USA)
Subject:	[URL Verdict: Neutral][Non-DoD Source] Re: SUBASE NLON INRMP - review for operation and effect
Date:	Tuesday, March 22, 2022 5:02:48 PM

Hi Jane,

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

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

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

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

Regards, -Brian

On Tue, Mar 22, 2022 at 2:54 PM Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <<u>jane.m.urban.civ@us.navy.mil</u>> wrote:

Good afternoon.

I am writing to follow up regarding our request for NOAA review of SUBASE's revised INRMP. I'd appreciate it if you could let know if you will be submitting comments and, if so, your timeline for completing your review.

Thank you, and all the best. - Jane

---

Jane M. Urban

Biologist, Environmental Division

Public Works Department | Naval Submarine Base New London

860.694.5164 (office: Mondays & Tuesdays) 805.451.1195 (cell: Wednesdays - Fridays)

jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) Sent: Wednesday, January 19, 2022 9:20 AM To: Jennifer.anderson@noaa.gov; Lou.chiarella@noaa.gov Cc: brian.d.hopper@noaa.gov; shannon.dionne@noaa.gov Subject: SUBASE NLON INRMP - review for operation and effect

Good morning, Ms. Anderson and Mr. Chiarella -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

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Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban

Natural Resources Manager, Environmental Division

Public Works Department | Naval Submarine Base New London

860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays)

jane.m.urban.civ@us.navy.mil

Brian D. Hopper Protected Resources Division NOAA Fisheries Greater Atlantic Regional Fisheries Office 200 Harry S Truman Parkway Suite 460 Annapolis, MD 21401 240-628-5420 Brian.D.Hopper@noaa.gov http://www.greateratlantic.fisheries.noaa.gov/

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NYSDEC Correspondence

Good morning, Mr. Farquhar -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity (NSA) Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

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We respectfully request your review of the INRMP for operation and effect by March 21, 2022. If you have any questions or need additional information, please feel free to contact me.

Thank you for your assistance in ensuring the continued stewardship of NSA Saratoga Springs' natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

From:	Wasilco, Mike R (DEC)
To:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Jensen, Paul G (DEC)
Subject:	[URL Verdict: Neutral][Non-DoD Source] RE: NSA Saratoga Springs - INRMP review for operation and effect
Date:	Thursday, January 20, 2022 11:45:10 AM
Attachments:	image001.png
	image002.png

Jane,

I do not need to be included in the NSA Saratoga Springs communications as this site is outside of my region. You may want to reach out to my counterpart in NYSDEC Region 5, Paul Jensen. paul.jensen@dec.ny.gov

# Michael R. Wasilco

Regional Wildlife Manager, Division of Fish and Wildlife

New York State Department of Environmental Conservation 6274 E. Avon-Lima Rd., Avon, NY 14414 P: (585)226-5460 | F: (585) 226-6323 | mike.wasilco@dec.ny.gov

www.dec.ny.gov | 🖪 | 🕒

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Sent: Wednesday, January 19, 2022 9:16 AM
To: Farquhar, James (DEC) <james.farquhar@dec.ny.gov>
Cc: Wasilco, Mike R (DEC) <mike.wasilco@dec.ny.gov>; Petronis, Katharine J (DEC)
<Katharine.Petronis@dec.ny.gov>
Subject: NSA Saratoga Springs - INRMP review for operation and effect

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The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity (NSA) Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

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### Good afternoon, Mr. Jensen -

Michael Wasilco indicated that you are the correct contact for Saratoga Springs, NY. Please see message below and note that you will receive a separate transmittal email from the Navy's FTP site, called DoDSafe.

Thank you. - Jane ---Jane M. Urban Biologist, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Wednesday, January 19, 2022 9:16 AM
To: james.farquhar@dec.ny.gov
Cc: mike.wasilco@dec.ny.gov; katharine.petronis@dec.ny.gov
Subject: NSA Saratoga Springs - INRMP review for operation and effect

Good morning, Mr. Farquhar -

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Thank you for your assistance in ensuring the continued stewardship of NSA Saratoga Springs'

natural resources. All the best, Jane

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Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

From:	Farquhar, James (DEC)
To:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Petronis, Katharine J (DEC)
Subject:	[Non-DoD Source] RE: NSA Saratoga Springs - INRMP review for operation and effect
Date:	Friday, January 28, 2022 7:44:45 AM
Attachments:	SUBASE NLON INRMP Jan22 5 signed.pdf

Jane,

Please find attached, a signature page with New York concurrence.

I did find it incredibly odd that no occurrences of even common wildlife have previously been observed at Saratoga. Suggestive that no military environmental staff have visited the base. I doubt that to be true, but the lack of very basic flora and fauna information was striking. That said, The plan calls for survey work which I encourage to better understand the resources you have presently as you continue operations. I saw nothing in the plan that would appear to present risk.

If you need anything else, please let me know.

Jim Farquhar Acting Director, Division of Fish and Wildlife

-----Original Message-----From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Sent: Wednesday, January 19, 2022 9:16 AM To: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Cc: Wasilco, Mike R (DEC) <mike.wasilco@dec.ny.gov>; Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: NSA Saratoga Springs - INRMP review for operation and effect

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	Farquhar, James (DEC)
Cc:	Petronis, Katharine J (DEC)
Subject:	RE: NSA Saratoga Springs - INRMP review for operation and effect
Date:	Wednesday, February 2, 2022 9:29:00 AM

Mr. Farquhar -

Thank you very much for your review and for your feedback. The completion of wildlife surveys at NSA Saratoga Springs is a priority for the Navy, but I agree that documentation likely exists for the presence of squirrels, deer, and skunk (at a minimum) on the base.

Thanks again. - Jane

Jane M. Urban Biologist, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office - Mondays) | 805.451.1195 (cell - Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

-----Original Message-----From: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Sent: Friday, January 28, 2022 7:43 AM To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Cc: Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: [Non-DoD Source] RE: NSA Saratoga Springs - INRMP review for operation and effect

#### Jane,

Please find attached, a signature page with New York concurrence. I did find it incredibly odd that no occurrences of even common wildlife have previously been observed at Saratoga. Suggestive that no military environmental staff have visited the base. I doubt that to be true, but the lack of very basic flora and fauna information was striking. That said, The plan calls for survey work which I encourage to better understand the resources you have presently as you continue operations. I saw nothing in the plan that would appear to present risk.

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-----Original Message-----From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Sent: Wednesday, January 19, 2022 9:16 AM To: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Cc: Wasilco, Mike R (DEC) <mike.wasilco@dec.ny.gov>; Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: NSA Saratoga Springs - INRMP review for operation and effect ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
To:	Farquhar, James (DEC)
Cc:	Petronis, Katharine J (DEC)
Subject:	RE: NSA Saratoga Springs - INRMP review for operation and effect
Date:	Friday, April 29, 2022 8:37:00 AM
Attachments:	NYSDEC-sig.pdf

#### Jim -

Thank you again for your review of NSA Saratoga's INRMP and New York's concurrence. To facilitate signature by all parties, we revised the signature page and I would appreciate it if you could sign and return the attached, revised signature page.

There have been no changes to the NSA Saratoga Springs portion of the INRMP since your prior review, but I would be happy to send you the current version if you would like to review it again if before you sign. Otherwise, I will send you a final version once all parties have signed.

Thank you. - Jane

Jane M. Urban Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays -Fridays) jane.m.urban.civ@us.navy.mil

-----Original Message-----From: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Sent: Friday, January 28, 2022 7:43 AM To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Cc: Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: [Non-DoD Source] RE: NSA Saratoga Springs - INRMP review for operation and effect

## Jane,

Please find attached, a signature page with New York concurrence. I did find it incredibly odd that no occurrences of even common wildlife have previously been observed at Saratoga. Suggestive that no military environmental staff have visited the base. I doubt that to be true, but the lack of very basic flora and fauna information was striking. That said, The plan calls for survey work which I encourage to better understand the resources you have presently as you continue operations. I saw nothing in the plan that would appear to present risk.

If you need anything else, please let me know.

Jim Farquhar Acting Director, Division of Fish and Wildlife -----Original Message-----From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Sent: Wednesday, January 19, 2022 9:16 AM To: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Cc: Wasilco, Mike R (DEC) <mike.wasilco@dec.ny.gov>; Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: NSA Saratoga Springs - INRMP review for operation and effect

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

From:	Farquhar, James (DEC)
То:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Petronis, Katharine J (DEC)
Subject:	[Non-DoD Source] RE: NSA Saratoga Springs - INRMP review for operation and effect
Date:	Monday, May 2, 2022 7:42:29 AM
Attachments:	NYSDEC-sig Naval.pdf

Jane,

Should be all set.

Jim

-----Original Message-----From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil> Sent: Friday, April 29, 2022 8:39 AM To: Farquhar, James (DEC) <james.farquhar@dec.ny.gov> Cc: Petronis, Katharine J (DEC) <Katharine.Petronis@dec.ny.gov> Subject: RE: NSA Saratoga Springs - INRMP review for operation and effect

Jim -

Thank you again for your review of NSA Saratoga's INRMP and New York's concurrence. To facilitate signature by all parties, we revised the signature page and I would appreciate it if you could sign and return the attached, revised signature page.

There have been no changes to the NSA Saratoga Springs portion of the INRMP since your prior review, but I would be happy to send you the current version if you would like to review it again if before you sign. Otherwise, I will send you a final version once all parties have signed.

Thank you. - Jane

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Jane M. Urban Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays -Fridays) jane.m.urban.civ@us.navy.mil

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ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

**USFWS** Correspondence

Good morning, Dr. Mayer -

\_\_\_\_

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

We recently completed a comprehensive update to SUBASE NLON'S INRMP. The INRMP updates focused primarily on incorporating new information, updating project lists, and expanding the original tree mitigation policy (Appendix J). Due to the large file size, I will be transmitting the INRMP to you via DoDSafe, the Navy's FTP service. You will receive a separate email directly from DoDSafe with a link and a password that will allow you to download the file.

We respectfully request your review of the revised INRMP for operation and effect by March 21, 2022. If you have any questions or need additional information, please feel free to contact me.

Thank you for your assistance in ensuring the continued stewardship of SUBASE NLON's natural resources. All the best, Jane

Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil Good afternoon.

\_\_\_\_

I am writing to follow up regarding our request for USFWS review of SUBASE's revised INRMP. I'd appreciate it if you could let know if you will be submitting comments and, if so, your timeline for completing your review.

Thank you, and all the best. - Jane

Jane M. Urban Biologist, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Wednesday, January 19, 2022 9:17 AM
To: audrey\_mayer@fws.gov
Cc: katherine\_ineson@fws.gov; susi\_vonoettingen@fws.gov; newengland@fws.gov
Subject: SUBASE NLON INRMP - review for operation and effect

Good morning, Dr. Mayer -

The Sikes Act and Department of Defense (DoD) instruction require that DoD Integrated Natural Resources Management Plans (INRMPs) be reviewed no less than every 5 years for "operation and effect". An operation and effect review determines whether an INRMP is being implemented to meet Sikes Act requirements and to effectively manage and conserve natural resources on the installation. Naval Submarine Base New London's (SUBASE NLON) INRMP, which also covers Naval Support Activity Saratoga Springs in Saratoga Springs, NY, was last reviewed for operation and effect in 2016.

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Jane M. Urban Natural Resources Manager, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office – Mondays) | 805.451.1195 (cell – Tuesdays-Fridays) jane.m.urban.civ@us.navy.mil

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From:	Tur, Maria
To:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Cc:	Ineson, Katherine M; Dube, Jeannine
Subject:	[Non-DoD Source] Comments on draft INRMP
Date:	Friday, March 25, 2022 3:47:34 PM
Attachments:	SUBASE NLON DraftINRMP USFWS Comments 032522 MT KI.xlsx

Hello Jane,

Please see our comments on the Draft INRMP for SUBASE New London. If you have any questions, please reach out to me or Katherine. Thank you.

Maria E. Tur U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Phone (603) 568-4871 FAX (603) 223-0104

http://www.fws.gov/newengland/

Section/Page	Comment	Reviewer
	The USFWS is proposing to reclassify the northern long-eared bat as endangered (87 FR 16442). If the species	
	is reclassified as endangered, the species specific 4(d) rule would be removed. If the species is reclassified as	
p.39	endangered, guidance on surveys and consultation would follow.	MT
	EAB documented in 2019 and several Ash trees near Rock Lake removed in 2020 - are there any proactive	
p.56/117	measures being taken to protect trees or control spread? Will trees that are removed be replaced?	Katherine Ineson
	Are there alternative measures being considered to control M-A-M? Any ideas on why the weevils are not	
p.62	working?	Katherine Ineson
	Please clarify how additional acoustic monitoring with emergence counts will be used to identify bat roosting	
p.64	locations.	Katherine Ineson
	Mentioned that acoustic data will be shared with CT DEEP. Suggest also uploading data to NABat or having	
p.64	consultant upload data. Data are especially useful if acoustic surveys will be conducted annually	Katherine Ineson
p.72/137	Are there any plans for a terrestrial invertebrate survey? Could this be combined with a pollinator survey?	Katherine Ineson
	Are there monarchs present on the installation? I don't see a section/paragraph about them. A CCA with	
	DOD for Monarchs is in development with the AF leading its development. Could this make a pollinator	
p.73/C-4	survey a higher funding priority? In Table C-1 there is no ERL level for Project 14	Katherine Ineson
	Eastern box turtle has the potential to occur on SUBASE NLON. Surveys will next be conducted in 2024. If box	NAT
p.74	turties are found, the location should not be released as they are vulnerable to collection for the pet trade.	IVII
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p.75		Katherine meson
	Small tupe. Change encompassing to encompasses in this conteness. The C7NAA mandates that states	
n 0.1	delineate a spactal zone area that encompasses in this sentence. The CZMA manuales that states	Katharing Incom
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h.101		

Section/Page	Comment	Reviewer
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p.103/112	report turtle sightings? Same for TES?	Katherine Ineson
	It looks like the last comprehensive bird survey was in 2014 and the next is programmed for FY2024. Is the	
p.106	plan to conduct these surveys every 10 years?	Katherine Ineson
	Mention of contacting a rehabber if injured birds are discovered, but how about sick birds? (Sick birds could	
	appear injured or may just behave differently). There is currently a highly pathogenic avian influenza virus	
	circulating in eastern North America and it was recently detected in Massachusetts. Suggest base personnel	
	avoid handling any birds that appear injured OR sick. For sick birds, identify a contact to collect or sample	
p.106	bird.	Katherine Ineson
p.107/p.117	Are feral cats a significant issue for the installation or the surrounding area?	Katherine Ineson
	Suggestion to clarify or expand on how the defined projects for TES and candidate species contribute to	
	species conservation/management/recovery. Such as using acoustic surveys to identify areas on the	
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p.111	mention here about the bat houses?	Katherine Ineson
	Spotted lanternfly is not currently found on the base but is present in CT. Is personnel trained to spot signs	
p.117	that lanternfly may be present?	MT
	There are also lists of native plants and nurseries available more locally, such as from CT DEEP:	
	https://portal.ct.gov/DEEP/Plants/DEEPs-Native-Garden-Project and CT Audubon:	
p.119	https://ct.audubon.org/conservation/plant-native-species	Katherine Ineson
p.123	Interested to know where the stocked fish are sourced from?	Katherine Ineson
p.126	Could USFWS get a shapefile of the installation perimeter, including NSA Saratoga Springs?	Katherine Ineson
	Objective 3.2 and Page G-3 have sections about bird surveys and management, but include bats - suggest	
p.129/G-3	removing bats from these two sections to avoid any confusion.	Katherine Ineson
	Project 2 - how often do you hope to conduct acoustic survyes? Mist-netting was suggested earlier, but I	
p.130	don't see it in the project description here.	Katherine Ineson
	Project 2 - how will potential roosts be identified? If a roost is found, how will the emergence count be	
p.130	conducted and how often?	Katherine Ineson
	Project 17 - Can a section on Osprey be added somewhere, perhaps in Section 3.3.6.2? Osprey are only	
	mentioned in terms of developing alternative nesting sites in bullet points or project tables and I'm curious	
p.139	to know more.	Katherine Ineson
	If there are ideas for projects that you need a partner on to apply for grants, let us know. Just curious if	
p.153	you've applied for Legacy Program grants in the past?	Katherine Ineson

Section/Page	Comment	Reviewer
	Table C-1: SUBASE NLON Natural Resource Project List - What does it mean if a project is ERL 4, but the FY	
C-3	Scheduled Implementation is TBD?	Katherine Ineson
	Project 9 - since promoting pollinator habitat is a low funding priority, could you have volunteers come and	
	plant? Could be local groups or staff from General Dynamics/Electric boat who might be interested to see	
C-4	the installation	Katherine Ineson
	Good to see high priority for flora and fauna surveys and invasive species surveys at NSA Saratoga Springs,	
C-6	but year is TBD?	Katherine Ineson
	"Project #24 calls for the required update of this INRMP (criterion 3)." This sentence seems tricky to me	
	because updating the INRMP is not quite the same as providing certainty that the conservation effort will be	
G-3	effective. Could you expand on this a bit?	Katherine Ineson

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
To:	Tur, Maria
Cc:	Ineson, Katherine M; Dube, Jeannine
Subject:	RE: Comments on draft INRMP
Date:	Monday, March 28, 2022 9:37:00 AM

Maria –

Thank you for your review of SUBASE's INRMP and for sending us these comments. We will work to address the USFWS' comments and will let you know if we have any questions as we do so.

Thanks again. - Jane

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Jane M. Urban Biologist, Environmental Division Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Tur, Maria <maria\_tur@fws.gov>
Sent: Friday, March 25, 2022 3:46 PM
To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: [Non-DoD Source] Comments on draft INRMP

Hello Jane,

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Maria E. Tur U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Phone (603) 568-4871 FAX (603) 223-0104

http://www.fws.gov/newengland/

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	Tur, Maria
Cc:	Ineson, Katherine M; Dube, Jeannine
Subject:	RE: Comments on draft INRMP
Date:	Thursday, April 14, 2022 7:27:00 AM
Attachments:	RTCs SUBASE NLON DraftINRMP USFWS Comments Apr22.xlsx

Maria –

With apologies for the delay, attached are the Navy's responses to your comments on the INRMP. We are working on updating the INRMP to reflect these comments and hope to have a revised version to you for concurrence before the end of this month.

As requested, I will be sending you GIS boundary data for SUBASE and NSA Saratoga. Because the files are zip files, which do not transmit well through the Navy's email system, you will receive the GIS data via DoDSafe, our FTP program.

If you have any additional comments or any questions regarding our responses, please let me know.

Thanks. - Jane ---Jane M. Urban Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

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Section/Page	Comment	Reviewer	Navy Response
p.39	The USFWS is proposing to reclassify the northern long-eared bat as endangered (87 FR 16442). If the species is reclassified as endangered, the species specific 4(d) rule would be removed. If the species is reclassified as endangered, guidance on surveys and consultation would follow.	МТ	Comment noted. Changes to species status are implemented by the installation immediately and are noted in the INRMP during the required annual review/update process.
p.56/117	EAB documented in 2019 and several Ash trees near Rock Lake removed in 2020 - are there any proactive measures being taken to protect trees or control spread? Will trees that are removed be replaced?	Katherine Ineson	In 2019, when EAB was documented on base, the NRM contacted the CT Agricultural Experiment Station (CAES) for information on options for controlling the spread of EAB. CAES stated that trees that are completely uninfested, which we have not found on base due to the extent of the EAB infestation, could be treated using systemic insecticides but that the process was expensive, had to be repeated annually, and raised environmental concerns over impacts to pollinators as well as human health from broad-scale pesticide application. Based on CAES' feedback, SUBASE determined that measures to protect the trees were not feasible. As recommended by CAES, SUBASE has focused on removing trees that pose a threat of injury or property damage. SUBASE does not have funding to replace dead trees that are removed due to infestation. If live, native trees require removal, SUBASE does require mitigation through tree replacement, as described in Appendix J of the INRMP.

Section/Page	Comment	Reviewer	Navy Response
p.62	Are there alternative measures being considered to control M-A-M? Any ideas on why the weevils are not working?	Katherine Ineson	Invasive species control, including M-A-M, remains a priority for SUBASE. However, funding from the Navy for such programs is limited so it is challenging to obtain the necessary multi-year funding to make meaningful progress. SUBASE's NRM is looking into additional funding sources for invasives species control projects. The weevils were released as part of an experimental study by CAES. Although the weevils successfully established, the weevils have not been able to keep the M-A-M vine in check due to the extent of the M-A-M established prior to the weevil release as well as the constant reintroduction of M-A-M to the installation by birds and along Route 12.
p.64	Please clarify how additional acoustic monitoring with emergence counts will be used to identify bat roosting locations.	Katherine Ineson	The text will be revised to state the following: "To follow up on these findings, additional acoustic monitoring with emergence counts is planned to obtain supplemental data on the species present at SUBASE and AFNRA."
p.64	Mentioned that acoustic data will be shared with CT DEEP. Suggest also uploading data to NABat or having consultant upload data. Data are especially useful if acoustic surveys will be conducted annually	Katherine Ineson	Comment noted. The results of the initial acoustic monitoring survey were shared with Jonathan Jaka of the USFWS in May 2020. The follow-on survey is expected to be completed over a 1-year period. It is unlikely that SUBASE will receive funding for annual surveys; surveys are typically funded at 5-year intervals at installations such as SUBASE where listed species have not been documented.
p.72/137	Are there any plans for a terrestrial invertebrate survey? Could this be combined with a pollinator survey?	Katherine Ineson	SUBASE does not currently have a terrestrial invertebrate or pollinator survey programmed, although the pollinator survey is identified as a need. The NRM can request future funding to support both surveys and completion of a terrestrial invertebrate survey can be added to the project list in the INRMP.

Section/Page	Comment	Reviewer	Navy Response
p.73/C-4	Are there monarchs present on the installation? I don't see a section/paragraph about them. A CCA with DOD for Monarchs is in development with the AF leading its development. Could this make a pollinator survey a higher funding priority? In Table C-1 there is no ERL level for Project 14	Katherine Ineson	There are monarchs present on the installation. They have not been documented through a survey, but the NRM has observed them at the pollinator garden on base. They are listed in Table 3-13, but additional information regarding their presence on SUBASE will be added to the INRMP. DoD is working with USFWS on a SAP for pollinators, which will be focused on the monarch and possibly other pollinators such as bees. DoD is also considering development of a separate but similar SAP effort for bats. A CCA was discussed during initial talks, and there is also a CCA already developed for Energy and Transportation lands. The ERL level for Project 14 is 2, and Table C-1 will be updated to indicate such.
p.74	Eastern box turtle has the potential to occur on SUBASE NLON. Surveys will next be conducted in 2024. If box turtles are found, the location should not be released as they are vulnerable to collection for the pet trade.	МТ	Comment noted.
p.75	Have there been other surveys for Small whorled pogonia since 1996? Are browsing levels by deer at acceptable amounts now?	Katherine Ineson	SUBASE has not completed additional surveys for small whorled pogonia since 1996, as there are only two historical sites known to exist in New London county and no known extant sites or colonies in New London county. Deer browse remains high, as white-tailed deer continue to thrive in CT and populations have increased in recent years.
p.94	Small typo. Change encompassing to encompasses in this sentence: The CZMA mandates that states delineate a coastal zone area that encompassing the state's most important coastal resources	Katherine Ineson	Text will be corrected as indicated.

Section/Page	Comment	Reviewer	Navy Response
p.99/C-4	Is there a rough timeline for developing a Installation Conservation Design Plan? Does any pollinator habitat work have to wait until that is developed? USFWS can provide technical assistance on pollinator habitat if needed	Katherine Ineson	SUBASE does not have a timeline for development of the Installation Conservation Design Plan. However, work to establish additional pollinator habitat is not dependent on completion of the plan. The SUBASE NRM is interested in partnering with USFWS on future pollinator habitat projects.
p.101	Is anyone monitoring the two bat houses on Building 558 to see if bats are using/occupying them? Are there plans to install more?	Katherine Ineson	The NRM regularly checks the bat houses to see if bats are using/occupying them. So far, there is no evidence of use. SUBASE will install more bat houses as opportunities arise. The two installed in 2021 were constructed by a SUBASE employee and installed as part of SUBASE's Earth Day activities.
p.103/112	Is a reptile and amphibian educational pamphlet in development? Are personnel supposed/required to report turtle sightings? Same for TES?	Katherine Ineson	The SUBASE NRM plans to create the reptile and amphibian educational pamphlet, but the pamphlet is not currently in development. The SUBASE NRM is notified of species sightings on base. The SUBASE NRM is also working on a communication document for SUBASE staff regarding base natural resources.
p.106	It looks like the last comprehensive bird survey was in 2014 and the next is programmed for FY2024. Is the plan to conduct these surveys every 10 years?	Katherine Ineson	The goal is to conduct surveys every 5 to 10 years. Due to the way the Navy's funding cycles operate, 2024 was the earliest year the NRM could request funding for a migratory bird survey, as SUBASE was without an NRM for 2.5 years prior to the current NRM's arrival in 2019.
p.106	Mention of contacting a rehabber if injured birds are discovered, but how about sick birds? (Sick birds could appear injured or may just behave differently). There is currently a highly pathogenic avian influenza virus circulating in eastern North America and it was recently detected in Massachusetts. Suggest base personnel avoid handling any birds that appear injured OR sick. For sick birds, identify a contact to collect or sample bird.	Katherine Ineson	Concur. The SUBASE NRM is aware of CT DEEP Wildlife avian influenza recommendations related to not handling sick birds and reporting sick or dead birds to the State.

Section/Page	Comment	Reviewer	Navy Response
p.107/p.117	Are feral cats a significant issue for the installation or the surrounding area?	Katherine Ineson	Feral cats are an issue on SUBASE and are managed under SUBASE's Pest Management Program. SUBASE has implemented a strict policy against feeding feral cats and anyone caught violating the policy is subject to disciplinary action.
p.111	Suggestion to clarify or expand on how the defined projects for TES and candidate species contribute to species conservation/management/recovery. Such as using acoustic surveys to identify areas on the installation that may be important for feeding or roosting and protecting those areas. You could also mention here about the bat houses?	Katherine Ineson	Comment noted. Base TES/candiate species projects and surveys provide valuable data sets including, but not limited to, species abundance and diversity that help facilitate project planning on base as well as management efforts locally and regionally for the species being surveyed. Population trends, species diversity, environmental stressors, etc. can all play a vital role in the conservation and management of said species.
p.117	Spotted lanternfly is not currently found on the base but is present in CT. Is personnel trained to spot signs that lanternfly may be present?	MT	The SUBASE NRM has distributed fliers developed by CT DEEP regarding the spotted lanternfly to EV Division staff. The natural resource communication document in development includes information on the spotted lanternfly to educate more base personnel. However, the NRM has not received formal training on identifying signs that lanternfly may be present.
p.119	There are also lists of native plants and nurseries available more locally, such as from CT DEEP: https://portal.ct.gov/DEEP/Plants/DEEPs-Native-Garden-Project and CT Audubon: https://ct.audubon.org/conservation/plant-native-species	Katherine Ineson	Comment noted.
p.123	Interested to know where the stocked fish are sourced from?	Katherine Ineson	SUBASE applies for a Fish Liberation Permit from CT DEEP prior to stocking. In recent years, fish have been purchased from Phillips Fish Farm in Ashford, CT.
p.126	Could USFWS get a shapefile of the installation perimeter, including NSA Saratoga Springs	Katherine Ineson	The files will be sent to you via DoDSafe.
p.129/G-3	Objective 3.2 and Page G-3 have sections about bird surveys and management, but include bats - suggest removing bats from these two sections to avoid any confusion.	Katherine Ineson	Concur. References to bats will be removed for these sections.

Section/Page	Comment	Reviewer	Navy Response
p.130	Project 2 - how often do you hope to conduct acoustic survyes? Mist-netting was suggested earlier, but I don't see it in the project description here.	Katherine Ineson	The goal would be to conduct year-long acoustic surveys at least every 5 years, but more frequently if listed species are identified. Mist netting will be added as a potential component of future bat surveys.
p.130	Project 2 - how will potential roosts be identified? If a roost is found, how will the emergence count be conducted and how often?	Katherine Ineson	SUBASE would rely on a contractor with bat expertise to complete the planned survey work. Specific survey protocols and methods to identify potential roosts and conduct emergence counts would be detailed by the contractor in a project work plan produced closer to the date of the survey.
p.139	Project 17 - Can a section on Osprey be added somewhere, perhaps in Section 3.3.6.2? Osprey are only mentioned in terms of developing alternative nesting sites in bullet points or project tables and I'm curious to know more.	Katherine Ineson	Concur. Additional information regarding osprey will be included. SUBASE has in prior years had osprey nest on an unused yard crane located on lower base.
p.153	If there are ideas for projects that you need a partner on to apply for grants, let us know. Just curious if you've applied for Legacy Program grants in the past?	Katherine Ineson	Comment noted. SUBASE has not applied for a Legacy Program grant since 2019. The NRM is not sure about prior years.
C-3	Table C-1: SUBASE NLON Natural Resource Project List - What does it mean if a project is ERL 4, but the FY Scheduled Implementation is TBD?	Katherine Ineson	An ERL 4 project might have a TBD schedule for a few reasons. Some ERL 4 projects require completion by the NRM and so are dependent on workload. In other cases, funding may have been requested in a prior year but the project may not have been approved due to limitations on Navy natural resource budgets and so it is unknown when funding may be available. These projects are classified as "accepted risk", and funds are transferred to other higher priority projects. Funding is constantly shifting from a top-down approach.
C-4	Project 9 - since promoting pollinator habitat is a low funding priority, could you have volunteers come and plant? Could be local groups or staff from General Dynamics/Electric boat who might be interested to see the installation	Katherine Ineson	Concur. SUBASE typically limits volunteer activities to those with approved base access, but SUBASE staff and Navy personnel have participated in prior volunteer opportunities on base.

Section/Page	Comment	Reviewer	Navy Response
C-6	Good to see high priority for flora and fauna surveys and invasive species surveys at NSA Saratoga Springs, but year is TBD?	Katherine Ineson	The table will be corrected to indicate that the year is FY26 for both projects. Funding was requested for FY21 but was not received.
G-3	"Project #24 calls for the required update of this INRMP (criterion 3)." This sentence seems tricky to me because updating the INRMP is not quite the same as providing certainty that the conservation effort will be effective. Could you expand on this a bit?	Katherine Ineson	Every effort is made to meet the objectives outlined in SUBASE's INRMP that contribute to the conservation and rehabilitation of natural resources on SUBASE base property. However, SUBASE, like many other installations in the region, are often faced annually with the difficult decision to prioritize limited time, resources, and funding to conserve and enhance efforts aimed at natural resources management.

From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	Tur, Maria
Cc:	Ineson, Katherine M; Dube, Jeannine
Subject:	RE: Comments on draft INRMP
Date:	Friday, April 29, 2022 9:02:00 AM
Attachments:	USFWS-siq.pdf

## Maria –

We have incorporated your comments on SUBASE's INRMP and I just sent you the updated version of the INRMP via DoDSafe.

If you have no additional comments or questions on the INRMP, I would appreciate it if you could sign the attached concurrence statement and return it to me. Once I have obtained all necessary signatures, I will provide you with a final, signed version of the INRMP for your records.

Thanks very much. - Jane

---

Jane M. Urban Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Thursday, April 14, 2022 7:30 AM
To: 'Tur, Maria' <maria\_tur@fws.gov>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: RE: Comments on draft INRMP

Maria –

With apologies for the delay, attached are the Navy's responses to your comments on the INRMP. We are working on updating the INRMP to reflect these comments and hope to have a revised version to you for concurrence before the end of this month.

As requested, I will be sending you GIS boundary data for SUBASE and NSA Saratoga. Because the files are zip files, which do not transmit well through the Navy's email system, you will receive the GIS data via DoDSafe, our FTP program.

If you have any additional comments or any questions regarding our responses, please let me know.

Thanks. - Jane

Jane M. Urban

Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Tur, Maria <maria\_tur@fws.gov>
Sent: Friday, March 25, 2022 3:46 PM
To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: [Non-DoD Source] Comments on draft INRMP

Hello Jane,

Please see our comments on the Draft INRMP for SUBASE New London. If you have any questions, please reach out to me or Katherine. Thank you.

Maria E. Tur U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Phone (603) 568-4871 FAX (603) 223-0104

http://www.fws.gov/newengland/
From:	Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
То:	<u>Tur, Maria</u>
Cc:	Ineson, Katherine M; Dube, Jeannine
Subject:	RE: Comments on draft INRMP
Date:	Friday, May 13, 2022 1:07:00 PM
Attachments:	<u>USFWS-siq.pdf</u>

Good afternoon, Maria –

I wanted to follow up with you regarding the USFWS' signature on SUBASE's revised INRMP. If you have any questions or concerns regarding how your agencies' comments were incorporated, please do not hesitate to let me know.

All the best, Jane

----

Jane M. Urban

Environmental Division | Natural & Cultural Resources, NEPA, & Environmental Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Sent: Friday, April 29, 2022 9:05 AM
To: Tur, Maria <maria\_tur@fws.gov>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: RE: Comments on draft INRMP

Maria –

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If you have no additional comments or questions on the INRMP, I would appreciate it if you could sign the attached concurrence statement and return it to me. Once I have obtained all necessary signatures, I will provide you with a final, signed version of the INRMP for your records.

Thanks very much. - Jane

----

Jane M. Urban

Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navy.mil Sent: Thursday, April 14, 2022 7:30 AM
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Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
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As requested, I will be sending you GIS boundary data for SUBASE and NSA Saratoga. Because the files are zip files, which do not transmit well through the Navy's email system, you will receive the GIS data via DoDSafe, our FTP program.

If you have any additional comments or any questions regarding our responses, please let me know.

Thanks. - Jane ---Jane M. Urban Environmental Division | Natural & Cultural Resources, NEPA, & Installation Restoration Public Works Department | Naval Submarine Base New London 860.694.5164 (office: Mondays & Tuesdays) | 805.451.1195 (cell: Wednesdays - Fridays) jane.m.urban.civ@us.navv.mil

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Sent: Friday, March 25, 2022 3:46 PM
To: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: [Non-DoD Source] Comments on draft INRMP

Hello Jane,

Please see our comments on the Draft INRMP for SUBASE New London. If you have any questions, please reach out to me or Katherine. Thank you.

Maria E. Tur U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Phone (603) 568-4871 FAX (603) 223-0104

http://www.fws.gov/newengland/

Tur, Maria
Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA)
Ineson, Katherine M; Dube, Jeannine
[Non-DoD Source] Re: [EXTERNAL] RE: Comments on draft INRMF
Friday, May 13, 2022 3:53:29 PM
USFWS-sig alm.pdf

Hello Jane,

The signed INRMP page is attached. Thank you for coordinating with us.

Maria E. Tur U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Phone (603) 568-4871 FAX (603) 223-0104

http://www.fws.gov/newengland/

From: Urban, Jane M CIV USN NAVFAC MIDLANT NOR (USA) <jane.m.urban.civ@us.navy.mil>
Sent: Friday, May 13, 2022 1:08 PM
To: Tur, Maria <maria\_tur@fws.gov>
Cc: Ineson, Katherine M <katherine\_ineson@fws.gov>; Dube, Jeannine <jeannine\_dube@fws.gov>
Subject: [EXTERNAL] RE: Comments on draft INRMP

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# APPENDIX F. ENVIRONMENTAL ASSESSMENT (EA) AND FINDING OF NO SIGNIFICANT IMPACT (FONSI)



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# ENVIRONMENTAL ASSESSMENT FOR DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

# FINAL

# NAVAL SUBMARINE BASE NEW LONDON

# NEW LONDON, CONNECTICUT



#### **Prepared For:**

Atlantic Division Naval Facilities Engineering Command

# Prepared by:



Geo-Marine, Inc. Newport News

September 2003

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#### FINAL

# NAVAL SUBMARINE BASE NEW LONDON NEW LONDON, CONNECTICUT

**Prepared For:** 

Atlantic Division Naval Facilities Engineering Command

Prepared by:

Geo-Marine, Inc. Newport News

For Further Information Contact:

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E-mail: richard.conant@navy.mil Phone: 860-694-5649 FAX: 860-694-5320

September 2003

# Final

# **Finding of No Significant Impact**

# Environmental Assessment for Development and Implementation of an Integrated Natural Resources Management Plan for Naval Submarine Base New London

Pursuant to Council on Environmental Quality regulations (40 CFR parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy has prepared an Environmental Assessment (EA) for the development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Submarine Base (SUBASE) New London, Connecticut. Based on the EA, it has been determined that an Environmental Impact Statement (EIS) is not required for the proposed action.

The purpose of this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997, U. S. Code, Title 16, Conservation, § 670 (a) et seq. In November 1997, the Sikes Act was amended to require the Secretary of Defense to carry out a program to provide for the conservation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement integrated natural resources management plans for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

The EA considered the environmental impacts of three alternative actions. The no action alternative (Alternative 1) is the continued implementation of the management objectives and practices currently conducted at SUBASE. The proposed action (Alternative 2) is to develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. Alternative 3 consists of limited implementation of the INRMP. Under this alternative, only management activities necessary to achieve compliance with legal requirements, such as the SAIA, Clean Air Act (CAA), Clean Water Act, Endangered Species Act, appropriate state laws, and Executive Orders would be implemented. Relevant resources that were evaluated for each alternative include ecological resources, cultural resources, air quality, socioeconomics, and land use.

The proposed action (Alternative 2) is to develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management activities; and provides for sustainable multipurpose uses of natural resources. The proposed INRMP will address and implement land management, forestry, fish and wildlife management, outdoor recreation and environmental awareness, and natural resources program administration. A total of eight ongoing and new management actions and projects are proposed to meet compliance and stewardship objectives for natural resources management at SUBASE.

The no action alternative (Alternative 1) is the continued implementation of the management objectives and practices currently conducted at SUBASE. The Environmental Program Director (EPD) and the Natural Resources Manager (NRM) are responsible for natural resources management at SUBASE. Stormwater management, surface drainage, and soil erosion and sedimentation control are also primary management issues in the natural resources program at SUBASE. As part of the process for reviewing proposed projects and plans for potential impacts to natural resources, the EPD and NRM are also responsible for ensuring compliance with all applicable environmental regulations. Any new projects described in the proposed INRMP would not be implemented under this alternative. No EA was completed for implementation of management objectives and practices; consequently, the existing management program does not meet the SAIA requirements for an INRMP.

Alternative 3 consists of limited implementation of the INRMP. Under this alternative, only management activities necessary to achieve compliance with legal requirements, such as the SAIA, Clean Air Act (CAA), Clean Water Act, Endangered Species Act, appropriate state laws, and Executive Orders would be implemented. Although consistent with the Sikes Act and INRMP requirements, this alternative would reduce environmental benefits achieved by full implementation of the INRMP.

The EA demonstrated that implementation of the proposed action would result in overall positive impacts to environmental resources. Implementation of engineering design solutions for stormwater and erosion control problem areas will benefit water quality, wetlands, and soils.

Urban forestry management activities and implementation of forest inventories will benefit forest resources on SUBASE. Development of wildlife habitat will benefit outdoor recreation and environmental awareness. Protected species surveys will benefit protection and management of threatened and endangered species. Implementation of integrated pest management practices will enhance biodiversity in the area.

In preparing the INRMP, SUBASE has worked in cooperation with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection so the plan will reflect the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on the installation. Based on the parties' agreement and the analysis presented in the EA, the Department of the Navy finds the implementation of the proposed action will not have a significant adverse impact on the quality of the human or natural environment or generate significant controversy.

The EA addressing this action is on file and may be obtained from: Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street, Norfolk, Virginia 23511-2699 (Attn: Mr. Jack Markham), telephone (757) 322-4882.

Approved:	Date:

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# LIST OF ACRONYMS AND ABBREVIATIONS

AFNRA	Admiral Fife Naval Recreation Area
BMP	best management practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEO	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	Comprehensive Management Plan
CNO	Chief of Naval Operations
CO	carbon monoxide
CRA	Cultural Resource Assessment
CWA	Clean Water Act
DEP	Department of Environmental Quality (Connecticut)
DoD	Department of Defense
DRMO	Defense Reutilization and Market Office
EA	environmental assessment
EIS	environmental impact statement
ENVEIS	Environmental Department Engineering Information System
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPD	Environmental Program Director
ESA	Endangered Species Act
ESOD	explosive ordnance quantity distance
FONSI	finding of no significant impact
GIS	geographic information system
ICRMP	integrated cultural resources management plan
INRMP	integrated natural resources management plan
IPM	integrated pest management
LTA	lighter-than-air
NAAOS	National Ambient Air Quality Standards
NAES	Naval Air Engineering Station
NAVAIR	Naval Air Systems Command
NAWCAD	Naval Air Warfare Center Aircraft Division
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NORTHDIV	Northern Division, Naval Facilities Engineering Command
NO.	nitrous oxides
NO <sub>2</sub>	nitrogen dioxide
NRM	Natural Resources Manager
MWR	Morale, welfare, and recreation
NRHP	National Register of Historic Places
03	ozone
<b>OPNAVINST</b>	Chief of Naval Operations Operating Instruction
Pb	lead
$PM_{10}$	particulate matter less than 10 micrometers

# LIST OF ACRONYMS AND ABBREVIATIONS (cont'd)

RCSA	Regulations of Connecticut State Agencies
RDTE	research/development/testing/evaluation
RONA	Record of Nonapplicability
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SUBASE	Naval Submarine Base
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

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# 1.0 PURPOSE OF AND NEED FOR ACTION

# 1.1 Background

Naval Submarine Base (SUBASE) New London is located within the towns of Groton and Ledyard, New London County, Connecticut. SUBASE is composed of Main Base, Admiral Fife Naval Recreation Area (AFNRA), and Navy housing. Established in 1868, the Main Base, excluding noncontiguous housing areas and the north acquisition area, consists of 687 acres. AFNRA and Navy-owned family housing areas are also part of SUBASE. AFNRA is a 36-acre plot of land in Stonington, Connecticut used by Naval personnel and their families for recreation. The 630 acres of Navy-owned family housing areas are located in the town of Groton, Connecticut.

Main Base is situated on the east bank of the Thames River, 6 miles north of the river's mouth. Main Base is approximately 1.5 miles long and 0.6 mile wide. Crystal Lake Road and Connecticut Route 12 border it on the south and east, respectively, and it is bounded to the north by a property line that came into existence after a series of land acquisitions by the Navy during the twentieth century. The main north-south road crossing SUBASE is Shark Boulevard, also known as Military Highway. The Providence and Worcester Railroad also runs north-south, crossing SUBASE between Shark Boulevard and the Thames River. The railroad divides the installation into two distinct parts: the Upper Base (east of the railroad) and the Lower Base (between the railroad and the Thames River). Facilities occupying the Lower Base consist of: Naval Submarine Support Facility (NSSF) maintenance buildings; the power plant; vehicle maintenance facilities; warehouse supply operations; submarine administrative buildings; Port Services operations; the Moral. Welfare and Recreation (MWR) small boat marina; and the Defense Reutilization and Marketing Office (DRMO) recycling yard (Conant 2003, pers. comm.).

SUBASE currently houses 16 attack submarines and has approximately 43,000 military and civilian employees and their dependents. SUBASE is home to many tenant activities and supports a broad range of administrative, maintenance. operational, supply. research/development/testing/evaluation (RDTE), and medical activities. Presently, Main Base contains 240 buildings and structures constructed between 1872 and the present. These include offices, classrooms, barracks, supply depots, shops, power plants/stations, berthing piers, ammunition magazines, pumphouses, sentry booths, garages, bus shelters and recreational facilities.

# 1.2 **Proposed Action**

SUBASE proposes to develop and fully implement an integrated natural resources management plan (INRMP) consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural



Figure 1-1. Vicinity Map of Main Base, Navy Housing, and Admiral Fife Naval Recreation Area.

resources and cultural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

# 1.3 **Purpose of Action**

The purpose of this action is to implement a conservation program that integrates crosion and sediment control, fish and wildlife management, land management, and management of outdoor recreational opportunities, urban forestry and shadetree landscaping, pest management, wetland management, and noxious weed control as practicable and consistent with the military mission and established land uses.

The need for this action is to meet statutory requirements under the SAIA. In November 1997, the Sikes Act, 16 United States Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the United States, unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

The principal use of military installations is to ensure the preparedness of the armed forces. The SAIA requires each installation to prepare an INRMP providing for the following program management activities, to the extent that such activities are consistent with use of the installation for military preparedness:

- The conservation and rehabilitation of natural resources on the installation;
- The sustainable multipurpose use of the resources, including hunting, fishing, trapping, and nonconsumptive uses; and
- Subject to safety requirements and military security, public access to the installation to facilitate such uses.

As required by the SAIA, the plan must, to the extent appropriate and applicable, provide for:

- Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- Fish and wildlife habitat enhancement or modification;
- Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;
- Integration of, and consistency among, the various activities conducted under the plan;
- Establishment of specific, natural resources management goals and objectives and time frames for proposed actions;

- Sustainable use by the public of natural resources, to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- Public access to the military installation that is necessary or appropriate for the sustainable use of natural resources, subject to requirements necessary to ensure safety and military security;
- Enforcement of applicable natural resource laws (including regulations);
- No net loss in the capability of the installation's lands to support the military mission of the installation; and
- Such other activities as the Navy has determined are appropriate.

Through the process of developing the INRMP, SUBASE has worked in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Connecticut Department of Environmental Protection (DEP) so the plan reflects the mutual agreement of these parties concerning conservation, protection, coastal zone consistency, and management of fish and wildlife resources on SUBASE. Also, as required by the SAIA, the plan has been provided for public comment, and all comments received were taken into account in finalizing the INRMP.

# 1.4 Regulatory Compliance

The National Environmental Policy Act (NEPA) of 1969, 42 USC § 4231 et seq. as amended, requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect the environment through providing an assessment of alternative actions and providing the opportunity for public comment on federal actions that have the potential to impact the environment. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process. The CEQ has issued the *Regulations for Implementing Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] § 1500-1508). These regulations specify that an environmental assessment (EA) be prepared to:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI);
- Aid in an agency's compliance with NEPA when no EIS is necessary; and
- Facilitate the preparation of an EIS when one is necessary.

The Navy Environmental and Natural Resources Program Manual prepared by the Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1B CH-3 further requires preparation of NEPA documentation prior to INRMP approval.

Information on laws, executive orders (EOs), regulations, and Department of Defense (DoD) directives for environmental management is available on the internet at www.denix.

osd.mil/denix/Public/Policy/env-law-index.html. An abbreviated list of pertinent regulations and guidances is in Appendix A.

# 1.5 Scope of the Environmental Assessment

This EA has been prepared to evaluate the potential environmental impacts of implementing the proposed INRMP for SUBASE. The analysis compares and summarizes the environmental consequences of the proposed action and alternative management objectives rather than individual projects or practices and is therefore a programmatic environmental assessment. Site-specific environmental analyses required for future projects may be tiered to this EA provided the anticipated impacts of a specific project, project components, the affected resources, or circumstances do not differ substantially from those evaluated in this EA.

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# 2.0 PROPOSED ACTION AND ALTERNATIVES

This section of the EA describes and compares the proposed action and alternatives. The alternatives consist of modifications in the level of effort to implement the natural resources management objectives and include:

- Alternative 1, No Action Alternative. Under this alternative, SUBASE would continue implementation of the objectives and practices outlined in the existing natural resources management plan developed in 1997.
- Alternative 2, Proposed Action. The proposed action is to develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The INRMP would include both compliance and stewardship actions and practices that meet the goals and objectives established in the SAIA.
- Alternative 3, Limited Action Alternative. Alternative 3 is a limited action alternative that focuses on implementing actions necessary to achieve legal compliance with environmental laws and regulations.

# 2.1 Selection Criteria for Alternatives

Each alternative presented for analysis must be a reasonable alternative meeting the needs and purpose of the proposed action. Each alternative must integrate natural resources management at SUBASE with the station's military mission in a manner that ensures military preparedness and meets the requirements of SAIA and other conservation laws that regulate natural resources on federal lands.

The proposed alternatives are based on SAIA and Chief of Naval Operations (CNO) guidance that installations shall develop and implement an INRMP using an ecosystem management approach. OPNAVINST 5090.1B CH-3 provides program requirements, guidelines, and standards for managing natural resources on Navy installations.

The Environmental Conservation Program (DoD Instruction 4715.3) provides guidelines for classifying conservation actions as compliance activities (Classes 0, I, and II) or stewardship activities (Class III). These criteria are used to develop implementation priorities for management actions in each alternative.

**Compliance**. Compliance projects are associated with a legal requirement for protection and management of natural resources. Failure to implement these projects would result in disruption of military mission activities.

• Class 0, Recurring. Natural and Cultural Resources Conservation Management Requirements. Included are 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 or that are in direct support of the military mission.

- Class I, Current Compliance. This includes projects and activities needed because an installation is currently out of compliance; 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, EOs, or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission.
- Class II, Maintenance Requirements. Included are projects and activities that are not currently out of compliance, but will be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.

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

# 2.2 Mission Constraints on Natural Resources Management

Existing land use and the possibility of future development in support of the military mission are the primary constraints to natural resources management. Presently there are very small amounts of woodland, which provide numerous benefits to the natural wetland environment by buffering the boundaries of the wetlands. The forested areas and various other natural habitats would be compromised in productivity and resilience by a reduction in size. Proposed development should provide opportunities to improve the natural resource base, such as offsetting the loss of natural resources by reutilization of structures or paved areas. When this cannot occur, development projects can be designed so the impacts can be mitigated. Such tradeoffs are recognized and recommended management actions are given for mitigation in which the natural environment and its various resources benefit in exchange for necessary development of buildings or facilities. Since the Natural Resources Program at SUBASE has a strong track record of coordinating natural resources issues with mission requirements, the overall intent of this INRMP is compatible with the military mission.

# 2.3 Alternatives Eliminated from Consideration

Alternatives to the proposed action that disproportionately administer one portion of the natural resources program (e.g. forest or wildlife management) over others was considered and eliminated from further consideration. Also, alternatives suggesting Stewardship activities over Compliance activities were eliminated from further consideration. These alternatives would not constitute an integrated conservation program and would therefore not be compliant with SAIA, DoD Instruction 4715.3, or OPNAVINST 5090.1B CH-3, and would not adequately address other conservation laws and regulations.

# 2.4 Alternatives Considered

Natural resources management issues and program areas relevant to the natural resources program at SUBASE include wetlands and water quality protection, threatened and endangered species protection, urban forestry and shadetree landscaping, erosion and sediment control, fish and wildlife management, outdoor recreation and environmental awareness, conservation and restoration of natural communities, pest management, and cultural resources protection. The management objectives and projects that are implemented for these program areas would differ under each alternative. A brief description of the management objectives and ongoing and new initiatives for each alternative is presented below. A list of actions and projects is included in Table 2-1.

# 2.4.1 Alternative 1 (No Action)

The Alternative 1 is the continued implementation of the management objectives and practices currently being conducted at SUBASE according to its 1997 INRMP. The existing management plan provides valuable information on natural resources management, establishes specific natural resources management goals and objectives, and sets time frames for projects. However, the period of performance for this plan ended in 2002, and no projects or actions are scheduled beyond this time. Any new projects described in the proposed INRMP would not be implemented under this alternative. In addition, no EA was completed for development of the existing plan. Consequently, the existing plan does not meet the SAIA requirements for an INRMP. The no action alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations. A summary of objectives and recommended actions for each program area that are identified in the various sections of the existing management plan follows.

# Soil Erosion and Sediment Control

Under Alternative 1, current erosion and sediment control activities would continue. The primary objective of the erosion and sediment control section under the 1997 INRMP was focused on 18 sites where serious, but correctable, erosion problems exist. These sites only occurred on the Main Base and Navy Housing. No sites were identified at AFNRA. Several of these sites have been corrected, but some have not. Further, some erosion control methods were ineffective in alleviating the problems. Several more erosion sites have developed since the 1997 INRMP was implemented. Under Alternative 1, project recommendations for some of these areas would not be implemented, however, ongoing projects would continue.

# Urban Forestry and Shade Tree Management

Under Alternative f, current urban forestry and shade tree management activities would continue. The primary objective of Urban Forestry and Shade Tree Management outlined in the 1997 INRMP was to unify the landscaping practices on SUBASE. Plants and trees poorly suited to particular sites were consistently used. Another objective was to alleviate damage to trees from careless construction activities and to remove various hazard trees.

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SUBASE New London

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EPR#	Topic	Title	Project Description	Regulatory Driver	Navy Assessment Level 1-5	Project recommended by: C= Contractor B= SLBASE S= State (CT CEP) F= Federal (USFWS)	Cost Data	Funding Source	Impact to Mission if not Funded	FY 04	FY 05	FY 06	FY 07	F¥ 08	FY 09	FY 10
00129NR100	Erosion	Erosion Site 2, 3, 4, and 8	Water turn-outs need to be installed along the stairwell added between Tautog Avenue and Building 33. Insert rip-rap to divert some of the torce. Water turn-outs need to be inserted along the new stairwell added behind the Small Weapons building; Water bars and turn-outs should be installed on the buildozed din path from the SeaBee parking lot down to Wahoo Avenue. The dirt path should be graded and re-seeded.	Stormwater Management Regulations	]	B	\$15.(xx)	O&MN	These erosion problems will eventually undermine the integrity of both stairwells, thus causing a more expensive repair of the starwell in addition to the erosion problem in the future. Further, effective Natural Resources Management compliance with the Stormwater Pollution Prevention Plan will be geoparaized at SUBASE_SUBASE may eventually be found to be in violation of local, state and federal laws, including SUBASE's General Permit issued by the Department of Environmental Protection. State of Connecticut, if the request is not funded. Because the nature of the problem if not liked while small, the future costs may be evorbitant to the mission in the tuture.			x				
00129NR100	Erosion	Erosion Site 6	Extend the gabion baskets that exist along the hill to the southwest of Building 460. Insert larger rip-rap along the path to slow the velocity of the water.	Stormwater Management Regulations		C	\$20,000	- OXMN	The measures installed to accommodate the water flow off the parking lot are not substantial enough. Effective Natural Resources Management compliance with the Stormwater Pollution Prevention Plan will be jeopardized at SUBASE. SUBASE may eventually be found to be in violation of local, state and federal laws, including SUBASE General Permit issued by the Department of Environmental Protection. State of Connecticut, it the request is not funded. Because the nature of the problem, if not fixed while small, the future costs may be exorbitant to the mission in the future.			x				
00129NR100	Eroxion	Erosion Site 1, {() and } }	Placement of rock riprap on the slope leading up to the boundary/security fence located at along the railroad tracks; Riprap should be inserted in the streambed on the scath side of the parking lot drains. Don't mow the grass along creek to allow vegetation to harden the wall of the creek. Stabilize the slope along the backside of the parking lot for Buildings 430 and 429 with erosion matting to hold the eroding soils in place and plant native herbaceous vegetative cover. Once the soils have been temporarily stabilized native shrubs should be planted. Carefully monitor the integrity of the curbs on the above street, Rasher Avenue.	Stormwater Management Regulations	I	C	\$15.0x0 -	O&MN	The integrity of the barrier fence presents a security risk to SUBASE. Further, effective Natural Resources Management compliance with the Stormwater Pollution Prevention Plan will be reopardized a SUBASE. SUBASE may eventually be found to be in violation of local, state and federal laws, including SUBASE's General Permi issued by the Department of Environmental Protection. State of Connecticut, if the request is not funded Because the nature of the problem, if not fixed while small, the future costs may be exorbitant to the mission in the future.				x			

Table 2-1. Management Actions/Projects for the Alternatives.

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SUBASE New London

EPR#	Topic	Title	Project Description	Regulatory Driver	Navy Assessment Level 1-5	Project recommended by C= Contractor B= SUBASE S= State (CT CEP) F= Federal (USFWS)	Cost Data	Funding Source	Impact to Mission if not Funded	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY	10
00129NR100	Erosion	Eroxion Site 5 and 7	Install straw bales and silt fencing between the corner of the parking lot east of Building 98 down to the parking lot off Runner Avenue. Allow vegetative layer to recover. Placement of gravel rock may be necessary in some of the deepest cut areas to fill the channels and dissipate some of the runoff energy. Install 100 feet of side walk at the southwest corner of the parking lot for Building 534 over an unauthorized footpath. Install shrubs o another barrier to ensure use of the sidewalk and to prevent further erosion.	Stormwater Management Regulations		C	\$35.(KK)	O&MN	Effective Natural Resources Management compliance with the Stormwater Pollution Prevention Plan will be jeopardized at SUBASE. SUBASE may eventually be loand to be in violation or local, state and federal laws, including SUBASE's Coencil Permis issued by the Department of Environmental Protection. State of Connecticut, if the request is not funded. Because the nature of the problem, it not fixed while small, the future costs may be evolution to the mission in the tuture.	T				x			
00129NR100	Erosion	Erosion Site 9 and 12	Remove the 3-foot wooden fence between Building 436 and 33, Insert a stairwell at this location since it is so frequently used. Install water nurn-outs atong the length of the stairwell to disrupt the direc flow of water that will occur and to avoid a future erosion situation. An interlocking stone wall needs to be built around the culvert behind Building 447, similar to the one in the parking lot near the North Gate, to stabilize the area.	Stormwater Management Regulations t		C.B	\$75.(x)+	O&MN	Effective Natural Resources Management compliance with the Stornwater Pollution Prevention Plan will be jeopardized at SUBASE. SUBASE may eventually be found to be in violation of horal, state and releval laws, including SUBASE's General Permit search by the Department of Environmental Protection. State of Connecticut, if the request is not funded. Because the nature of the problem, it not fixed while small, the future costs may be evolution to the mission in the future.						x		
00129NR100	Erosion	Erosion Site 13 and 14	Re-grade the entire slope and spread a thicker cap of fill onto the re-graded surface of the large sloped open space overlooking the Hempstead Brook valley and Gungwamp Hill. Re-grade the entire slope and spread a thicker cap of fill onto the re- graded surface of the south side of the intersection of Ohio Avenue and Florida Avenue.	Stormwater Management Regulations	1	C	\$10,000	O&MN	Effective Natural Resources Management compliance with the Stormwater Pollution Prevention Plan will be jeopardized at SUBASE. SUBASE may eventually be found to be in violation or local state and federal laws, including SUBASE's General Permit essued by the Department of Environmental Protection. State of Connection, if the request is not funded. Because the nature of the problem, in or fixed while small, the future costs may be evolutiant to the mission in the future.							x	
00129NR101	Land- scaping	General Landscaping and Urban Tree Renewal	Conduct general landscaping and orban tree replacement across the base	Executive Memorandum on Environmentally Beneficial Landscaping	1	В	\$3,000	O&MN					x	x	x	x	
00129NR102	Wildlife/ end spec	Golden Alexander Survey: Lesser Sand Spurty Survey: Marine Biological Assessment	Survey for state listed endangered. Golden Alexander, Zizin uptern, in Beaver Dam Brook Wetland during June and July. Survey for state listed threatened Lesses stand Spury. Spergularia Canadensis, on AFNRA between July and September: Develop a seasonahty matrix for potential occurrence of anadromous fishes, commercially or recreationally important fishes, sea turtles, and marine namnals for use in planning of dredging activities in the Tharnes River around the piers, quays, and navigational channels servicing SUBASE.	Endangered Species Act; Connecticut General Statute Annotated \$\$26- 303 et seq		s	\$20.18H	Agricultural Outlease	Effective Natural Resources Management compliance with the Endangered Species Act will be joupardized at SUBASE SUBASE may eventually be bound to be in violation of state and federal Endangered Species laws	X							

#### Table 2-1. Environmental Project Request. (cont'd)

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Final January 2006

#### Environmental Assessment for the Integrated Natural Resources Management Plan

SUBASE: New London

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EPR#	Topic	Title	Project Description	Regulatory Driver	Navy Assessment Level 1-5	Project recommended by C= Contractor B= SUBASE S= State (CT CEP) F= Federal (USFWS)	Cost Data	Funding Source	Impact to Mission if not Funded	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10
00129NR103	Birds	Migratory Bird Stopover Habitat Surveys: UCONN banded bird re-sighting	Conduct Migratory Bird Stopover Habitat Surveys help to identify Connecticut's priority sites and help guide conservation efforts at state and local levels. Contribute information on sightings along the Thanes River during late April and June and from late August through September: Assist the researchers at the University of Connecticut, in collaboration with Patrick Comins (Director of Bird Conservation at Audubon - Connecticut) by providing information on resigntings of banded birds.	Environmental Stewardship	2	C	\$4.(KH)	Agricultoral Outlease	SUBASE would become an important resource for biological information to the scientific community. Connecticut, and the whole nation_SUBASE's involvement in bird movements would increase the Quality of Life of base personnel and those residing a Navy housing by increasing awareness to the widdlife inhabiting and migrating through the area. Human contact with nature and wildlife is extremely valued.	t.	x					
00129NR104	Wetlands	Beaverdam Brook Wetland clean-up	Remove trash that has accumulated in Beaverdam Brook Wetland and the wetland on Main Base begin Building 447. An initial clean-up of the area should be followed by frequent monitoring; Plant red maple trees in the small wetland behind Building 447 where Phragmites has grown to shade out the recell unfunded, the species grows so rapidly over an area that it will become a monoculture. In order to protect the ecology of the area, the weed needs to be removed in accordance with the Federal Noxious Weed Act of 1974. Because the nature of the problem, if not fixed while small, the future costs will be exorbitant to the mission in the future.	En vironmental Stewardship	2	c	\$2.(HX)	DAMN	The trash in the wetland may contribute to flooding of Navy family housing. Removal of trash immediately will avoid avpensive flooding problems in the tature. Further, if the project i not funded, SUBASE could be found to be in violation of General Statues of Connecticut Chapter 446k Sec 22a-449 and Chapter [440 Sec 22a-36].					• • • • • • • • •	X	
00129NR105	Wildlife	Bat House Construction	Build and install bat houses on the Main Base, Navy Housing, and AFNRA as a natural control for bothersome insects on base.	Environmental Stewardship	2	¢	\$1,0(x)	OAMN	This project would positively impact the mission by improving the Quality of Life of personnel resuling in Navy Howsing. Personnel could become more familiar with the bat species of Connecticut. Additionally, increasing the bat population would reduce the insect population, specifically the mosquiro population that is known to transmit West Nile disease and Eastern Equine Encephalitis (EEE).							x

#### Table 2-1. Environmental Project Request. (cont'd)

#### Environmental Assessment for the Integrated Natural Resources Management Plan

SUBASE New London

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EPR#	Topic	Title	Project Description	Regulatory Driver	Navy Assessment Level 1-5	Project recommended by C = Contractor B = SUBASE S = State (CT CEP) F = Federal (USFWS)	Cost Data	Funding Source	Impact to Mission if not Funded	FY	0-1	FY 05	FY 06	FY 07	FY 08	FY (19	FY 10
00129NR106	Wetland	Wetland Protection Plan	Develop comprehensive plan to protect the wetlands of SUBASE especially the unique characteristics of Beaverdum Brook Wetland. The Plan is to include restoration alternatives, vegetative buffering, stormwater run-off quality monitoring, and removal of exotic/noxious vegetation.	Clean Wuter Act	F	f:	\$10,000	Agricultural Outlease	Effective Natural Resources Munagement compliance with the Stormwater Pollution Prevention Plan will be copardized at SUBASE. SUBASE may eventually be found to be in violation of local, state and federal laws, including SUBASE's General Permit issued by the Department of Environmental Protection. State of Connecticut and General Statuses of Connecticut Chapter 446k Sec 22a-449 and Chapter 440 Sec 22a-36.	x							
00129NR107	Invasive Species	Invasive Species Control Plan	Conduct baseline survey of invasive species located on SUBASE property. Develop a plan for control and systematic removal of those species. Prepare annual invasive species control measures.	Federal Noxious Weed Act of 1974	1	F	\$7,500	Agricultural Outlease	Effective Natural Resources Management compliance with the Pest Management Plan will be jeopardized at SUBASE SUBASE may eventually be found to be in violation of local, state and federal laws, as well as DOD 4150.7, OPNAVINST 6250.4B, and DoD 4150.7-M.	x							

# Table 2-1. Environmental Project Request. (cont'd)

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# Pest Management

Under Alternative 1, current pest management activities would continue according to SUBASE's Pest Management Plan. The primary objective of Pest Management outlined in the 1997 INRMP was focused on integrated pest management at SUBASE. One issue addressed was nuisance wildlife (e.g. Canada Geese, white-tailed deer) control and management. Hunting programs and habitat alterations were suggested as means to control nuisance wildlife. No specific pest management section is defined under the current INRMP.

# Upland and Wetland Habitat Restoration

Under Alternative 1, current upland and wetland habitat restoration activities would continue. The primary objective of wetlands protection outlined in the existing plan is to avoid, to the maximum degree feasible, wetlands destruction or degradation at Beaverdam Brook Wetland. Since the implementation of the 1997 INRMP, the wetlands on base were mapped. The Area A Downstream was restored in 2000 as part of a CERCLA remediation project. The Area A wetlands still consist of a Phragmites monoculture and remains a CERCLA study site pending action. Wetlands are managed in accordance with federal, state, and local regulations as well as applicable EOs.

# **Noxious Weed Control**

Under Alternative 1, current noxious weed control activities would continue. The primary objective of Noxious Weed Control outlined in the 1997 INRMP was to minimize the spread of the common reed and Asiatic bittersweet mechanically rather than by chemical means. This is consistent with SUBASE's Integrated Pest Management (IPM) Plan.

# Fish and Wildlife Management

Under Alternative 1, current fish and wildlife management activities would continue. The primary objective identified by the Fish and Wildlife Management Section of the existing natural resources management plan is to protect and enhance the habitat of species existing at SUBASE. Additionally, the fish and wildlife program is aimed at the improvement of habitat for a wide range of wildlife species within the constraints of the military mission. Management actions generally include the fishing programs and suggesting the management of the white-tailed deer (*Odocoileus virginiana*) population through an active hunting program. Enhancing areas or allowing natural process to control vegetative cover was suggested for wildlife habitat under the 1997 INRMP.

# **Outdoor Recreation**

Under Alternative 1, current outdoor recreation activities would continue. The goal of outdoor recreation management is to provide recreational opportunities that are sustainable, within the military mission and established carrying capacities, and are consistent with the natural resources upon which they are based. Moral, welfare, and recreation (MWR) maintains several recreational activities on Main Base in addition to the AFNRA. Current outdoor recreational opportunities include a golf course, paintball, several ball fields, fishing, swimming, and hiking/biking trails.

# 2.4.2 Alternative 2 (Proposed Action)

The proposed action is to develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management activities; and provides for sustainable multipurpose uses of natural resources. A summary of the plan's objectives and recommended actions and practices follows. The INRMP would be reviewed annually and updated every 5 years.

# Soil Erosion and Sediment Control

The primary objective of the erosion and sediment control section under the proposed INRMP (Alternative 2) is focused on 16 sites where serious, but correctable, erosion problems exist. These sites only occurred on the Main Base and Navy Housing. No sites were identified at AFNRA. Other current suggestions are focused on preventing the development of erosion sites by monitoring unauthorized foot traffic by base personnel.

# Urban Forestry and Shade Tree Management

The primary objective of Urban Forcstry and Shade Tree Management in the proposed INRMP (Alternative 2) would be to improve the appearance of the installation through the preservation of existing natural and landscaped areas and through the development of appropriate new urban forest and landscape plantings. Under this alternative, the implementation of environmentally beneficial landscaping practices such as using regionally native species in landscaped areas, reducing the area of mowed turf, and expanding the urban forest area would be maximized. Specific projects for general landscaping and urban tree replacement would be implemented under Alternative 2.

# Pest Management

Ongoing pest management activities would continue to be implemented and Navy policy on IPM would continue under the proposed INRMP (Alternative 2). Additional actions include exerting greater control of some nuisance species such as the common reed, insects, nuisance wildlife (e.g. Canada Geese, white-tailed deer), and implementing the new Navy policy on feral cats and dogs (CNO 2002).

# **Upland and Wetland Habitat Restoration**

Ongoing wetlands, water quality, and floodplain protection would continue under the proposed INRMP (Alternative 2). The primary objective of wetlands protection is to avoid, to the maximum degree feasible, wetlands destruction or degradation to Beaverdam Brook Wetland, the wetlands on Main Base, and the freshwater and tidal wetlands at AFNRA. Since the implementation of the 1997 INRMP, the base's wetlands have been mapped and restoration of Area A Downstream has begun. The proposed INRMP incorporates this new wetlands information. Wetlands are managed in accordance with federal, state, and local regulations as well as applicable EOs.

# **Noxious Weed Control**

The primary objective of Noxious Weed Control outlined in the proposed INRMP (Alternative 2) is to minimize the spread of the common reed and Asiatic bittersweet mechanically rather than chemically. Project recommendations are in accordance with SUBASE's IPM Plan.

# Fish and Wildlife Management

The primary objective identified by the Fish and Wildlife Management Section of the proposed INRMP (Alternative 2) is to protect and enhance the habitat of species existing at SUBASE. The fish and wildlife program is aimed at the improvement of habitat for a wide range of wildlife species within the constraints of the military mission. Additionally, fish-stocking efforts are occurring in Rock Lake on Main Base and in Manor Inn Pond at AFNRA. Management actions generally include the fishing programs and suggesting the management of the white-tailed deer population through an active hunting program. Enhancing natural areas and allowing natural process to control vegetative cover were suggested for wildlife habitat under the proposed INRMP.

# **Outdoor Recreation**

Many of the same outdoor recreational activities would be provided under the proposed INRMP (Alternative 2) as under Alternative 1. Ongoing fishing, hiking, swimming, golfing, paintball, and biking programs would continue. Additional opportunities and environmental benefits would be provided by the proposed INRMP. The goal of outdoor recreation management is to provide recreational opportunities that are sustainable, within the military mission and established carrying capacities, and are consistent with the natural resources upon which they are based. MWR Department maintains several recreational activities on base in addition to the Admiral Fife Naval Recreation Area.

# 2.4.3 Alternative 3 (Limited Action)

Alternative 3 involves limited implementation of the proposed INRMP. Under Alternative 3, only management activities necessary to achieve compliance with legal requirements such as the SAIA (Class 0, I, and II activities), Clean Air Act (CAA), Clean Water Act (CWA), Endangered Species Act (ESA), appropriate state laws, and EOs would be implemented. As with Alternative 2, the period of performance of the limited action alternative would be reviewed each year and updated every 5 years.

# Soil Erosion and Sediment Control

Under Alternative 3, current erosion and sediment control activities would continue. New suggestions for erosion treatment and prevention would not be implemented under Alternative 3.

# **Urban Forestry and Shade Tree Management**

Routine grounds maintenance activities such as mowing would continue to be implemented as part of Alternative 3. Additionally, use of native plants and other environmentally beneficial landscaping practices would be implemented as required by EO 13148.

# Pest Management

Ongoing pest management activities, as well as new initiatives described under Alternative 2, would also be implemented under Alternative 3.

# Upland and Wetland Habitat Restoration

Ongoing wetlands, water quality, and floodplain protection would continue under Alternative 3. Certain riparian buffer plantings and other habitat enhancement projects that would reduce runoff and improve water quality would not be implemented.

# **Noxious Weed Control**

Ongoing Noxious Weed Control activities would continue under Alternative 3.

# Fish and Wildlife Management

Under the limited action alternative, fish and wildlife management activities would be limited to compliance actions such as the protection of threatened and endangered species and nuisance species control.

# **Outdoor Recreation**

No outdoor recreation or environmental awareness projects or actions would be implemented under Alternative 3.

# 2.5 Comparison of Alternatives

Resource areas analyzed in this EA include: ecological resources, cultural resources, air quality, socioeconomics, and land use. The comparison of alternatives presented in Table 2-2 is based on the information and analyses presented in Section 3.0 (Affected Environment) and Section 4.0 (Environmental Consequences). Noise would not be generated from implementation of any of the alternatives and was therefore not considered relevant to this assessment.

Although Alternative 1 (the no action alternative) satisfies military mission requirements and fulfills Navy policies on natural resources management, it was not developed according to the SAIA guidelines for development of an INRMP. Alternative 2 would satisfy the requirements of the SAIA, support objectives of ecosystem management, provide public access for outdoor recreational opportunities when possible, and support the military mission at SUBASE. Alternative 3 would limit the ability to fully manage natural resources at the station because no stewardship activities (or limited stewardship activities) would be implemented. Forest and wildlife management, environmental education, and outdoor recreation activities would be severely limited under Alternative 3; however, Alternative 3 would be compliant with the SAIA.

	Alternative 1	Alternative 2	Alternative 3				
	No Action	Proposed Action	Limited Action				
Sikes Act	Not Compliant	Compliant	Compliant				
Ecological Resources	Positive effects from review of soil erosion and control plans, compliance with wetlands regulations, pest management and integration plan	Positive effects from review of soil crosion and control plans, compliance with wetlands regulations, stewardship activities, pest management and integration plan. Benefit of implemented soil erosion projects. Implementation of wildlifc surveys and habitat enhancements.	Positive effects from lreview of soil erosion and control plans, compliance with wetlands regulations, pest management and integration plan Benefit of implemented soil erosion projects				
Cultural Resources	Positive effects from cultural resources surveys	Positive effects from development of an integrated cultural resources management plan	Positive effects from cultural resources surveys				
Air Quality	Minimal effect from emissions; action is in conformity with State Implementation Plan	Minimal effect from emissions; action is in conformity with State Implementation Plan	Minimal effect from emissions; action is in conformity with State Implementation Plan				
Socioeconomics	No change to population, income, or employment	No change to population, income, or employment	No change to population. income, or employment				

# Table 2-2. Comparison of Alternatives.

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# 3.0 AFFECTED ENVIRONMENT

# 3.1 Ecological Resources

# 3.1.1 Soil

A soil survey was prepared for New London County, Connecticut, by the U. S. Department of Agriculture (USDA), Soil Conservation Service in 1983 (USDA 1983) including soils of the Main Base, the Navy Housing, and AFNRA. The area in which the SUBASE lies consists of soils of the uplands, terraces, and floodplain, all of which may be found within the SUBASE perimeter. The upland areas are characterized with soils varying from well drained to poorly drained with slopes in many areas exceeding 15 percent, and in some areas exceeding 30 percent. The terrace areas generally are characterized by poorly to very poorly drained soils. For urban use, these soils have severe limitations and intensive drainage and landfill measures are necessary to overcome the high water table. The floodplain areas have soils varying from well drained to very poorly drained; but because of flood hazards, these areas are limited in development potential. A majority of the Lower Base is below the 100-year flood plain. This necessitates protective measures for construction in these areas.

# 3.1.2 Water

Main Base is situated on the east bank of the Thames River, 6 miles north of the river's mouth. The main surface water feature at SUBASE is the tidally influenced Thames River. Tidal wetlands or marshes are scattered along both shores of the Thames River from its mouth at Long Island Sound up to Norwich, Connecticut. These particular tidal marshes are usually less than one acre in size. All of these tidally influenced wetlands serve as feeding and nesting areas for a variety of waterfowl, and as nurseries to many other aquatic forms such as fish and shellfish.

A total of 116 acres (approximately 9 percent of the base) were classified as wetlands at SUBASE according to the Vegetation and Wetlands Mapping Report dated December 2000. Surface water resources occur on SUBASE in the form of small intermittent streams, freshwater wetlands, and glacial ponds. The main freshwater wetland area is located in the central portion of the Main Base, and is known as the "Area A wetland." Remedial action to the adjacent "Area A Downstream" area was taken between 1999 and 2000 to remove contaminated soils and sediments as part of a CERCLA remediation project. Tidal wetlands and marshes are extremely limited on Main Base due to development. They only occur at Goss Cove and DRMO at the extreme southern and northern portions of the property

Major drainage features occur in the western portion of AFNRA. Here, a second-order stream (a branch of Silvias Brook) enters the property from the north and empties into Manor Inn Pond, an artificial impoundment contained behind a massive earthen dam. The dam incorporates a bridge and a remnant spillway over which the water falls into a channelized streambed. This channel in turn directs the water into a tidal pond 400 feet below the dam. A second tidal pond is located on the east side of the property. Both of these tidal ponds were formed when naturally occurring prongs of the northern portion of Quanaduck Cove were impinged by the construction of Route 1. Tidal flushing of these ponds occurs through culverts passing beneath the Route 1 roadbed.
Beaverdam Brook Wetland in Navy Housing is a wooded basin swamp with extensive tree and shrub cover. The wetland is surrounded on the west, north, and east sides by relatively impermeable ground moraine. An outlet to the south is composed of stratified drift. This stratified drift is continuous with the stratified drift surrounding the Groton Reservoir. The wetland itself is a remnant land feature from the latest glacial advance during the Pleistocene era. As the glaciers retreated they deposited unsorted till on the land's surface. They also left behind large isolated blocks of ice. One such block of ice likely formed the hasin of Beaverdam Brook Wetland. As the ice melted, the water flowed to the south through the unsorted ground moraine. Water flowing through the moraine sorted the particles of till, resulting in the stratified drift present today. Water still flows out of the wetland through Beaverdam Brook and eventually reaches Groton Reservoir. Stormwater runoff is now channeled into the wetland via several stormwater ditches and outfalls. Natural stormwater and groundwater runoff have always been a component of the hydrology of Beaverdam Brook Wetland, however, the routing of these stormwater outfalls to the wetland has almost certainly increased the contribution of stormwater to the overall hydrology of the site.

There are three types of aquifers in the area: stratified drift, bedrock, and till. Fresh water can be obtained from wells almost anywhere in the area, but the amount obtainable at any particular point depends upon the type and water bearing properties of the particular aquifer. Yields from stratified drift far exceed amounts from till or bedrock. Stratified drift in the area is capable of yielding an average of 85 gallons per minute to individual wells. In Groton, stratified drift covers most of the lowland and floodplain area where it overlies till and bedrock. A properly drilled well in bedrock will supply most of the lowland and floodplain area where it overlies till and bedrock. It can supply at least three gallons per minute, with some cases exceeding 50 gallons per day on a yearly average. No groundwater wells exist on Main Base, Navy Housing, or AFNRA. All SUBASE facilities utilize town water.

All three of these aquifers are vulnerable to saltwater intrusion in the SUBASE area. Salt water intrusion renders the water unfit for human and vegetative consumption. In some cases, salt water has intruded aquifers in the Groton area when wells have been over-pumped for extended periods. Damage from intrusion is usually long-term or permanent.

# 3.1.3 Vegetation

SUBASE is located within the central hardwoods or central hardwoods/hemlock vegetation zone of the eastern deciduous forest (Westveld et al. 1956). This forest zone is dominated by oaks (*Quercus spp.*) and a variety of associated hardwoods, including hickory (*Carya spp.*), black birch (*Betula lenta*), white ash (*Fraxinus americana*), and red maple (*Acer rubrum*). In lower slope communities the principal hardwoods may include red maple, red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), yellow birch (*Betula lutea*), and tulip-tree (*Liriodendron tulipifera*).

The soils of the oak-dominated forests, derived from glacial till, decomposing plant, and organic material are generally acidic. Shrubs in the heath family (Ericaceae) are tolerant of acidic conditions and dominate this vegetation zone, the most common of which are mountain laurel (Kalmia latifolia), huckleberry (Gaylussacia baccata), and highbush blueberry (Vaccinium corymbosum). Along stream margins and in other wet sites, sweet pepperbush (Clethra

alnifolia) and spicebush (Lindera benzoin) may be locally abundant. Canada Mayflower (Maianthemum canadensis), Virginia creeper (Parthenocissus quinquefolia), wild sarsaparilla (Aralia nudicaulis), wood asters (Aster spp.), and poison ivy (Toxicodendron radicans) are common components of the ground flora.

Vegetated rock outcrops on the Main Base represent a distinct habitat type. Shallow soils and generally xeric conditions limit the types of species able to persist along these rocky ledges. Although oaks, hickory, black birch, and white ash form a nearly continuous canopy in and around these areas, the forest understory is a sparse layer of sapling red maple, sassafras (Sassafras albidum), and black cherry (Prunus serotina).

Forested areas of SUBASE are dominated by oaks and hickory and intermixed with black birch. American beech, red maple, and white pine. The forest understory consists primarily of sassafras, black birch, and black cherry saplings and shrubs such as arrowwood viburnum (*Viburnum recognitum*) and highbush blueberry. The herbaceous layer is fairly sparse, including Canada mayflower, ground pine (*Lycopodium tristachyum*), virginia creeper, wood asters, and poison ivy.

The two tidal wetlands on AFNRA contain typical salt marsh vegetation, except for the presence of *Phragmites* in the western intertidal marsh. A belt of saltmarsh cordgrass (*Spartina alterniflora*) lines the intertidal zone, and the high marsh is dominated by saltmeadow cordgrass (*Spartina patens*) interspersed with blackgrass (*Juncus gerardii*) and salt marsh herbs such as sea lavender (*Limonium nashii*) and seaside goldenrod (*Solidago sempervirens*). Hummocks on the high marsh are dominated by switchgrass (*Panicum virgatum*), marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*).

The species composition of the Atlantic white cedar (*Chamaecyparis thyoides*) stand in the eastern portion of Beaverdam Brook Wetland in Navy Housing has white cedar occuring in relatively pure stands, and also intermixed with red maple and black gum. The shrub layer, dominated by sweet pepperbush, highbush blueberry, swamp azalea (*Rhododendron viscosum*), and greenbrier is dense and nearly impenetrable in some areas. Appendix D of the INRMP lists the plant species encountered during a vegetative survey of SUBASE during the wetland mapping of SUBASE done in 2000 and previous studies.

# 3.1.4 Wildlife

No state or federally listed, threatened, or endangered animals are known to occur on SUBASE. A list of the faunal species that could occur on SUBASE is included in Appendix E. The list will be updated accordingly as a species' presence on SUBASE is confirmed. Systematic surveys have not been conducted on the station for birds, mammals or fish. A herpetofauna survey for reptiles and amphibians is scheduled for Spring 2003.

The federally listed bald eagle (*Haliaeetus leucocephalus*) and the peregrine falcon (*Falco peregrinus*) are known to occasionally pass through southern Connecticut during migration. Two bald eagle nest sites have been found in Connecticut, one in Barkhamsted and a new nest site along the upper Connecticut River (CT DEP 2003). According to USFWS, bald eagles may be occasional transients in the area of SUBASE. Since 1997, there have been two pairs of nesting peregrines in Hartford and Bridgeport (CT DEP, 2003).

The Shortnose Sturgeon (*Acipenser brevirostris*), a federally listed endangered anadromous fish, is known from the Connecticut River. According to the Connecticut DEP, Marine Fisheries Division (Tom Savoy 2002), this species is not presently known to occur in the Thames River.

# 3.2 Cultural Resources

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archeological resources (prehistoric and historic), architectural resources, and traditional cultural resources. Archeological resources are locations and objects from past human activities. Architectural resources are those standing structures that are usually over 50 years of age and are of significant historic or aesthetic importance to be considered for inclusion in the National Register of Historic Places (NRHP). Traditional cultural resources hold importance or significance to Native Americans or other ethnic groups in the persistence of traditional culture.

The significance of such resources relative to the Native American Graves Protection and Repatriation Act (NAGPRA) and/or eligibility for inclusion in the NRHP is considered a part of the EA process. The regulations and procedures in 36 CFR 800, which implements Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects on properties listed in, or eligible for inclusion in the NRHP. Prior to approval of the proposed action, Section 106 requires that the Advisory Council on Historic Preservation be afforded the opportunity to comment.

# 3.2.1 Cultural Setting

# **Prehistoric Period**

Prehistoric occupation in the eastern North America is conventionally divided into three major periods that reflect technological and social adaptation and development. These periods are the Paleo-Indian, Archaic, and Woodland. The Archaic and Woodland periods are further divided into Early, Middle, and Late subperiods.

Paleo-Indian period (10,000 - 7,500 B.C.) sites are characterized by the presence of portable, versatile toolkits containing finely crafted, fluted stone projectile points, usually made of high quality cryptocrystalline stone such as chert or jasper (Snow 1980). The Archaic period (7,500 - 2,000 B.C.) is marked by the onset of a gradual warming period that brought about technological and cultural adaptations. The Early Archaic subperiod (7,500 - 6,000 B.C.) serves as a transitional phase as new, smaller, projectile point styles are introduced (Custer 1989; Gardner 1974). During the Middle Archaic subperiod (6,000 - 4,000 B.C.) food technologies change, including the introduction of ground stone tools for food preparation, and an increased reliance on fishing and shellfish gathering (Dincauze 1976; Snow 1980). The Late Archaic subperiod (4,000 - 2,000 B.C.), also known as the Terminal Archaic or Transitional period, sees a large increase in population and social complexity. The Woodland period (2,000 B.C. - A.D. 1600) is defined by the introduction of pottery. By the Late Woodland subperiod (AD 900 - 1600), horticulture became a significant part of the overall subsistence system.

# **Historic Period**

Prior to European contact in the area known today as New London County, Connecticut, a number of Native Americans Indian Tribes utilized the area including the Pequots, Mohegans, and the Narragansetts. These tribes maintained unique forms of government, culture, social order, and language. During the 17th century, after first contact, war and disease significantly reduced the Tribes population and they were limited to only small amounts of their traditional lands. Permanent European settlement in New London was not established until around 1645 near the mouth of the Thames River. By 1784, the first whaling ship left New London beginning a new and prosperous industry. After the War of 1812, manufacturing industries such as textile, firearms, paper, printing and machinery production moved in and New London again grew (Southeastern Connecticut 1968). In 1868, the state of Connecticut made a gift of 112 acres of land along the east side of the Thames in Groton to the United States government to establish a Navy Yard (Navy n.d.). In 1916, the facility be came the nation's first permanent continental submarine base. Today New London County is home to two Federally recognized Tribes, the Mashantucket Pequot Tribe and the Mohegan Indian Tribe, and to the historical Eastern Pequot Tribe, which has received a preliminary final decision of Federal acknowledgement.

## 3.2.2 Archeological Resources

In 1992, a Cultural Resource Assessment (CRA) for the SUBASE Main Base and AFNRA facilities was completed. This assessment consisted of documentary background research, archeological field reconnaissance, architectural survey, and an assessment of archeological sensitivity of the property (Northern Division 1992). In addition, SUBASE has been operating under an Historic and Archaeological Resources Protection Plan (HARP) since 1996. This plan will be superseded by implementation of the Integrated Cultural Resources Management Plan (ICRMP)) in calendar year 2003.

## Main Base and Navy Housing

There is a high probability that prehistoric groups utilized the immediate environs of the base for habitation and/or resource procurement however, only two prehistoric and no historic archeological sites have been previously recorded at Main Base and Navy Housing. One site consists of human remains encountered in 1918 during construction of barracks at the southern end of the Main Base near the present-day main gate. The remains of the two individuals were stored at the Smithsonian Institution's Museum of Natural History in Washington, D.C. until they were returned to the Mashantucket Pequot in 1997 as required under NAGPRA. The second site, the Baldwin Ridge site, was located during excavations for construction at the Navy Housing Trident Park facility east of the Main Base. The multi-component site dates from the Paleo-Indian through Middle Archaic periods. In a notice dated December 11, 1981, the Keeper of the NRHP concurs with the Connecticut State Historic Preservation Officer (SHPO) that the Baldwin Ridge site is eligible for inclusion on the NRHP.

Construction of Main Base, Navy Housing, and the surrounding land, has disturbed much of the area soils through excavation, grading, extensive fill deposition, blasting, and stream development that has adversely affected integrity of many historic and prehistoric archeological sites within the installation. However, the CRA identifies four small areas of the Main Base as having the "capacity for containing intact prehistoric resources". These areas are located in the

extreme northeastern portion of the facility and consist of three ridge tops dominating a ravine with an intermittent stream, and one relatively flat sheltered area on the side of a hill dominating the headwaters of an intermittent stream (Northern Division 1992 [Figure 6-1]).

# AFNRA

At AFNRA, the disturbance from development has not been as severe as the disturbance at the Main Base; however, no prehistoric archeological sites have been previously recorded in the area. The CRA identified three large areas of relatively undisturbed ground designated as having a "high prehistoric archeological potential" (Northern Division 1992 [Figure 7-2]). Archeological reconnaissance of AFNRA located five historic archeological resources consisting of a dam/mill complex, a cistern, stable ruins, Walnut Grove Manor/Stonington Manor Inn ruins, and a historic dump (Northern Division 1992 [Figure 7-2]). This complex has suffered some impact from land alterations, but was recommended for nomination to the NRHP for its association with events significant in American history (Northern Division 1992). During the mid 1800s, James Ingersoll Day, a wealthy businessman originally from New London, purchased five contiguous tracts of land which include the tract where AFNRA is now located. He built a large mansion on the AFNRA property where a mill, millpond, and dam were already located. Later he built a stable and called his estate Walnut Grove. Day became a secret supplier of the Confederacy and his house became a depot for blockade-runners; activities considered high treason in Connecticut (Bridge 1955). No other archeological resources were located during the archeological reconnaissance.

## 3.2.3 Historic Architectural Resources

## Main Base and Navy Housing

The CRA of Main Base included the evaluation of buildings, structures, and objects. One extant building, Building 70, the Escape Training Tank, and one object, SSN 571 Nautilus, the first nuclear-powered submarine in the world, are listed in the NRHP. Also eligible, but not yet listed, are two objects, a pair of 6-inch/53-calibre Mark 12/2 deck guns from the SS167 *Narwhal* and the HA8 midget submarine of the Imperial Japanese Navy. Three hundred twenty-five buildings were surveyed at Main Base and considered ineligible for the NRHP (Northern Division 1992). A later survey of World War II and Cold War-era buildings, the Chapel-on-the-Thames (Building 168) is eligible for the NRHP and on the Upper Base, Buildings 83, 84, 86, 164, and 169 known as the Dealey Plaza, meet the criteria for a historic district. No Cold War-era resources at Main Base possess the characteristics of "exceptional significance" necessary for inclusion in the NRHP (Northern Division 2001).

# AFNRA

All five standing structures located at AFNRA have been assessed for NRHP eligibility. These structures were all built between 1960 and 1983 and do not possess the characteristics of "exceptional significance" necessary for inclusion in the NRHP (Northern Division 1992).

# 3.3 Air Quality

National Ambient Air Quality Standards (NAAQS) have been established by the Environmental Protection Agency (EPA) for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), particulate matter with a diameter less than or equal to a nominal 10 micrometers (PM<sub>10</sub>), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), and lead (Pb). In addition, the CAA of 1970 requires that states with designated ozone nonattainment areas regulate volatile organic compounds (VOCs) and oxides of nitrogen (NO<sub>x</sub>) because they are precursor pollutants to ozone formation.

SUBASE is located in EPA's Region 1, which generally has very good air quality, but is in the Greater Connecticut severe nonattainment area for ozone (<u>http://www.epa.gov/oar/oaqps/greenbk/ancl.html</u>). The Clean Air Act Amendments (CAAA) of 1990 state that federal agencies are not permitted to support any action that does not conform to and EPA-approved State Implementation Plan (SIP). A General Conformity Rule applicability analysis is required to demonstrate that any proposed federal actions conform to the SIP. Ongoing actions and actions that are identified in the SIP are exempt from demonstrating conformity, and other actions are assumed to be in conformity if total project emissions are below a minimum threshold level (the *de minimis* level) and constitute less than 10 percent of the regional emission inventory. Projects with emission levels below the *de minimis* levels are not subject to the General Conformity Rule; those projects at or above the levels are required to perform a conformity analysis. *De minimis* levels for areas of non-attainment are presented in Table 3-1.

Pollutant/Nonattainment Classification	Emissions (tons/year)		
Ozone (VOCs and NO <sub>x</sub> )	((())))		
Serious	50		
Severe	25		
Extreme	10		
Other ozone nonattainment areas outside an ozone transport region	100		
Marginal and moderate nonattainment areas inside an			
ozone transport region	50		
VOC	100		
NO <sub>x</sub>			
СО			
All classifications	100		
SO <sub>2</sub> or NO <sub>2</sub>	100		
$PM_{10}$			
Moderate	100		
Serious	70		

Table 3-1. De Minimis Exemption Levels for Conformity in Nonattainment Areas.

Source: 40 CFR § 93.153(b)(1)

In accordance with the CAA and its amendments, SUBASE manages a comprehensive program to help control air pollution. The program includes participating in emissions trading, Title V permitting program, and monthly State Implementation Plan coordination meetings with state agencies. The air quality program at SUBASE strives to meet federal requirements, as well as those set forth by the Connecticut DEP, Bureau of Air Management.

The SUBASE Title V Operating Permit Program is aimed at satisfying all requirements of Title V of the CAAA and the Connecticut state regulations outlined in Regulations of Connecticut State Agencies (RCSA) 22A-174. Operating permits and their accompanying applications serve to identify and define compliance obligations of the station. SUBASE received its Title V operating permit from the state of Connecticut in August, 2003. The following table (Table 3-2) illustrates the Estimated Annual Actual Emissions for SUBASE during the year 2000 and was submitted as part of their Title V operating permit application.

	Fuel Burning Equipment							
	<u>Boilers</u>	Engines						
	4		voc	VOC Subject to	Other		Other	Site
			Subject to	Shipbuilding	VOC	Total HAP	Sources	Total
			C.O. #8049	МАСТ				
NOx	37.0	4.5						41.5
SOx	17.7	0.4						18.0
со	26.9	1.2					1.4E-02	28.2
РМ	4.3	0.2					3.3	7.8
PM10	4.2	0.2					3.3	7.8
voc	4.5	0.3	0.0	2.9	5.2		4.2	17.2
Lead	5.9E-04						1.5E-03	2.1E-03
Fotal HAP	0.0	3.2E-03				1.5	1.5	3.0
Max HAP	2.6E-02	1.0E-03				0.6	0.5	0.6

Table 3-2. Estimated Annual Actual Emissions during 2000.

## 3.4 Socioeconomics and Environmental Justice

Socioeconomic analyses generally provide a detailed investigation of the prevailing population, income, employment, and housing conditions of a community or area of interest. This section provides a description of these demographics for New London County and the state of Connecticut, with the demographics of the whole nation for comparison.

Environmental justice is another important aspect of a socioeconomic analysis. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency ensure achieving environmental justice is part of its mission by identifying and addressing, as appropriate, disproportionately high human health or environmental effects of its programs, policies, and activities on minority populations and low income populations. Each year the U.S. Census Bureau defines the national poverty thresholds, which are measured in terms of household income dependent upon the number of persons within the household. In 2000, the average threshold was \$17,603 for a family of four and \$13,738 for a family of three (U.S. Census Bureau 2001).

EO 13045, Protection of Children from Environmental Health Risks and Safety Risk, further requires that federal agencies make identifying and assessing environmental health and safety risks that could disproportionately impact children a high priority. The EPA (2000) has identified that children are particularly susceptible to outdoor and indoor air pollutants, drinking water contaminants, pesticide residue in foods, and lead contamination.

#### 3.4.1 Demographics

U.S. Census Bureau data show the total population of New London County was 259,088 in 2000 (Table 3-3). The state's population is 81.6 percent White, 9.1 percent Black or African American, 2.4 percent Asian, and 4.3 percent other. Persons of Hispanic or Latino origin are included in these statistics.

#### 3.4.2 Income and Employment

The median household income in New London County is \$50,646, and is slightly less than the state average of \$53,935. Persons below the poverty line, 6.4 percent, are lower than the state average of 7.9 percent. The number of children below poverty level, 8.2 percent of the population, is also slightly lower than the state average of 10.4 percent.

Demographic Characteristic	New London County	Connecticut	United States
Population	259,088	3,405,565	281,421.906
Persons under 18 years old	24.4%	24.7%	25.7%
Persons 65 years old and over	13.0%	13.8%	12.4%
White persons, percent <sup>a</sup>	87.0%	81.6%	75%
Black or African American persons <sup>a</sup>	5.3%	9.1%	12.3%
Asian persons <sup>a</sup>	2.0%	2.4%	3.6%
Persons reporting some other race <sup>a</sup>	2.2%	4.3%	5.6%
Female persons	50.5%	52.6%	50.9%
Persons of Hispanic or Latino origin <sup>b</sup>	5.1%	9.4%	11.8%
White persons, not of Hispanic/Latino origin	84.7%	77.5%	69.1%
High school graduates, persons 25 years and over	86.0%	84.0%	80.4%
College graduates, persons 25 years and over (Bachelor's degree or higher)	26.2%	31.4%	24.4%
Median household income (1999)	\$50,646	\$53,935	\$41,994
Persons below poverty	6.4%	7.9%	12.4%
Children below poverty (under age 18)	8.2%	10.4%	16.6%

# Table 3-3. Profile of General Demographic Characteristics.

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race so also are included in applicable categories.

Source for New London County, Connecticut, United States: U.S. Census Bureau, 2000 Survey http://census.gov/index.html

# 3.5 **Operational Factors**

Subase is a large quantity generator of Hazardous Waste operating a state-of-the-art Transfer, Storage, and Disposal Facility (TSDF) under a RCRA Part B permit issues by the state of Connecticut in 2003. RCRA and state regulated waste is generated primarily from the industrial activities on lower base, stored temporarily in over 100 designated Satellite or 90-Day accumulation sites located adjacent to or near the site of generation, before being transported to the TSDF for bulking and preparation for shipment off-base.

Primarily transportation on, off and around SUBASE is by means of privately operated vehicles. Subase and its tenant commands do maintain a GSA motor vehicle fleet of over 150 vehicle for official transportation. To alleviate traffic congestion on SUBASE a shuttle bus transportation system has been in place since 2001

SUBASE generates most of its electricity and steam heat from the Building 29 Power Plant located on Lower Base. Air emissions and wastewater discharges from this facility are permitted under the SUBASE CAA Title V permit and Power Plant NPDES permit, respectively.

The state of Connecticut has imposed no noise regulations on day-to-day SUBASE operations.

## 4.0 ENVIRONMENTAL CONSEQUENCES

This section presents an analysis of the potential environmental consequences of the three alternatives described. The potential impacts to the human and natural environment are evaluated relative to the existing environment (see Section 3.0). The overall management approach and management practices are evaluated on a programmatic level, rather than a project-specific level. The intent is to evaluate the overall impacts of implementing the alternatives in a broad sense. Programmatic analysis provides opportunities for the installation to accommodate unforeseen projects, and changes to projects, as long as impacts are covered within the overall scope and analysis of this EA.

The natural resources management activities evaluated were designed to avoid negative environmental impacts and include planning measures for compliance with applicable laws and regulations. Therefore, none of the activities currently being conducted at SUBASE, nor any of the project actions recommended in the proposed action or alternative, would have the potential to cause significant environmental impacts. The proposed action (Alternative 2) would provide greater environmental benefits than either continuing the no action alternative (Alternative 1) or implementing a limited action alternative (Alternative 3) because the fullest range of management projects would be implemented to ensure an ecosystem approach to natural resources management is achieved.

## 4.1 Alternative 1 (No Action)

Under the no action alternative, natural resources would continue to be managed in accordance with existing plans and programs. The existing natural resources plan is comprehensive and based on ecosystem management. However, without implementation of the INRMP (Alternative 2), future actions and projects would not be planned and accounted for as required by SAIA. Baseline conditions of the affected environment would not change under the Alternative 3, nor would the full benefits realized under the INRMP be achieved.

## 4.1.1 Ecological Resources

Management would continue to be conducted in accordance with state and federal regulations for water quality and wetlands protection. Implementation of current natural resources management practices such as erosion and sediment control measures and forestry BMPs would continue to protect water resources. Baseline conditions for groundwater, surface water, and wetlands would

therefore not change under Alternative 1. Baseline conditions for wildlife would not change under Alternative 1. Current management practices such as white-tailed deer population control would continue to be implemented for the benefit of wildlife resources.

## 4.1.2 Cultural Resources

Implementing the no action alternative would result in no changes to cultural resources at the Main Base, Navy Housing, or AFNRA facilities.

# 4.1.3 Air Quality

Implementing Alternative 1 (the no action alternative) would result in no changes to local or regional air quality. None of the recommended management projects outlined in the Integrated Natural Resources Management Plan would require a conformity analysis because they are either already currently outlined in the SIP, are continuations of ongoing projects, or would produce emissions well below *de minimis* levels.

## 4.1.4 Socioeconomics

Alternative 1 would not impact population, income, or employment in the region. Neither will this alternative have a disproportionately high or adverse impact on minority or low-income populations or pose environmental health or safety risks that would disproportionately affect children (EO 12898, Federal Actions to Address Environmental Justice in Minority Population and Low Income Population, and EO 13045, Protection of Children from Environmental Health Risks and Safety Risks). Therefore, under the no action alternative, there would be no change in the potential effects of natural resources management on socioeconomics and environmental justice.

## 4.1.5 Land Use

No changes to land use would occur under implementation of Alternative 1. Under this alternative, mission activities would continue to be supported for grounds maintenance on the SUBASE. Therefore, implementation of Alternative 1 would not change land use at SUBASE or in the region.

# 4.2 Alternative 2 (Proposed Action)

Alternative 2, the proposed action, is to develop and fully implement the INRMP. Under this alternative, a broad range of natural resources management activities and practices, which support Navy policy on good stewardship and ecosystem management, would be implemented. Adaptive management would be used to assess and improve management practices and help ensure stated objectives are achieved. Baseline conditions would remain unchanged or improved under this alternative.

# 4.2.1 Ecological Resources

Under Alternative 2, ecological resources, specifically water resources would continue to be protected through adherence to state and federal water quality and wetlands protection laws and

review of erosion and sediment control plans. Additional projects to enhance water quality include planting and maintaining riparian buffers along streams. Implementing a control program for invasive plant species would further improve habitat diversity and function in some of the native vegetative communities. Potential problems such as loss of nontarget species and degradation of water quality in wetlands from chemical control of invasive plant species (state permits are obtained, when necessary, for such things as herbicide applications to wetland areas.) would be avoided by using appropriate application methods, adhering to label instructions, and using appropriate, approved herbicides. Implementation of this action would have positive impacts on wildlife resources. All state and federal threatened and endangered species protection laws would continue to be implemented under Alternative 2. Additional benefits would be provided by implementation of several proposed new actions including conducting threatened and endangered species surveys to confirm the occurrence of known species and identify new species. Implementation of Alternative 2 would have no negative impacts on federally listed threatened or endangered species.

## 4.2.2 Cultural Resources

## **Archeological Resources**

## Main Base and Navy Housing

One archeological site, the Baldwin Ridge site located at Navy Housing Trident Park is considered eligible for inclusion on the NRHP. As a result of significant ground disturbance at the Main Base and Navy Housing, the potential for locating additional archeological resources is low. However, four small areas in the northeastern region of the Main Base have been identified as having a higher potential for prehistoric site location (Northern Division 1992:6-3). Prior to execution of any ground disturbing activities in these areas related to implementation of the INRMP, a cultural resources survey should be conducted. Throughout Main Base and Navy Housing, it is possible that currently buried and unknown archeological resources may be uncovered during ground-disturbing activities. As provided for in all construction contracts at SUBASE, if any archeological resources (historic and/or prehistoric) are encountered during earth movement or construction, the SUBASE, Cultural Resources Manager (CRM) and the Connecticut SHPO would be notified to ensure compliance with 36 CFR Part 800.11. All construction work would be suspended until a qualified archeologist could determine the significance of the encountered resource(s). In addition, the ICRMP provides an overview of standard operating procedures to follow when cultural material is encountered.

## AFNRA

Five historic archeological resources have been identified in the AFNRA area. Intensive sitespecific field investigation will be necessary at these locations prior to any ground disturbing activities. In addition, areas identified as having a high potential for prehistoric site location will require cultural resources survey prior to ground disturbance (Northern Division 1992). Throughout AFNRA, it is possible that currently buried and unknown archeological resources may be uncovered during ground-disturbing activities. As provided for in all construction contracts at SUBASE, if any archeological resources (historic and/or prehistoric) are encountered during earth movement or the construction phases of the proposed action, the SUBASE CRM and the Connecticut SHPO would be notified to ensure compliance with 36 CFR Part 800.11. All construction work would be suspended until a qualified archeologist could determine the significance of the encountered resource(s).

#### Architectural Resources

#### Main Base and Navy Housing

A complete inventory of architectural resources has been completed at SUBASE. One extant building on Main Base, Building 70, the Escape Training Tank, and one object, the SSN 571 Nautilus, the first nuclear-powered submarine in the world, has been listed in the NRHP. The Nautilus is also designated as a National Historic Landmartk. In addition, the World War H-era Chapel-on-the-Thames, the Dealey Plaza Historic District on the Upper Base, the pair of Mark 12/2 deck guns located in front of Morton Hall (Building 169), and the Japanese HA8 midget submarine on the grounds of the Nautilus Memorial and Submarine Force Museum Library are considered eligible for the NRHP. The construction of new buildings and facilities can have an adverse effect on historic properties through disturbance of the integrity of an existing historic building, district, or landscape. New structures or buildings with architectural design elements that are incompatible with surrounding historic properties would impact the integrity, character, and/or feeling of the historic property. Should implementation of the INRMP include any such construction.

#### AFNRA

A complete inventory of architectural resources has been completed at AFNRA and no structures were found eligible for the NRHP. As such, no architectural resources will be adversely impacted by the proposed action.

## 4.2.3 Air Quality

Implementing Alternative 2 (the proposed action) would result in no permanent changes to local or regional air quality. The primary short-term impact would be directly related to the generation of  $PM_{10}$  at and around the project corridor during the erosion control work at SUBASE. These emissions would primarily be a function of:

- Construction activities such as grading and excavation,
- Movement of dust (wind erosion) from "piled" materials, and
- Mechanical entrainment of road dust

USEPA AP-42 states that emission factors for fugitive dust emissions from heavy construction operations can be conservatively expressed in terms of total suspended particulate (TSP). The TSP emissions from construction-based activities depend on a number of considerations including, but not limited to:

• Number of vehicles (diesel exhaust - volatile organic compounds [VOC], particulate, etc.) and type of vehicles (earth mover, etc.);

- Activity type for construction (demolition and debris removal, site preparation, and general construction);
- Materials used (for foundations and infrastructure [roads] asphalt, concrete, etc.);
- Controls for fugitive emissions from area source (wetting, cover):
- Burning of cut material; and
- Street asphalt installation.

Analysis of a "worse-case" scenario (Table 4-1) regarding the proposed action indicates that none of the recommended management projects outlined in the Integrated Natural Resources Management Plan would require a conformity analysis. Conformity analysis would not be required because the proposed actions fall into one or more of several categories:

- Currently outlined in the SIP
- Continuations of ongoing projects
- Responsible for less than 10 percent of the emissions inventory at the base
- Emissions are less than the *de minimis* exemption levels for conformity determinations specified in 40 CFR 93.153.

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	SOx (tpy)	NOx (tpy)	Pb (tpy)	PM10 Equipment (tpy)	PM10 Excavation (tpy)	PM10 Demolition (tpy)	Total PM10 Emissions (tpy)
Emissions	0.3	0.05	0.1	0.2	0.00	0.3	0.7	0.0	1.0

 Table 4-1. Analysis of Worse Case Scenario.

## 4.2.4 Socioeconomics

As with Alternative 1 (the no action alternative), Alternative 2 (the proposed plan) would not impact population, income, or employment in the region. Nor would the proposed action have a disproportionately high or adverse impact on minority or low-income populations, nor pose environmental health or safety risks that would disproportionately affect children. The outdoor recreational opportunities provided by the existing INRMP would continue to improve the quality of life for station personnel and their dependents.

# 4.2.5 Land Use

As with Alternative 1, land management practices under Alternative 2 would continue to support all of the station's current land uses. Additionally, implementation of management activities that conserve and protect the landscape and maintain ecosystem integrity would help ensure the longterm sustainability of military land use on the station. Because the proposed INRMP was prepared through interagency coordination, the proposed action would be compatible with regional land use plans and land use in the vicinity of the station would not be affected under this alternative.

## 4.3 Alternative 3 (Limited Action)

Under Alternative 3, the limited action alternative, only compliance-driven activities that address legal requirements for natural resources management would be implemented. Most stewardship actions relating to habitat restoration and enhancement, outdoor recreation and environmental awareness, wildlife management would not be implemented under this alternative. The environmental consequences of implementing an INRMP without stewardship actions would reduce environmental benefits achieved by full implementation of the INRMP.

#### 4.3.1 Ecological Resources

Under Alternative 3, erosion and sediment control measures that protect soil resources during construction and other ground-disturbing activities would continue to be implemented. However, stewardship projects such as riparian buffer plantings that would be implemented under Alternative 2, which would benefit soil resources, would not be implemented under Alternative 3 and benefits from these activities would not be achieved.

Management of water resources under Alternative 3 would continue to be conducted in accordance with state and federal regulations for water quality and wetlands protection. Erosion and sediment control plans would continue to be reviewed and enforced for construction and other ground-disturbing activities. However, benefits to water resources that would be achieved by implementing stewardship activities proposed under Alternative 2, planting riparian areas along streams, would not be realized. Therefore, although the overall benefits of Alternative 2 would not be gained with implementation of this alternative, there would be no change from the baseline condition of water resources.

Wildlife management activities proposed under Alternative 2, such as nest box programs and deer and bird population monitoring, would not be implemented under this alternative. Because few wildlife management projects would be implemented under Alternative 3, very limited benefits would be achieved, though no negative impacts would result. Threatened and endangered species would continue to be protected under Alternative 3 through the implementation of state and federal threatened and endangered species protection laws. Implementation of Alternative 3 would therefore have no negative impacts on federally listed threatened or endangered species.

## 4.3.2 Cultural Resources

Implementation of Alternative 3 would have the same impacts to cultural resources as provided by Alternative 2. As provided for in all construction contracts at Main Base, Navy Housing, and AFNRA, if any archeological resources (historic and/or prehistoric) are encountered during earth movement or construction, the SUBASE CRM and the Connecticut SHPO would be notified to ensure compliance with 36 CFR Part 800.11. All construction work would be suspended until a qualified archeologist could determine the significance of the encountered resource(s).

# 4.3.3 Air Quality

Implementing the limited action alternative would result in no changes to local or regional air quality. None of the recommended management projects outlined in the Integrated Natural Resources Management Plan would require a conformity analysis because they are either already currently outlined in the SIP, are continuations of ongoing projects, or would produce emissions well below *de minimis* levels.

#### 4.3.4 Socioeconomics

As with Alternatives 1 and 2, Alternative 3 would not impact population, income, or employment in the region. Nor would Alternative 3 have a disproportionately high or adverse impact on minority or low-income populations, nor pose environmental health or safety risks that would disproportionately affect children. Fewer outdoor recreational opportunities would be available for station personnel and their dependents as outdoor recreation and environmental awareness activities proposed under Alternatives I and 2 would not be implemented under Alternative 3.

#### 4.3.5 Land Use

As with Alternatives 1 and 2, no changes to land use would occur under implementation of Alternative 3. Mission activities would continue to be supported by management of administrative areas on the Main Base.

#### 4.4. Operational Impacts

Implementation of Alternatives 1, 2, or 3 would have no impact on hazardous/state regulated waste generation, transportation impacts, energy use and requirements, or noise generated at SUBASE

#### 4.5 Cumulative Impacts and Conclusions

Cumulative impacts are the incremental impacts of an action when added to the impacts of other federal or nonfederal past, present, or reasonably foreseeable future actions. There are no major actions proposed or currently being planned at SUBASE that represent cumulative impacts with the proposed action.

Provisions of the INRMP that integrate needs of the military mission with natural resources protection are designed to minimize cumulative impacts. Additionally, appropriate NEPA procedures would be undertaken for any actions that could result in cumulative impacts.

Implementing any of the alternatives analyzed in this EA would not result in negative cumulative impacts to the environment. In addition to the current management practices conducted at SUBASE, the proposed action would implement projects that directly support regional ecosystem management initiatives and would enhance and protect the human and natural

environment, including state and federally listed threatened and endangered species. Preparation and implementation of this INRMP is consistent with State of Connecticut Coastal Zone Management policies. As funding becomes available for the recommended INRMP projects, final project-specific CZMA consistency reviews will be undertaken by the SUBASE Natural Resources Manager and proper coordination will be initiated with the CTDEP. Monitoring programs, annual reviews, and five-year updates of the INRMP allow for continuous reassessment of management goals and objectives (adaptive management) and would help to avoid undesirable cumulative impacts. Coordination with state and federal wildlife agencies, as required by the SAIA, further reduces the potential for cumulative negative impacts. The proposed alternative would not result in any significant impacts to the environment in the context of The National Environmental Policy Act of 1969 and a Finding of No Significant Impact (FONSI) is appropriate. This page intentionally left blank

# 5.0 COORDINATION AND PUBLIC INVOLVEMENT

In accordance with the SAIA, SUBASE has worked cooperatively with the USFWS and Connecticut DEP to ensure that the INRMP reflects the mutual agreement of these parties concerning the conservation, protection, and management of fish and wildlife resources on the station. Draft copies of the SUBASE INRMP were provided to these agencies and the public for review. Notice of Availability of the draft EA was also made to the public. All comments were considered in the preparation of the final INRMP and letters of mutual agreement from each agency were obtained (Appendix C).

In addition, to identify issues of interest and concern, advice and information were sought from a number of other interested parties and stakeholders. The following persons and agencies were consulted in preparation of the INRMP.

#### Federal Agencies:

Philip A. Morrison U.S. Fish and Wildlife Service New England Field Office

#### **Connecticut Department of Environmental Protection**

Jenny Dickson Joan Hoelzel Dawn McKay Tom Savoy

#### SUBASE New London:

Richard Conant Natural Resources Manager

Rhonda Nielsen SUBASE Public Works Dept.

Mike Brown Air Program Manager

#### **United States Navy**

Joel Ames Commander Navy Region Northeast, Regional Environmental Compliance Officer

P. Jack Markham LANTDIV Navy Technical Representative This page intentionally left blank

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#### 6.0 LIST OF PREPARERS

Richard Conant Naval Submarine Base (SUBASE) New London Natural Resources Manager

Andy Stackpole Naval Submarine Base (SUBASE) New London Environmental Program Director

Joel Ames Commander Navy Region Northeast Regional Environmental Compliance Officer

Troy Anderson Geo-Marine, Inc. Air Quality Specialist

Nancy Parrish Geo-Marine, Inc. Cultural Resources Specialist

Hunter Williams Geo-Marine, Inc. Graphic Artist

Joseph Campo, Ph.D. Geo-Marine, Inc. Sr. Wildlife Biologist/Forester

Cheryl McGarrity Geo-Marine, Inc. Project Manager This page intentionally left blank

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Appendix A Record of Nonapplicability

.

From: Natural Resources Manager, Naval Submarine Base, New London

Subj: Record of Non-Applicability for Integrated Natural Resources Management Plan (INRMP)

The Naval Submarine Base (SUBASE) New London, Connecticut INRMP does not require a conformity analysis because their management projects are either already currently outlined in the SIP, are continuations of ongoing projects, or would produce emissions well below *de minimis* levels. The Clean Air General Conformity requires that potential emissions generated from any project-related construction activity and increased operational activity be determined on an annual basis and compared to the annual de minimus levels for those pollutants for which the area is classified as non-attainment.

The Navy proposes to fully implement an INRMP that includes both compliance and stewardship actions and practices that meet the goals and objectives of the Sikes Act Improvement Act. The supporting actions that make up this proposed action include:

- Protecting water quality and wetlands, planting riparian buffers along water courses.
- Implementing bird surveys, bird monitoringm marine species surveys, and herpetofaunal surveys. Surveys for 2 possible endangered species. Installation of bat houses.

General landscaping and urban tree replacement. Environmentally beneficial landscaping practices using native species would be maximized. Areas of mowed turf would be reduced and the urban forest area would be increased.

- ٠ Ongoing fish and wildlife management practices would continue.
- Ongoing outdoor recreation programs would continue.
- An updated integrated cultural resources management plan will be implemented in 2003. ٠

No actions will affect air quality. Therefore an applicability analysis under the Clean Air Act General Conformity Rule is not required since the proposed action will result in fewer emissions than current practices.

To the best of my knowledge the information contained in this RONA for the proposed action is accurate and correct. By signing this statement I am attesting that this action is presumed to conform with the Connecticut State Implementation Plan for air quality.

SUBASE Natural Resources Manager **Richard Conant** 

APPENDIX B

State and Federal Agency Comments



# STATE OF CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

ENVIRONMENTAL & GEOGRAPHIC INFORMATION CENTER 79 Elm Street, Store Level Hartford, CT 06106 Natural Diversity Data Base



September 3, 2003

Mr. P. John Markham Department of the Navy Atlantic Division Naval Facilities Engineering Command 1510 Gilbert Street Norfolk, VA 23511-2699

> re: Draft Integrated Natural Resources Management Plan for Naval Submarine Base (SUBASE) in New London, Connecticut

Dear Mr. Markham:

t have reviewed the Draft Integrated Natural Resources Management Plan for Naval Submarine Base (SUBASE) in New London, Connecticut that you submitted to our office. I would recommend that as environmental projects are implemented (Section 5, Management Recommendation Summary) that you coordinate activities with appropriate biologists within the Connecticut Department of Environmental Protection to avoid any impacts to Federal or State Listed Species.

Please contact our botanist, Nancy Murray (DEP-EGIC; 860-424-3589) for projects that involve plant species. She will help with survey methods and any collection permits that may be required. All projects concerning fish species, including the State Threatened Atlantic Sturgeon (*Acipenser oxyrhynchus*) that have been known to occur in the Thames River, should be coordinated with Peter Aarrestad (DEP-Inland Fisheries; 860-424-3474). All other wildlife surveys including the ones proposed for both bats and birds should be coordinated with Julie Victoria (DEP-Wildlife Division; 860-642-7239) or Jenny Dickson (DEP-Wildlife Division; 860-675-8130). Thave sent Section 5 from your report to these department biologists and they will write to you directly if they have any further questions or concerns. Thank you for the opportunity to comment on the Draft Integrated Natural Resources Management Plan. Please contact me if you have further questions at 860-424-3592.

The Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Sincerely.  $\longrightarrow M \cdot Md$ Dawn M. McKay

Biologist/Environmental Analyst

Cc: Richard Conant (Naval Subase, New London) Nancy Murray Jenny Dickson Julie Victoria Peter Aarrestad NDDB File # 12808

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# United States Department of the Interior



FISH AND WILDLIFE SERVICE New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301-5087

Re: Review of the Draft Integrated Natural Resources Management Plan, Naval Submarine Base, New London, Connecticut

July 30, 2003

P. John Markham, Forester Department of the Navy Naval Facilities Engineering Command 1510 Gilbert Street Norfolk, VA 23511-2699

Dear Mr. Markham:

The Service has reviewed the Draft Integrated Natural Resources Management Plan for Naval Submarine Base, New London, Connecticut and provides the following comments in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

We agree with the Navy's goal that natural resource stewardship should be a high priority at the Naval Submarine Base, New London. The Navy has a great opportunity to restore native vegetation currently dominated by invasive phragmites. One restoration opportunity is the wetland area surrounding the tidal pond at Admiral Fife Naval Recreation Area. Another potential restoration area is Wetland Area A, at the Naval Submarine Main Base. These areas would provide more diverse wildlife habitat if restored to native vegetation.

The Navy's resource management goal should be to develop a long-term restoration and protection plan for all of its wetlands and watercourses. In addition to restoring Wetland A and the tidal pond wetlands at Admiral Fife Naval Recreation Area, protection plans should be developed for the Beaverdam Brook wetland area. This wetland area has an Atlantic White Cedar swamp, which is a rare wildlife habitat in Connecticut. The protection plan should also consider providing additional buffer around the wetland complex to adequately protect its functions and values.

The restored wetland located near North Lake is progressing nicely but the planted trees which have died should be replaced. Trees provide food and cover for wildlife and also reduce the amount of nutrients/sedimentation into the wetlands. There should be no tree cutting in or next to any of the wetlands and watercourses located on Naval property. Additionally, lawn-mowing adjacent to the wetlands and watercourses should be reduced or eliminated. This will reduce the need for maintenance, fertilizer and other chemicals. A buffer of native vegetation will greatly enhance the wildlife habitat value of the wetlands and watercourses and improve water quality.

An invasive species survey and control program should be implemented for all Navy property. Once the larger patches of invasives are under control, we recommend that invasive plants such as phragmites and purple loosestrife be removed on a yearly basis.

All waters that drain from the Navy property should be treated with best management practices to protect the water quality of the Thames River. Oil/water separators should be installed on all storm water outlets to wetlands and watercourses. Annual catch basin cleanup should be implemented. This includes cleaning oil from oil/water separators. Any building using or storing potential hazardous materials should implement a plan using best management practices to avoid spills into wetlands and watercourses. For example, a berm or curbing could be placed around any site with the potential to spill hazard materials.

Thank you for the opportunity to provide these comments. If you have any questions, please contact Greg Mannesto of our Rhode Island Field Office at 401-364-9124.

Sincerely yours,

William J. Minkennight

William J. Neidermyer Assistant Supervisor Federal Activities New England Field Office



DEPARTMENT OF THE NAVY COMMANDER, NAVY INSTALLATIONS COMMAND 2713 MITSCHER ROAD, SW ANACOSTIA ANNEX, DC 20373-5802

> 5090 Ser CNIC N45/6U14633 19 April 2006

From: Commander, Navy Installations Command To: Commander, Navy Region Northeast (N8)

- Subj: FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, GROTON, CONNECTICUT
- Ref: (a) Navy Region Northeast ltr 5090. Ser N8/210 of 31 May 05
  - (b) OPNAVINST 5090.1B

Encl: (1) Finding Of No Significant Impact (FONSI)

1. An Environmental Assessment (EA) dated Sep 2003 for the subject action was forwarded by reference (a) for review in accordance with reference (b). It has been determined that preparation of an Environmental Impact Statement (EIS) is not required. Accordingly, it is considered that, with implementation of the following paragraph and any mitigation measures described in enclosure (1), compliance with the National Environmental Policy Act has been effected and, in this regard, the project may be initiated.

2. Per OPNAVINST 5090.1B, the action proponent is responsible for publishing a Notice of Availability (NOA) in the appropriate local newspaper(s) upon receipt of the signed FONSI. The purpose of the NOA is to provide public notification of the FONSI while avoiding the cost of publishing the entire FONSI. As such, the NOA shall be a succinct, one-page or less, synopsis of the FONSI. The NOA shall include the name of the agency, action proponent, title of EA, statement of the proposed action, list of alternatives considered, conclusion, and point of contact with name, telephone number, address, and e-mail address to request copies of the FONSI and/or EA. The NOA shall be published for three consecutive days. If the EA/FONSI includes a signed Conformity Determination, the action proponent must publish the NOA within 30 days of signature. Subj: FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, GROTON, CONNECTICUT

3. Per the CNO Supplemental Environmental Planning Policy, a copy of the final EA must be submitted to CNO (N45) on a CD-ROM all in Adobe Acrobat 5.0 (.PDF) format. The Region shall be the responsible party for forwarding the CD-ROM. The CD-ROM must include the final EA, the signed FONSI, the actual publication of the Notice of Availability or affidavit of publication, a text version of the NOA, signed legal and technical sufficiency documents, and all notification, endorsement and transmittal correspondence letters. Two copies are to be sent to CNO, two copies to CNIC HQ and one copy to the Action Proponent.

4. The Region shall provide, via e-mail, to the CNIC Action Officer, the total cost for the EA document preparation and a list of all consulting and/or cooperating agencies involved with the project. The costs are defined as the funds obligated for payment to a contractor and/or expended for in-house document preparation, government management and contract oversight. All cost data will include a breakdown per fiscal year and whether they were contractor or in-house. This information will be used as part of the fiscal year Program Review Summary to CNO.

5. Questions regarding this FONSI may be directed to Kelli Ackiewicz at 202-433-4960.

Kuliatto

JOYCE A. JATKO By direction

Copy to: NAVFAC (Nicole Pak)

#### DEPARTMENT OF DEFENSE DEPARTMENT OF THE NAVY

#### FINDING OF NO SIGNIFICANT IMPACT FOR DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, NEW LONDON, CONNECTICUT

Pursuant to Council on Environmental Quality regulations (40 CFR parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy has prepared an Environmental Assessment (EA) for the development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Submarine Base (SUBASE) New London, Connecticut. Based on the EA, it has been determined that an Environmental Impact Statement (EIS) is not required for the proposed action.

**Proposed Action:** The purpose of this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997, U. S. Code, Title 16, Conservation, § 670 (a) et seq. In November 1997, the Sikes Act was amended to require the Secretary of Defense to carry out a program to provide for the conservation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement integrated natural resources management plans for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

Alternatives Analyzed: The EA considered the environmental impacts of three alternative actions. Relevant resources that were evaluated for each alternative include ecological resources, cultural resources, air quality, socioeconomics, and land use. FINDING OF NO SIGNIFICANT IMPACT FOR DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, NEW LONDON, CONNECTICUT

The no action alternative (Alternative 1) is the continued implementation of the management objectives and practices currently conducted at SUBASE. The Environmental Program Director (EPD) and the Natural Resources Manager (NRM) are responsible for natural resources management at SUBASE. Stormwater management, surface drainage, and soil erosion and sedimentation control are also primary management issues in the natural resources program at SUBASE. As part of the process for reviewing proposed projects and plans for potential impacts to natural resources, the EPD and NRM are also responsible for ensuring compliance with all applicable environmental regulations. Any new projects described in the proposed INRMP would not be implemented under Alternative 1. The existing management program does not meet the SAIA requirements for an INRMP.

The proposed action (Alternative 2) is to develop and fully implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the proposed INRMP is to implement an ecosystembased natural resources program that provides for conservation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management activities; and provides for sustainable multipurpose uses of natural resources. The proposed INRMP will address and implement land management, forestry, fish and wildlife management, outdoor recreation and environmental awareness, and natural resources program administration. A total of eight ongoing and new management actions and projects are proposed to meet compliance and stewardship objectives for natural resources management at SUBASE.

FINDING OF NO SIGNIFICANT IMPACT FOR DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, NEW LONDON, CONNECTICUT

Alternative 3 consists of limited implementation of the INRMP. Under this alternative, only management activities necessary to achieve compliance with legal requirements, such as the SAIA, Clean Air Act (CAA), Clean Water Act, Endangered Species Act, appropriate state laws, and Executive Orders would be implemented. Although consistent with the Sikes Act and INRMP requirements, this alternative would reduce environmental benefits achieved by full implementation of the INRMP.

Environmental Effects: The EA demonstrated that implementation of the proposed action would result in overall positive impacts to environmental resources. Implementation of engineering design solutions for stormwater and erosion control problem areas will benefit water quality, wetlands, and soils. Urban forestry management activities and implementation of forest inventories will benefit forest resources on SUBASE. Development of wildlife habitat will benefit outdoor recreation and environmental awareness. Protected species surveys will benefit protection and management of threatened and endangered species. Implementation of integrated pest management practices will enhance biodiversity in the area.

In preparing the INRMP, SUBASE has worked in cooperation with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection so the plan will reflect the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on the installation.

**Finding:** Based on the parties' agreement and the analysis presented in the EA, the Department of the Navy finds the implementation of the proposed action will not have a

FINDING OF NO SIGNIFICANT IMPACT FOR DEVELOPMENT AND IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUBMARINE BASE NEW LONDON, NEW LONDON, CONNECTICUT

significant adverse impact on the quality of the human or natural environment or generate significant controversy.

The EA prepared by the Navy addressing this action is on file and may be obtained from: Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street, Norfolk, Virginia 23511-2699 (Attn: Mr. Jack Markham), telephone (757) 322-4882.

6 April 2006

SHEAR G ØR.

Rear Admiral, U.S. Navy Vice Commander, Navy Installations Command


# APPENDIX G. INRMP BENEFITS FOR ENDANGERED SPECIES, CRITICAL HABITAT, AND MIGRATORY BIRDS



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# INRMP BENEFITS FOR ENDANGERED SPECIES, CRITICAL HABITAT, AND MIGRATORY BIRDS

Section 4(a)(3)(B)(i) of the ESA of 1973 prohibits the Secretaries of the Departments of Interior and Commerce from designating as critical habitat any lands or other geographical areas owned or controlled by the DOD, or designated for its use, that are subject to an INRMP prepared pursuant to Section 670a of the Sikes Act (Department of Defense, 2011). This restriction applies if either Secretary determines that a given INRMP provides a benefit to the species for which critical habitat is proposed for designation.

The USFWS uses three criteria to determine if an INRMP provides adequate special management or protection to obviate the need for critical habitat designation:

- 1. The INRMP provides a conservation benefit to the listed species.
- 2. The INRMP provides certainty that relevant agreed-on actions will be implemented.
- 3. The INRMP provides certainty that the conservation effort will be effective.

One federally listed species has been observed on SUBASE NLON: a single Atlantic sturgeon identified through telemetry during nearshore surveys in the summer 2014 and the summer of 2015. (see Section 3.3.7, *Threatened and Endangered Species and Species of Concern*). In addition, bat species are increasingly becoming species of concern. Project #2 instructed the installation to complete a survey to determine if there are any bat species, especially the Northern Long Eared Bat, located on the installation. Acoustic bat surveys conducted in 2018 at three locations documented the presence of seven bat species but neither the northern long-eared bat nor the Indiana bat. This INRMP provides several projects (#'s 1, 2, 6, SS-1, SS- 2, SS-4; see Chapter 5, Appendix C, and Appendix D.5.1) focused on identifying, monitoring, and managing migratory birds and TES. As implemented, these projects will provide key data, information, and habitat restoration activities to identify and maintain possible migratory bird and TES habitats on SUBASE NLON (criterion 1). Appendix C includes the implementation schedule for these conservation efforts (criterion 2). Projects #5 outlines one project plan implementation and Project #24 calls for the required update of this INRMP (criterion 3).

No critical habitat has been proposed or designated for the lands or nearshore waters owned or controlled by SUBASE NLON, relative to any federally listed or candidate species with potential occurrence at SUBASE NLON (described above). Measures included in the INRMP (e.g., to address water quality and soil erosion) will indirectly benefit protected species that occur in the Thames River watershed and Long Island Sound. If future federal listed species occur on SUBASE NLON, the installation might be able to avoid USFWS or NOAA NMFS designation of critical habitat by implementing its INRMP through the execution of appropriate projects and activities, in accordance with the specific timeframes identified in this INRMP.

Federal trust species also include migratory birds. This SUBASE NLON INRMP includes several projects to benefit the conservation and management of migratory birds, including avian surveys (Project #1). Additional habitat restoration activities also will provide migratory bird breeding, wintering, and/or stopover habitats (e.g., Projects #3–5, 8, 10, and 16).



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# APPENDIX H. MEMORANDUMS OF UNDERSTANDING



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## REGIONAL STRANDING INVESTIGATION ASSISTANCE PLAN

## BETWEEN

## NORTHEAST REGION, NATIONAL MARINE FISHERIES SERVICE OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION DEPARTMENT OF COMMERCE AND MID-ATLANTIC REGION, UNITED STATES NAVY DEPARTMENT OF DEFENSE

### I. PURPOSE

The purpose of this Regional Stranding Investigation Assistance Plan (RSIAP or Plan) is to implement the National Memorandum of Understanding (MOU) (Attachment 1). The MOU establishes a framework consistent with federal fiscal law requirements whereby the Navy may assist the National Marine Fisheries Service (NMFS) with the Phase 1 and 2 investigations (See attachment (2) for definition of Phase 1 and 2, USE and MTEs) of uncommon stranding events (USE) during major training exercises (MTE) in specific geographical locations through the provision of in-kind services as specified later in this document. This Plan is intended to act as an instrument to more effectively respond to USEs during MTEs, subject to fiscal and procurement law requirements, and consistent with resource availability, military security, logistical feasibility, and operational or installation commitments. Additionally, this RSIAP ensures the optimum efficiency and maximum benefit to the United States by establishing a framework for cooperation and coordination between NMFS Northeast Region and Mid-Atlantic Region, U.S. Navy (the Parties) on marine mammal health and stranding responsibilities. This Plan is necessary and essential to further the mission of the Parties in that it will serve as an umbrella agreement that sets forth the general terms and conditions under which the Parties may seek cooperative programs and activities.

## II. BACKGROUND

a. Through a National Coordinator and six regional coordinators, NMFS oversees, coordinates, and authorizes marine mammal stranding responses, associated activities and training to personnel. To respond to strandings, volunteer stranding networks have been established in all coastal states and are authorized through Letters of Authority from the NMFS regional offices.

b. Pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules, the National MOU was created to establish a framework whereby the Navy can assist NMFS with Phase 1 and Phase 2 Investigations of USEs during MTEs. The National MOU requires completion of

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RSIAPs for these areas to further identify regional assets that might be requested by NMFS during a USE. In addition, the National MOU requires each RSIAP to identify high priority species based on the USE species identified below:

(1) Uncommon Stranding Event (USE) – A stranding event that takes place during a major training exercise (MTE) and involves any one of the following:

(i) Two or more individuals of any cetacean species (not including mother/calf pairs), unless of species of concern listed in the next subparagraph found dead or live on shore within a 2-day period and occurring within 30 miles of one another.

(ii) A single individual or mother/calf pair of any of the following marine mammals of concern: beaked whale of any species, dwarf or pygmy sperm whales, melon-headed whales, pilot whales, right whales, humpback whales, sperm whales, blue whales, fin whales, or sei whales.

(iii) A group of 2 or more cetaceans of any species exhibiting indicators of distress.

## **III. AUTHORITIES**

a. NMFS and Navy regions are authorized to enter into RSIAPs pursuant to the Marine Mammal Protection Act, 16 U.S.C. § 1361 et seq., and other authorities, as described in the National MOU (See paragraphs 3 & 5.e. of MOU).

 b. The Economy Act, 31 U.S.C. § 1535, which provides that an agency may place an order with a major organizational unit within the same agency or another agency for goods or services if: (A) Amounts are available:

(B) The ordering agency decides the order is in the best interest of the United States Government;

(C) The agency to fill the order is able to provide or get by contract the ordered goods or services; and

(D) The agency decides ordered goods or services cannot be provided by contract as conveniently or cheaply by a commercial enterprise (payments must be made on the basis of the actual cost of goods or services provided)

## IV. SCOPE

# a. INSTALLATIONS AND POCs FOR EACH INSTALLATION.

This Regional Stranding Investigation Assistance Plan is intended to address an agreement between Navy Region MIDLANT and NMFS Northeast Region. Navy installations covered by this agreement include the following:

2





Cheatham Annex,

Yorktown, VA

POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail; <u>trevor.manning@navy.mil</u> and (PWO) LT Trevor Bingham, telephone 757-887-4636, email; trevor.bingham@navy.mil



 Naval Weapons Station (NWS) Yorktown, Yorktown, VA POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail; <u>trevor.manning@navy.mil</u> and (PWO) LT Trevor Bingham, telephone 757-887-4636, email; trevor.bingham@navy.mil

3



 Naval Station Norfolk, Norfolk, VA POC: Sharon Bauman (IEPD), telephone 757-341-0523, email; Sharon.bauman@navy.mil and (Port Ops) LCDR Morris Oxendine, telephone 757-442-0942, email; morris.oxendine@navy.mil



4. Norfolk Naval Shipyard, Portsmouth, VA POC: Valerie Walker (IEPD), telephone 757 396-8270, email; <u>valerie.walker@navy.mil</u>.



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5. Craney Island Fuel Depot, Portsmouth, VA POC: Caren Hendrickson, telephone 757-445-3113, email; caren.hendrickson@navy.mil.



 St. Julian's Creek Annex, Portsmouth, VA POC: Valerie Walker (IEPD), telephone 757-396-8270, email; <u>Valerie.walker@navy.mil</u>



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 Joint Expeditionary Base Little Creek-Fort Story POC: Sharon Waligora (IEPD), telephone 757-462-5350, email; <u>Sharon.waligora@navy.mil</u>

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757-433-2151, Cell 757-635-5436

8. Dam Neck Annex, Virginia Beach, VA POC's: Michael Wright (NRS), telephone 4757-433-3461, cell 757-373-8531, email; Michael.wright@navy.mil and Conservation Law Enforcement Officer (CLEO), telephone

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9. Naval Weapons Station (NWS) Earle, Earle, NJ

POC: Eric Helms, telephone 732-866-2540, email; <u>eric.helms@navy.mil</u> and LCDR Matthew Tolhurst (PWO), telephone 732-866-2317, email: <u>matthew.tolhurst@navy.mil</u>



 Naval Submarine Base New London, Groton, CT POC: Michael Brown (IEPD), telephone 860-694-3976, email; michael.brown13@navy.mil



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11. Naval Station Newport, Newport, RI

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12. Portsmouth Naval Shipyard, Kittery, ME POC: Ian Trefry (NRM), telephone 207-438-4362, email: <u>ian.trefry@navy.mil</u> and Lisa Joy (IEPD), telephone 207-438-4707, email: <u>lisa.joy@navy.mil</u>.



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 Naval Computer and Telecommunications (NCTAMS) Cutler, Cutler, ME POC: Ian Trefry (NRM), telephone 207-438-4362, email: <u>ian.trefry@navy.mil</u> and Clifford "Mark" Staggs (EPS), telephone 207-259-8282, email: <u>clifford.staggs@navy.mil</u>

## V. GOALS AND OBJECTIVES

a. The Fleets and NMFS have developed a Stranding Protocol and Communication Plan that includes a flowchart with points of contact if a USE occurs. This is a related but separate requirement that remains unaffected by this document. This Plan is being developed to provide a consistent process for Navy support for Marine Mammal Stranding Investigations and Assistance when there is a USE during a MTE. This process may enable scientists to obtain better data on mechanisms involved in a marine mammal stranding.

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b. Subject to the limitations in paragraph VI of this Plan, the Parties agree to cooperate on stranding response and investigations through the use of U.S. Navy and NMFS in-kind services when available. In-kind services by installation may include:

## 1. Cheatham Annex

- GROUND VEHICLES: Three front end loaders, 3 backhoes, 1 rubber tire excavator, 1 track excavator, and 2 skid steer loaders.
- PERSONNEL: Five equipment operators, as well as escorts to locations of stranding occurrences on the installation.

## 2. Naval Weapons Station Yorktown

- Same resources as Cheatham Annex.
- 3. Naval Station Norfolk (NSN)
- PERSONNEL: Operators for equipment listed below.
- BOATS: NSN can provide 1 small service boat.
- GROUND VEHICLES: NSN has four 6K forklifts and 2 pickup trucks.
- ACCESS TO BASE: The IEPD contact will provide Security with the information of who will be responding (agency and/or individual, and an example of a badge, if possible) and security will ensure they obtain access.

## 4. Norfolk Naval Shipyard (NNSY)

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

## 5. Craney Island Fuel Depot

• ACCESS TO BASE: Coordinate with installation POC Caren Hendrickson.

## 6. St. Julian's Creek Annex

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

## 7. Joint Expeditionary Base Little Creek-Fort Story

- · No resources identified at this time.
- 8. Dam Neck Annex

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• The Command Duty Office (CDO) will assist with locating and obtaining equipment. The CDO is manned 24 hours a day and can be reached by telephone at 757-433-2366.

## 9. NWS Earle

- ACCESS TO BASE: Temporary access can be coordinated on a case by case basis in accordance with the needs of the stranding response.
- BOATS: Vessels and operators are available for sighting animals in the vicinity of the Earle piers. Other small vessels may be available.
- GROUND VEHICLES: Cranes, backhoes, and frontend loaders are available. Personnel transport vehicles are available as well as dump trucks and flatbed trucks.
- PERSONNEL: Heavy equipment operators are available and security personnel are available on a case by case basis.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, and cargo nets available. The installation has a waste disposal contract if dumpsters need to be requested.

## 10. Subase New London

- GROUND VEHICLES: New London can offer 1 tractor trailer and flat bed truck and one landing craft mechanized (LCM) boat.
- ACCESS TO BASE: Contact Michael Brown, IEPD, for installation access.

## 11. Naval Station Newport

- Naval Station Newport has a current memorandum of agreement (MOA) with the NMFS NERO (Attachment 2). All protocols specified in the MOU will be adhered to and this MOA provides the following information:
- ACCESS TO BASE: The NMFS will be granted base access to perform necropsies at the Stillwater Basin boat ramp and parking lot, contingent upon ramp operations, and the beaches as a backup necropsy site. NMFS will be allowed to bring a vessel into the installation's restricted waters provided it stays 100 feet from any Navy or Coast Guard vessel. Security must be notified 3 days in advance of NMFS intentions to come onto the installation, except in emergency situations. Installation and/or security POCs will assist NFMS in obtaining the necessary camera and equipment passes.

## 12. Portsmouth Naval Shipyard

- ACCESS TO BASE: There is a landing site at Jamaica Island Beach and a temporary response set up location can be available at Jamaica Island.
- Anti-Terrorism Office (ATO) may be able to provide tug boat assistance provided mission requirements are not compromised. The Facility Response Team (FRT) has several small vessels available for nearshore operations.
- GROUND VEHICLES: Bob Landry (Transportation), phone 207-438-5557 may be able to secure an excavator, skid-steer, rubber tire crane, flat bed trucks, and/or passenger vans (for personnel transport).
- PERSONNEL: Heavy equipment operators, public relations coordination, enforcement, labor.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, shackles, and life jackets.

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## 13. NCTAMS Cutler

- ACCESS TO BASE: There are landing sites at Davis Beach, Little Holly Cove, and Little Machias Bay Coastline. A temporary response set up location can be available at the old Coast Guard Landing Area, Davis Beach, and Little Holly Cove.
- PERSONNEL: Enforcement and general labor.

c. The Parties agree to share data (as clearance procedures allow) relevant to projects and activities conducted under this plan pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules.

d. The Parties recognize that NMFS possesses limited marine mammal stranding response and investigation resources and may not be in a position to fully implement all of the tests and procedures listed as part of Phase 1 and Phase 2 Investigations. If NMFS identifies that specific tests, procedures, or analyses are needed to complete Phase 1 and Phase 2 Investigations, NMFS may request assistance from the Navy to do so. NMFS and the Navy may enter into additional implementing agreements to authorize the Navy to transfer funds to NMFS consistent with federal fiscal law, to support the implementation of the necessary investigational procedures/tests/analyses.

e. As soon as practical, upon completion of a project or activity year, NMFS agrees to provide an accounting of each project's expenditures for projects or activities with applicable statutes, regulations, and policies.

f. The Parties will meet annually in March to discuss the implementation and progress of the prior year(s) projects and activities, provide contact updates, and submit a report documenting data collected supported by this MOU. A template will be developed for submitting the annual report. The plan will be reviewed during the annual meeting for operation and effect.

g. NMFS will work with Navy POCs to ensure Navy personnel providing assistance have knowledge and expertise consistent with NMFS' stranding response protocols, procedures and guidelines.

## VI. LIMITATIONS

This RSIAP is meant to serve as a regional framework for cooperation between the U.S. Navy and NMFS for assistance and response related to USEs during MTEs. Actions or activities agreed to in this Plan may not exceed the agreement between the Navy and NMFS in the National MOU. Nothing in this Plan obligates either Party to expend appropriations, provide inkind services or equipment, or enter into any contract or other obligation. Projects or activities conducted under this Plan must comply with all applicable statutes and regulations, including those statutes and regulations applicable to procurement and the Economy Act, further, the projects or activities are contingent upon resource availability and logistic feasibility and must not negatively affect Navy operational or installation commitments or military security.



SIGNATURES

Rear Admiral Dixon R. Smith Commander, Navy Region Mid-Atlantic

1/17/14 Date

MFS Northeast Regional Administrator JOHN BULLARD

 $\frac{11/21/13}{\text{Date}}$ 

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# APPENDIX I. EDUCATIONAL BROCHURE EXAMPLES



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### Toolkit to Address Free-ranging Domestic Cats (*Felis catus*) on Agency Lands Managed for Native Wildlife and Ecosystem Health

Editors: Sara H. Schweitzer, North Carolina Wildlife Resources Commission & Colin M. Gillin, Oregon Department of Fish and Wildlife

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#### AFWA Feral and Free-ranging Cat Working Group

Chair: Dr. Sara H. Schweitzer, North Carolina Wildlife Resources Commission Vice-Chair: Dr. Colin M. Gillin, Oregon Department of Fish and Wildlife

### AFWA Committees represented in Working Group Bird Conservation Committee Education, Outreach, and Diversity Committee

Fish and Wildlife Health Committee Invasive Species Committee Legal Committee

Suggested citation: Schweitzer, S.H., and C.M. Gillin (eds.) 2020. Toolkit to Address Free-ranging Domestic Cats (Felis catus) on Agency Lands Managed for Native Wildlife and Ecosystem Health. 32 pages.

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Naval Submarine Base New London





# **EXECUTIVE SUMMARY**

The Association of Fish and Wildlife Agencies (AFWA) developed this toolkit to provide guidance to fish and wildlife agencies as they address free-ranging domestic cats (*Felis catus*) on agency lands managed for native wildlife and ecosystem health. Topics in this document include wildlife conservation, infectious diseases, legal issues, education and outreach, human dimensions, partnerships, management strategies, and model regulatory and legal language. This toolkit is not intended to be prescriptive or to mandate any actions by agencies at the state, federal, tribal, or territorial level. Instead, this document should be regarded as a set of recommendations for agencies and other landowners to consider as they develop or revise their own programs.

This toolkit was developed with input from many wildlife conservation professionals, representing a variety of state, federal, and non-governmental partners across North America, actively engaged in this issue and AFWA Working Group. The content includes the best available peer-reviewed science and guidance based on compassion for the well-being of wildlife, native habitats, domestic animals, and people.

### **APPENDIX I**

Naval Submarine Base New London



# INTRODUCTION

Impacts of invasive species are among the leading, modern, natural resources conservation challenges. Globally, invasive species are one of the main drivers of blodiversity loss, and the associated disruption of ecosystems can undermine valuable ecosystem services (Doherty et al. 2016; Walsh et al. 2016). Invasive species in the United States alone have been estimated to cause nearly \$120 billion in economic damages annually (Pimentel et al. 2005). Consequently, to manage public trust resources effectively, control of invasive species is sesential.

One of the world's most hamful invasive species is the domestic cat (*Felix catus*, Lowe et al. 2000, Western Governors Association 2018). Since domestication in the Near East approximately 10,000 years ago, cats have been introduced by people to new environments across the globe (Driscell et al. 2007, Medine et al. 2011). Where domestic cats – whether owned or unowned – have been permitted to roam the landscape (i.e., free-ranging) the consequences of these introductions have been detrimental to wildlife and the environment. In this toolkit, we

use the term "free-ranging domestic cats" to refer to all domestic cats, regardless of ownership status, that are outdoors and not under the control of people.

Management of domestic cats is necessary to ensure the integrity of natural resources. The Association of Fish and Wildlife Agencies recognized this fact in a 1997 resolution, acknowledging "cat predation as an important inimical factor affecting wildlife that resources agencies are charged to manage" (AFWA 1997). Nevertheless, proportionate resources to assist agencies with this management need are not widely available.

Our objective was to develop a set of resources and recommended management practices based on the best available science to be used as a guideline for fish and wildlife agencies to effectively and appropriately address domestic cat impacts on agency lands managed for wildlife conservation and ecosystem health. We review resources on key issues, including predation of wildlife, domestic cat diseases, and legal and policy constraints, and make recommendations intended to assist agency staff.



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# **IMPACTS ON WILDLIFE**

As obligate carnivores, domestic cats are skilled and instinctive predators that have contributed to the extinction of at least 63 species, which accounts for 26% of all bird mammal, and reptile extinctions in the modern era (Doherty et al. 2016). In Australia, domestic cats kill an estimated 377 million birds and 1.14 billion mammals annually (Woinarski et al. 2017, Murphy et al. 2019) and are a leading cause of native mammal extinctions (Woinarski et al. 2015). In Canada, an estimated 204 million birds are killed by cats annually (Blancher 2013). In the United States, domestic cats kill an estimated 2.4 billion birds and 12.3 billion mammals each year (Loss et al. 2013). Domestic cats are the greatest direct, anthropogenic threat to birds in the United States and Canada, and their impacts are magnified by the fact that even well-fed domestic cats will hunt and kill wildlife (Blancher 2013, Loss et al. 2013, Loyd et al. 2013, Loss et al. 2015). The annual economic damage caused by free-ranging domestic cat predation on birds in the United States alone has been estimated at \$17 billion (Pimentel et al. 2005).

Domestic cats may also impact wildlife through indirect effects such as competition for resources, transmission of infectious agents (viruses, bacteria, and parasites) that can cause disease directly or by environmental contamination (see Domestic Cat Diseases), and hybridization (Medina et al. 2014). For example, domestic cats may compete with native predators for scarce resources, especially where there is close dietary overlap (George 1974; Biró et al. 2004, 2005; Medina et al. 2014; Széles et al. 2018). Predation of wildlife may also result in trophic cascades that indirectly affect one species through competitive release of another (Hawkins et al. 2004).

Additionally, domestic cats in the environment can modify the behavior of native wildlife, and these modifications may affect conservation outcomes. Domestic cat presence may alter migratory bird habitat use on the wintering grounds and selection of nesting sites (Marks and Redmond 1994, Ratcliffe et al. 2009). Domestic cat presence may also modify fecundity through the ecology of fear (Beckerman et al. 2007), Bonnington et al. (2013). for example, observed that the mere presence of a domestic cat in the environment was sufficient to reduce the amount of food provided to chicks in the nest and increase the likelihood of predation by another predator.

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### APPENDIX I

Naval Submarine Base New London



# DOMESTIC CAT DISEASES

Free-ranging domestic cats present disease concerns due to the health and welfare risks to individual domestic cats and consequential impacts on the health and welfare of other animals (both domestic and wild), humans, and our shared environment. Some agencies have adopted a "One Health" approach for managing such risks. One Health is "the concept that humans, animals, and the world we live in are inextricably linked" and "the collaborative effort of multiple disciplines working locally, nationally, and globally to attain optimal health of people, animals, and the environment" (AAWV 2017, AVMA 2020). A One Health approach that accounts for linkages among humans, animals, and the environment, and promotes meaningful engagement among human and veterinary medical professionals, wildlife stewards, and land/habitat management, is warranted for managing free-ranging domestic cat risks.

Compared to domestic cats maintained indoors, free-ranging domestic cats experience higher risks of viral, bacterial, fungal, and parasitic diseases due to their free-ranging behavior and uncontrolled environmental interactions (e.g., Chalkowski et al. 2019). Domestic cat diseases may be transmitted by pathogens persisting in the environment (soil, water, air) or through direct contact, and many are also zoonotic with public health consequences. Understanding the routes of pathogen transmission of these diseases is critical to developing intervention strategies that prevent or mitigate disease exposure risks, and the table in Appendix I summarizes these relevant diseases, their common routes of transmission, and control measures.

While prevention and control measures such as vaccination, antibiotics, or topical flea and tick treatments are available for owned domestic cats that can be properly medicated, health management of free-ranging domestic cats unaccustomed to human contact can present significant challenges. Repeated attempts to capture, handle, and administer treatments, including booster vaccinations, are often unsuccessful and may pose risk of injury or disease exposure to handlers. Frequent re-exposure and reinfection of these free-ranging domestic cats by viral or bacterial pathogens and parasites in the environment further exacerbate control effort challenges.

The challenges of disease control notwithstanding, the following examples illustrate the various routes of transmission for key pathogens reported in free-ranging domestic cats to highlight suspected and known disease spillover into wildlife or zoonotic disease exposure to humans. Disease control efforts should be targeted at these interfaces.

#### Aerosol

Viral diseases such as type-A influenza viruses (e.g., avian, swine) and coronaviruses (e.g., SARS-CoV-1, SARS-CoV-2, feline infectious peritonitis) can be transmitted by aerosolized ocular-nasal and oral discharges or by ingestion of infected prey/food. The novel SARS-CoV-2 coronavirus, for example, has caused infections in domestic cats, and the virus has subsequently been transmitted laterally (Halfmann et al. 2020, Shi et al. 2020). Domestic cats may also be exposed through close contact with people (ProMED Archive Number: 2020/422.7256272). While the susceptibility to and sustained transmission of SARS-CoV-2 in wild felids from domestic cats is not yet known, the potential warrants further investigation (AFWA 2020).

Bordetella bronchiseptica is a species of bacteria that may be found in the respiratory tracts of domestic cats with or without signs of disease. Its prevalence is much higher in domestic cats that live in dense concentrations such as catteries or animal shelters and, thus, may be particularly problematic where free-ranging domestic cats concentrate at a localized resource (Goldstein and Abrahamian 2015).

#### Vector-borne

Vector-borne diseases are very common in free-ranging domestic cats due to continued exposure to fleas, ticks, and mosquitose, especially for those domestic cats without routine, preventive pesticide treatments. Plague, tularemia, bartonellosis, rickettsial diseases, and tapeworms (*Dipylidium caninum*) are transmitted by fleas (McEIroy et al. 2010, Lappin et al. 2019). Enrichiosis, anaplasmosis, babesiosis, cytauzoonosis, hemobartonellosis, and borreliosis (Lyme disease) are transmitted by ticks (Lappin 2018, Lappin et al. 2019). West Nile Virus is transmitted by mosquitoes, but this disease has not yet been reported in domestic cats.

Many of these vector-borne diseases may cause fatal or chronic infections in free-ranging domestic cats, and free-ranging domestic cats may expose people and other animals to the fleas and ticks that transmit these diseases (Lappin et al. 2019). Riley et al. (2004), for example, reported high seroprevalence in bobcast (*Lynx rufus*) for *Bartonella henselae* (bartonellosis) and *Toxoplasma gondii* (toxoplasmosis) in rural and urban zona in association with proximity to domestic cats and humans.

#### Figure 1

Life cycle of Toxoplasma gondii and transmission pathways in humans, domestic animals, and wildlife (modified from Aguirre et al. 2019). Figure used with permission from authors.







The recovery of endangered southem sea otters (Enhydra lutris nervers) on the California coast has been impeded by contamination of the environment with *Toxoplasma gondii* oocysts. A series of studies identified *T. gondii* infection among otters and contamination of the marine ecosystem and determined that oocysts from the terrestrial environment were flowing into the marine environment and causing otter fatalities and sub-lethal effects (e.g., Miller et al. 2002, Kreuder et al. 2003, Johnson et al. 2009, Fig. 2). Dabritz et al. (2006) determined that 44% of more

et al. (2006) betermined that 44% of more than 9,000 domestic cats in one region of California defecated outside more than 75% of the time and estimated that each domestic cat deposited approximately 40 g of feces into the environment each day, potentially serving as a major route of transmission. VanWormer et al. (2013a) went on to determine that mountain lions (*Panthera concolor*), bobcats, and "unmanaged" feral domestic cats had very high *T. gondii* exposure prevalence (73-81%). Nevertheless, despite lower exposure prevalence (17%) among "managed" feral domestic cats, both managed feral domestic cats and pet domestic cats likely contributed more oocysts to the environment due to their much greater abundance (VanWormer et al. 2013a).

#### Figure 2

Environmental transmission pathway of *Toxoplasma* gondii from terrestrial to marine ecosystems (VanWormer et al. 2013b).



#### Oral

Viral diseases, such as feline infectious peritonitis, feline panleukopenia, pseudorabies, avian influenza, and SARS, are transmitted via the fecal-oral route or by ingestion of infected prey. Bacterial diseases, such as giardiasis, cryptosporidiosis, campylobaceteriosis, salmonellosis, and helicobacter, are transmitted by ingestion of contaminated feces, water, and food. Endoparasites (e.g., roundworms, hookworms) have a direct life cycle and are transmitted by ingestion of contaminated feces. Other endoparasites (e.g., tapeworms, flukes) have a more complicated life cycle requiring ingestion of prey animals serving as intermediate hosts.

Domestic cats and other felines are the definitive host of the protozoan parasite T. gondii, and domestic cats are a source of direct and indirect infection to themselves (auto-infection), other animals, and people (Dabritz et al. 2008, Dubey and Jones 2008, Aguirre et al. 2019). Domestic cats or other felines are necessary for the sexual reproduction of T gondii, which is then excreted into the environment in the form of occysts. Other animals (intermediate hosts) are then infected by ingesting these occysts from contaminated surfaces or by consuming animals that have been infected (Dubey and Jones 2008, Aguirre et al. 2019, Fig. 1). Humans are primarily infected by consuming infected tissues in undercooked meat or from exposure to occyst-contaminated environments (e.g., garden soil; Gerhold and Jessup 2013, Aguirre et al. 2019). Recent studies have found that rainfall and runoff have contributed to occyst contamination in aquatic and marine systems, resulting in subclinical, latent, or lethal infections in wildlife (e.g., seals, dolphins, otters; Aguirre et al. 2019). The diversity of infection pathways and variety of at-risk species necessitates a One Health approach. to mitigating T. gondii risks (Aguirre et al. 2019; Fig. 1).

#### **Direct Contact**

Bites, scratches, and skin abrasions are routes of transmission of viral diseases (e.g., rables, feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), hematozoal disease (babesiosis), bacterial diseases (pasteurellosis), and fungal diseases (e.g., sporotrichosis, dermatophytosis/ringworm; Goldstein and Abrahamian 2015). Many of these diseases pose a significant public health risk and can be spread to other domestic or wild animals. Rables, in particular; is a preventable disease by prophytactic vaccination of animals and people at risk of exposure. Approximately 5,000 animals per year test positive for rables in the United States (Wa et al. 2020).

Although domestic animals account for less than 10% of all rabid animals in the United States, domestic cats have consistently been the top source of rabies among domestic animals in recent years and are disproportionately more likely to expose people to the disease than wildlife (Goldstein and Abrahamian 2015, Roebling et al. 2014). Multiple studies have associated human exposure with free-ranging domestic cats purposely maintained outdoors and often lacking stringent rables vaccination adherence, which places a burden on local authorities to capture and euthanize domestic cats to protect animal and public health (Gerhold and Jessup 2013, Taetzsch et al. 2018). Any management of free-ranging domestic cats must account for these risks and follow standard veterinary practice and the National Association of State Public Health Veterinarians (NASPHV) rables compendium guidelines, including the administration of regular booster vaccinations (NASPHV 2016).

Over the last 20 years, FeLV and antibody titers indicative of infection have been detected in Florida panthers (Puma concolor corvi) and other wild felids in different regions of the United States, Based on genotyping, the FeLV strains isolated from Florida panthers appeared related to virulent domestic cat strains. This relationship has often been observed when panthers are near urban-wildland interfaces where exposure to free-ranging domestic cats is likely to occur (Cunningham et al. 2008, Chiu et al. 2019). Further investigations on the source of FeLV infection in panthers provided evidence to suggest that consumption of FeLV-infected domestic cats would be an effective way to transmit the virus. During necropsies, domestic cat remains have been found in stomachs of mountain lions from California and Colorado, especially near urban locations (Jessup et al. 1993, Chiu et al. 2019). Subsequently, the virus began to spread with the mountain lion population (Cunningham 2008). Several Rocky Mountain populations of mountain lions were also found to be endemic for feline immunodeficiency virus (FIV) and feline parvovirus (FPV) based on serologic analysis (Biek et al. 2006).

The control and management of free-ranging domestic cats should be of concern to wildlife management, public health agencies, and animal welfare groups (AAWV 1996). Furthermore, wildlife managers and other animal health and welfare professionals must have situational awareness of biohazards and zoonotic diseases when performing work activities. It is important to conduct a job hazard analysis to identify potential hazards and list corresponding risk mitigation efforts, including always following personal hygiene and biosafety protocols, receiving relevant pre-exposure vaccinations (e.g., rabies), and using appropriate personal protective equipment when handling live animals and working in known or potentially pathogen-contaminated environments.

### **APPENDIX I**

### Naval Submarine Base New London





A strategic approach used to control the spread of Feline Leukemia Virus (FeLV) in the endangered Florida panther population was to implement targeted FeLV vaccination first on the core infected population (northern range) followed by expanding vaccination throughout the panther range, as described in Cunningham et al. (2008). An initial vaccine pilot study was conducted on three captive sub-adult panthers to evaluate any adverse reactions: none were identified. These vaccinated animals were released to their core home range, Subsequently, 52 free-ranging, FeLV-negative panthers received at least one vaccination, and 26 of those received a booster. None of the FeLV-vaccinated panthers became infected, and FeLV monitoring of the population has continued. Test-removal of FeLV-infected panthers was eventually included in the disease management plan, which had been shown to be beneficial in closed domestic cat populations. The spread of FeLV may also pose a threat to other listed cats like the jaquar (Panthera onca), lynx (Lynx canadensis), and ocelot (Leopardus pardalis).





Governmental agencies and public or private organizations need to communicate and coordinate on how to humanely regulate and control free-ranging domestic cats on public lands managed for the conservation of native species and ecosystem health.

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# **LEGAL ISSUES**

Legal challenges associated with free-ranging domestic cats have arisen across federal, state, and local jurisdictions and included claims regarding physical injury, threats to property, and threats to wildlife. Many of these legal claims have included the regulation of "colonies" of domestic cats as part of trap, neuter, release (TNR) programs. It will be beneficial for wildlife conservation agencies to review the cases presented below to better understand their potential legal liabilities and responsibilities relative to free-ranging domestic cat managemet. These cases represent an emerging legal issue.

A central theme in litigation concerning free-ranging domestic cats is whether regulation falls within a municipality's traditional responsibility for affairs that are "local in nature rather than State or national." See County of Cook v. Village of Bridgeview, 8 N.E.3d 1275, 1278-81 (III, App. Ct. 2014). A 2014 Illinois appellate court looked through the lens of state and county disease control and held that domestic cats are not a purely local issue. Id. at 1279. Based on the limits of the village's home rule authority under Illinois's constitution, as well as the state's and counties' historical roles in animal health and diseases prevention, the court ruled that a county ordinance permitting TNR prevailed over a village ordinance prohibiting it. Id at 1279-80. A New Mexico appellate court upheld the City of Albuquerque's TNR program against a petition for writ of mandamus because the petitioner had not exhausted her potential remedies. Britton v. Bruin, 2016 WL 1018213 (N.M. Ct. App. Feb. 22, 2016). This narrow ruling avoided deciding whether the two ordinances conflicted. Id at \*5.

Responsibilities regarding natural resources are another emergent theme to filed litigation, and claims have been filed at both the state and federal levels. In one case, plaintiffs in California successfully challenged a Los Angeles TNR program that had failed to comply with the California Environmental Quality Act (CEQA). Defendants were enjoined from implementing the TNR program unless and until they had completed the required environmental review. Urban Wildlands Group v. City of Los Angeles, No. B222696 (unpublished) (Cal. Ct. App. 2d Dec. 6, 2010) (upholding the lower court's injunction on the City's operation of the TNR program until completion of CEQA review).

At the federal level, the U.S. Fish and Wildlife Service has repeatedly suggested that domestic cat impacts may be in violation of the Migratory Bird Treaty Act and the Endangered Species Act (ESA; FWS 2006, 2009, 2014). The principal case on point is a lawsuit filed by the American Bird Conservancy under the ESA against the Commissioner of the New York Office of Parks, Recreation, and Historic Preservation for facilitating the maintenance of free-ranging domestic cats at a state park on Long Island near nesting piping plovers (*Charadrius melodus*), which are a federally threatened species. American Bifd Conservancy v. Harvey, 2:16-cv-01582-ADS-AKT at \*6-\*7 (E.D.N.Y Feb. 6, 2017) (denying the Parks Office's motion to dismiss). It is relatively uncommon for an ESA take claim to involve a state agency's inaction or omission, but the presiding judge found as follows:

If...the Parks Office is the only entity authorized to remove the feral cats from Jones Beach, and the only entity authorized to control access of members of the public to the area to build shelters and/or feed feral cats...then the Commissioner's failure to take such measures represents the causative link needed to connect her actions and/or inactions to the Plaintiffs' harm.

#### Id. at \*21.

The Court also found a "broad affirmative duty to take such measures as are reasonably necessary to protect threatened species within [a governmental agency's] jurisdiction." Id. at \*25.\*26. A settlement in 2018 resulted in trapping and removing the domestic cats at Jones Beach State Park to an offsite sanctuary and requires the ongoing removal of any new free-ranging domestic cats in the park. Am. Bird Conserv., Jones Beach Legal Settlement Provides Safety for Endangered Birds (Aug. 8, 2018), available at https://abcbirds.org/article/jonesbeach-legal-settlement-provides-safety-for-endangered birds/ (dat accessed June 30, 2020).

We have summarized the relevant case law below in chronological order by decision year.

#### Urban Wildlands v City of Los Angeles | Filed: 2008 | Ruling: 2010 State: California

A coalition of conservation non-profits, led by The Urban Wildlands Group, sued the City of Los Angeles alleging that the City's new TNR program could not be implemented without environmental review under CEQA. The court agreed and enjoined the implementation of TNR until an environmental review had been completed.

#### State of Hawai'i v Krister Garcia | Filed: 2011 | Ruling: 2011

### State: Hawai'i

The State of Hawai'i charged Krister Garcia with animal cruelty for shooting feral domestic cats on Maui. The defense argued that the feral domestic cats did not qualify as a "pet animal" and were not covered by animal cruelty statute. The court rejected the argument, and the defendant ultimately pled quilty.

#### County of Cook v Village of Bridgeview | Filed: 2014 | Ruling: 2014 State: Illinois

Cook County filed suit against the Village of Bridgeview for prohibiting feral domestic cat colonies within its boundaries despite a county ordinance that permitted TNR. The County alleged that the village's ordinance impinged upon its statutory authority. The Court agreed

#### and enjoined the village from enforcing its ordinance. Britton v Bruin | Filed: 2013 | Ruling: 2016 State: New Mexico

Albuquerque, NM, resident Marcy Britton filed a Petition for Writ of Mandamus against the City of Albuquerque alleging that the City's TNR policy for domestic cats violated the City's Humane and Ethical Animal Rules and Treatment ordinance and the state's animal cruelty statutes. The Writ of Mandamus was denied by the District Court because "even if the TNR program [were] Illegal, other remedies were available to Petitioner short of the drastic remedy of mandamus." A Court of Appeals affirmed the decision "without deciding that the TNR program was a serious violation of the law."

#### Quail Village Homeowners Association v Janice Rossell | Filed: 2013 | Ruling: 2018

#### State: Delaware

The Quail Village Homeowners Association in Camden-Wyoming, DE, filed a complaint in the Delaware Court of Chancery against resident Janice Rossell alleging that her keeping of feral domestic cats in structures on the property violated deed restrictions regarding building structures. The Court agreed and granted injunctive relief to the plaintiffs.

#### ABC v Rose Harvey | Filed: 2016 | Settled: 2018 State: New York

American Bird Conservancy, a 501(c)(3) non-profit organization, sued the New York State Office of Parks, Recreation, and Historic Preservation for violating the Endangered Species Act by facilitating feral domestic cat colonies at Jones Beach State Park, which threatened piping plovers. In the court-ordered settlement, the State agreed to enclose or remove all the cats and to prohibit cat colonies in the future.

#### Alence v Hillsborough County | Filed: 2017 | Ruling: 2018 State: Florida

Veterinarian Ellen Alence sued Hillsborough County, FL, on the ground that its TNR policy, which exempted eartipped domestic cats from rables booster requirements, violated state law. The Court disagreed and dismissed the suit

#### Inks v Gaydos-Behanna Kennel | Filed: 2018 | Ruling: TBD State: Pennsylvania

Allegheny County, PA, resident Jennifer Inks sued the Gaydos-Behanna Kennel, which is the contracted animal control provider for Liberty Burough, PA, alleging negligence following multiple attacks by a rabid feral domestic cat. The case is ongoing.

# Winrock Villas Condominium Association v City of Albuquerque | Filed: 2018 | Ruling:

### State: New Mexico

The Winrock Villas Condominium Association sued the City of Albuquerque, NM, alleging that its TNR policy was a public nuisance. The case was dropped following turnover within the Association leadership.

#### Britton v Keller | Filed: 2019 | Ruling: 2020; currently under appeal (as of June 2020) State: New Mexico

Albuquerque, NM, resident Marcy Britton sued the City of Albuquerque in federal court, alleging that the City's TNR program is a violation of the Takings Clause of the fifth amendment and state law (nuisance and trespass). The federal claim was dismissed, and the court elected not to exercise supplemental jurisdiction over remaining state claims.

#### Bischoff v Crazy Crab | Filed: 2019 | Ruling: TBD State: South Carolina

Beaufort County, SC, residents Stephen and Barbara Bischoff sued The Crazy Crab for damages due to injuries inflicted by a feral domestic cat living at The Crazy Crab restaurant. The Plaintiffs assert that the defendants "failed to properly warn its customers or take appropriate action to address the dangerous condition." The case is ongoing.

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## APPENDIX I Naval Submarine Base New London



# **HUMAN DIMENSIONS**

The presence of free-ranging domestic cats on wildlife conservation lands is often directly or indirectly connected to human behaviors. For example, free-ranging domestic cat presence may be caused or contributed to by human abandonment of domestic cats, intentional or accidental feeding or sheltering, or permitting owned domestic cats to roam freely. Consequently, considering the various perspectives, values, and beliefs of diverse stakeholders, including those individuals whose behavior may contribute to domestic cat presence and those who may have an interest in management outcomes, is essential to achieving lasting management success.

Human attitudes toward domestic cats are context-specific, and these contexts can influence public perceptions. of various risks and support of management actions. Whereas free-ranging domestic cats may be characterized as invasive in a wildlife conservation context, some members of the public or animal welfare organizations may instead view these animals as homeless pets (Leong et al. 2020), and these different perspectives can influence preferred management strategies (Farnworth et al. 2011, Lohr and Lepczyk 2014). Public opinions about domestic cats and their management are often split complex and internally contradictory, as has been observed in Florida (Wald and Jacobson 2013, 2014), Georgia (Loyd and Hernandez 2012), Illinois (Loyd and Miller 2010), Ohio (Lord 2008), Ontario (Van Patter et al. 2019), and Texas (Ash and Adams 2003, Dombrosky and Wolverton 2014). For managers, acknowledging and listening to people's concerns and understanding diverse perspectives may help to avoid conflicts, build productive relationships, and realize long-term management success

Different types of free-ranging domestic cats may also necessitate different types of management interventions. For example, owned and unowned domestic cats are likely to have different stakeholders and different total impacts on wildlife resources (Loss et al. 2013, Cove et al. 2018). Because management actions could lead to stakeholder conflict, especially when lethal management techniques are employed, it is most beneficial when managers communicate with stakeholders early in the management planning process and prioritize management actions in areas of greatest harm to natural resources by free-ranging domestic cats. This stakeholder engagement may minimize conflict.

It is important to also consider the root causes of domestic cats roaming agency lands. Understanding how local communities think about domestic cats can be instructive for effective communications. For example, growing research around the world has investigated motivations for domestic cat owners to let their pets roam outdoors and perceptions of possible interventions. Domestic cat owners in the United Kingdom have expressed little concern over harm to wildlife caused by their domestic cats, and researchers have recommended considering. the multiple factors and competing priorities that inform domestic cat owner decision-making, such as cat health and welfare, the ease of behavior change, and the cost of owner interventions (McDonald et al. 2015, Crowley et al. 2019). In such cases, an emphasis on disease transmission risks, both to and from domestic cats, may be more effective (Lepczyk et al. 2015, Gramza et al. 2016). In New Zealand, domestic cat owners were more likely to agree to keep their pets indoors at night than to do so at all times, and this behavioral change was linked to greater willingness to consider keeping their cats permanently indoors in the future (Linklater et al. 2019). Other studies in New Zeal and point to owners being more likely to restrict their cats' outdoor activity if they receive these messages from trusted sources, such as veterinarians (MacDonald et al. 2015 McLeod et al. 2017). Interventions that include a public pledge may also be beneficial (MacDonald 2015). These findings may help managers interact with local communities to find solutions that will help minimize domestic cat incursions on agency lands.

#### Recommendations

Solutions that lessen the effects of free-ranging domestic cats on wildlife often involve human behavior change, conflict resolution, and effective communication, While it is imperative that managers control free-ranging domestic cats on agency lands, human dimensions and communications experts can help wildlife conservation practitioners understand these human dimensions and work toward developing innovative, collaborative solutions that protect wildlife populations and support domestic cat welfare. Many state and federal wildlife management agencies now employ human dimensions professionals, who should be consulted at the beginning of any domestic cat management effort. Below, we provide some quidelines for advancing dialogue on free-ranging domestic cat management and developing strategies to change hum an behavior.

1) Determine which human behaviors are leading to free-ranging domestic cats in the area of interest (McKenzie-Mohr et al. 2012, Linklater et al. 2019), To avoid wasting resources, prioritize targeted, specific behaviors rather than groups of behaviors that reduce negative impacts on wildlife. It is also important to target effective behaviors that are most likely to be adopted.



Cat photo by ArthurHidden - www.freepik.com

Domestic cats may be described with a variety of names, Colony/Community cat - a domestic cat that such as those related to their socialization and lifestyle, and different names have been associated with varving acceptability of management actions (Farnworth et al. 2011). Understanding of these names can help avoid potential conflicts and confusion. While domestic cat terminology is not standardized, the following definitions will help familiarize managers with terms and concepts:

Indoor cat - a domestic cat that lives entirely indoors or goes outdoors under the supervision of a person; habituated to people

Indoor/Outdoor cat - a domestic cat that spends part of its time indoors and part of its time outdoors; habituated to people; while outdoors, roams without restriction

Barn cat - a domestic cat that is maintained on an individual's property, typically around a barn, for the purpose of pest control; may or may not be habituated to people; roams outdoors without restriction

congregates around a human-provided food source or shelter; may or may not be habituated to people; roams outdoors without restriction; frequently associated with trap, neuter, release or similar programs

Stray cat - a domestic cat that lives exclusively outdoors; habituated to people; roams outdoors without restriction

Feral cat - a domestic cat living in a wild state: unhabituated to people; roams outdoors without restriction; may live far away from human settlements

In a legal sense, an at-large cat is a domestic cat that is on the premises of a person other than an owner of the cat, without the consent of an occupant or owner of such premises, or on a public street, on public or private school grounds, or in any other public place, except when under the direct control of an owner.

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Relatively simple and low-cost behaviors should be prioritized over more complex and costly behaviors.

2) Refrain from making assumptions about what stakeholder groups think about domestic cats. Instead, work to understand the various thought patterns (attitudes, beliefs, values, etc.) of stakeholders and how these thought patterns may drive decisions related to free-ranging domestic cats. Explore what values are shared among the stakeholder groups involved, and begin building relationships to learn more about each other. To do this, practitioners can partner with human dimensions specialists and explore the peer-reviewed literature related to the human dimensions of domestic cat issues.

3) Focus effort on areas of consensus. A wide variety of groups support management strategies that focus on reducing domestic cat abandonment and increasing adoption. These strategies can reduce the number of free-ranging domestic cats on the landscape. Commonly held values among the conservation and animal welfare communities include benevolence and humaneness. Members of both communities want animals to be treated humanely and care deeply about animals, although groups may use different definitions or focus on different aspects of what makes something humane. Striking a balance between animal welfare and protection of wildlife can bridge differences among stakeholder groups. In this context, promoting restriction behaviors for owned domestic cats can also be widely supported. Example strategies include the use of outdoor domestic cat enclosures and leashing.

#### 4) Construct messages that appeal to shared values.

Providing facts and data alone rarely changes human minds or behavior, people seldom make decisions based on scientific evidence or rational deliberation, especially for conflicts based on different sets of values. On the contrary, hearing facts that refute their worldview can solidify people's already strongly held beliefs (Wald and Jacobson 2014). Crafting an approach that acknowledges strongly held values will improve the chances of a successful outcome. The effectiveness of various communication techniques is evaluated and discussed in a recent and very useful study (McLeod et al. 2017).

5) Form productive partnerships. Due to the complexity and sensitivity of these issues and the number of stakeholders involved (wildlife agencies, the public, local governments, etc.), meaningful progress may not be possible without establishing working relationships with both traditional and non-traditional partners. In these partnerships, it is extremely important to start small and begin to build trust through one-on-one conversations to learn more about the people and the groups they represent. See the Partnerships section for examples of successful partnerships, as well as challenges involved in collaborating.



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THE FERAL CATS ARE FED AND CARED FOR BY **ADVOCATS VOLUNTEERS** WE ASK THAT YOU HELP US BY NOT LEAVING FOOD FOR THEM THIS INTERFERES WITH THEIR DIET AND THE CLEANLINESS OF THE ENVIRONMENT MAHALO

### APPENDIX I

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# **EDUCATION AND** OUTREACH

Educating the public to engage them as partners remains a primary strategy for addressing myriad conservation issues, including the management of invasive species. Part of the vision of the Association's 2010 Conservation Education Strategy is "an informed and involved citizenry...[that] understands and actively participates in the stewardship and support of our natural resources."

Many fish and wildlife agencies maintain education branches or staff who provide conservation education training and programs to educators, children, and families. While the link between education and stewardship can be difficult to evaluate, according to the Association's Stewardship Education Best Practices Planning Guide "researchers have come to three important conclusions about environmental and conservation education:

- 1. Ecological awareness and knowledge are not enough to cause long-lasting behavior changes, but they can provide a basis or readiness for learning and participation.
- 2. Ownership (a personal connection with one or more natural areas and knowledge of and/or investment in problems/issues) is critical to responsible environmental behaviors
- 3. Instruction and experiences intended to foster ownership and empowerment (a sense of being able to make changes and resolve important problems and use critical issues investigation skills to do so) often permit individuals and groups to change their behavior."

The tools listed below can be used to help agencies educate the public about the impacts of free-ranging domestic cats. It is best to select from these tools with the specific audience and educational setting in mind. For example, the Association's Flying WILD program offers training for educators in activities they can use to incorporate bird and bird conservation in their instruction. This program can help students learn about the threat that outdoor domestic cats pose to birds before they become domestic cat owners. On the other hand, American Bird Conservancy's Cats Indoors program provides useful information for domestic cat owners about simple solutions to keep pets and wildlife safe. See the Human Dimensions section for related information, including effective messaging and strategies.

By incorporating these resources into educational programs and offerings, agencies may better engage the public as partners in addressing the issue of free-ranging domestic cats and their impacts on natural resources.



#### Flying WILD: An Educator's Guide to Celebrating Birds | Association of Fish and Wildlife Agencies Flying WILD uses standards-based classroom activities and environmental stewardship projects to introduce students to bird conservation. Flying WILD encourages schools to work closely with conservation organizations, community groups, and businesses involved with birds to implement bird conservation projects and school bird festivals. Some state fish and wildlife agencies offer training for educators in Flying WILD materials. The curriculum quide is also available for purchase on the Association's website (see below). The following activi-

ties include mention of free-ranging domestic cat issues: Bird Action, Bird Buffet, Bird Friend or Foe?, Bird Hurdles, Feeder Frenzy, The Great Migration Challenge, Hidden Hazards, Jeop-Bird, and Migratory Mapping, For example, in the activity "The Great Migration Challenge" students move through migration stations that highlight the challenges faced by migrating birds. One station involves being caught and eaten by a free-ranging domestic cat. Other activities like "Bird Action" and "Bird Friend or Foe?" encourage students to take simple actions to protect birds, including keeping domestic cats indoors. www.flvingwild.org

### Cats Indoors | American Bird Conservancy

American Bird Conservancy's Cats Indoors program is dedicated to educating the public and policy makers about the many benefits to domestic cats, wildlife, and people when domestic cats are kept indoors or under an owner's direct control. The program promotes simple solutions that advocate treating domestic cats responsibly, more like people treat domestic dogs. Resources available include brochures, fact sheets, videos, a regular newsletter, and scientific literature. Domestic cat owners can also take a pledge online to keep their current or future pets safely contained. www.abcbirds.org/cats

#### Cats and Birds: Keep Cats Safe and Save Bird Lives | Nature Canada

Keep Cats Safe and Save Bird Lives is a coalition of organizations led by Nature Canada that advocates for improving the treatment of domestic cats as a means of limiting impacts to the environment, particularly birds. Nature Canada works with national, regional, and local partners across Canada to cultivate municipal action and raise awareness. https://catsandbirds.ca







#### Stewardship Education Best Practices Planning Guide | Association of Fish and Wildlife Agencies

Although this resource does not specifically pertain to free-ranging domestic cats, it provides recommendations, based on research and evaluation, for strengthening and developing natural resources stewardship components of fish and wildlife agency conservation education programs. By following the best practices described in this document, education programs will more effectively reach learners.

www.fishwildlife.org/application/files/5215/1373/1274/ ConEd-Stewardship-Education-Best-Practices-Guide.pdf

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### PARTNERSHIPS

Establishing partnerships with stakeholder organizations can be a powerful tool in achieving wildlife conservation aims. Building relationships with partners before acute management needs or conflicts can help to prevent or minimize potential misunderstandings and foster mutual trust and is especially important in invasive species management (keitt et al. 2019). Over the years, numerous coalitions have been formed seeking to tackle free-ranging domestic cat issues with varying success (Table 1). Below, we highlight two of the successful partnerships so they may serve as examples for future efforts.

#### San Nicolas Island - California

Free-ranging domestic cat management was identified as an important step to restore seabird populations and ecosystem function on San Nicolas Island, one of the Channel Islands off the coast of California (Hanson et al. 2010). A coalition of stakeholders, including the U.S. Navy, U.S. Fish and Wildlife Service, Island Conservation, Institute for Wildlife Studies, and the Humane Society of the United States (HSUS), all participated in the domestic cat removal process. Between June 25, 2009, and February 17, 2010, 52 captured domestic cats were transported to a long-term "holding sanctuary" by HSUS, and the final two domestic cats were removed in June 2010 (Hanson et al. 2010, 2015). The late inclusion of HSUS in this project "allowed free-ranging domestic cats to be removed alive" and "benefitted the project by garnering widespread support" (Hanson et al. 2015).

#### Brevard Zoo - Florida

The Brevard Zoo in Melboume, Florida, created an exhibit in 2018 designed to educate visitors about the impacts of free-ranging domestic cats on wildlife and to exemplify responsible cat ownership solutions. In partnership with the Brevard Humane Society, the zoo constructed and housed two adoptable domestic cats in a "catio"



(enclosed patio for cats). According to Brevard Humane Society Executive Director Theresa Clifton, Brevard Zoo's catio protects wildlife and offers domestic cats a safe environment, calling the program "an ideal partnership" (Brevard Humane Society 2018).

Partnerships for domestic cat management and control may include the interests of animal welfare, wildlife conservation, and human health organizations, and such interdisciplinary partnerships have served to express unified support for agency actions (American Bird Conservancy 2014). Non-profit organizations that have participated in alliances and/or publicly expressed their support for activities that would benefit the conservation of natural resources or protection of human safety on agency lands, such as those listed below, may serve as a starting point for future partnerships with agencies.

American Association of Wildlife Veterinarians

American Bird Conservancy

Association of Avian Veterinarians

Association of Zoos and Aquariums

International Wildlife Rehabilitation Council

National Association of State Public Health Veterinarians

National Wildlife Federation

National Wildlife Rehabilitators Association

People for the Ethical Treatment of Animals

Society for Conservation Biology The Wildlife Society

#### The vinance

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### Table 1

#### A selection of wildlife conservation partnership efforts initiated to address free-ranging domestic cat issues across the United States

State	Name	Stakeholder Organizations	Summary
California	N/A	Humane Society of the United States, Institute for Wildlife Studies, Island Conservation, U.S. Fish and Wildlife Service, U.S. Navy	Partner organizations successfully removed free-ranging domestic cats from San Nicolas Island. Most domestic cats were provided a lifelong home in a sanctuary off-island.
Florida	N/A	Brevard Humane Society, Brevard Zoo	These partner organizations joined forces in 2018 to educate the public about the impacts of free-ranging domestic cats on wild life, model a solution for owned domestic cats, and facilitate adoptions.
Hawafi	Cats and Wildlife Coelition	American Bird Conservancy, county humane soci- ettes, Hawafi Cat Foundation, Hawafi Obepartment of Land and Natural Resources (DLNR), Humane Society of the United States, National Oceanic and Amrospherica Administration, National Park, Service, The Wildlife Society – Hawafi Chaptes, U.S. Fish and Wildlife Service	Partner organizations sought to "develop and implement collaborative efforts among wildlife managers and animal weifers advocates to protect cats and wildlife." Though disagreement about how to control domestic cats near protectes species limited the group's progress, theformation of the coalition facilitated the establishment of ongoing working relationships. Staff within the various groups of the coalition regularly commu- nicate and work together on policy. For example, DLNR regularly interfaces with the Hawaiian Humane Society to support legislation the state reduces animal abandomment and requires better pet identification.
Hawafi	Kaua'i Feral Cat Task Force	American Bird Conservancy, Best Friends Animal Society, County of Kaudi , Hawari i DLNR, Hanalei Watershal Hu, Hawailan Humane Society, Hu Ho'omalu i ka 'Aina, Humane Society of the Unked States, Kaudi / Abatross Network, Kaudi Fensls, Kaudi Humane Society, Kaudi Invasive Species Committes, National Park, Storico, Paradiae Animal Clinic, University of Hawari, U.S., Fish and Wildlife Service	Convened by the County of Kaua <sup>(1)</sup> , this task force made recommendations in 2014 for the purpose of Kaua 15 becoming "Tree of Ireral, abandoned, and stray" domestic cats (Adler 2014).
Hawafi	Toxoplasmosis and At-large Cat Technical Working Group (TACTwg)	City and County of Honolulu, County of Maui, Havari DLNR, Office of Hawalian Affairs, National Oceanic and Atmospherio Administration-Fisher- ies, National Park Service, U.S. Fish and Wildlfe Service, U.S. Army Garrison Hawari, U.S. Depart- ment of Agrioubure Animal and Plant Health Inspection Service, U.S. Ceckologial Survey, U.S. Marine Corps Base Hawari, U.S. Naval Facilities Hawari Engineering Command	The TACTwg was formed in 2016 following a cluster of endangered Hawaiian monk seal (Neomonadvius oshaurisaland) deaths that were later determined to be caused by toxoplasmosis. Because domestio aata are the only definitive host of Toxoplasma growtii in Hawaii, the group's mission includes addressing impacts and man- agement of domestic cats. The TACTwg shares information and ideas, collects and conducts research, provide spolicy implementation advice, and educates the public about toxoplasmostis and at-large domestic cats risks. Membership in the TACTwg is currently limited to fed early, state, and outing government age nor presentatives.
Virginia	Comprehensive Animal Care Laws Working Group	Danville Area Humane Society, Virginia Alliance for Animal Shelters, Virginia Animal Control Association, Virginia Department of Agriculture and Consumer Services, Virginia Department of Wildlife Resources, Virginia Department of Health, Virginia Veterinary Medical Association, Virginia Federation of Humane Societies	Established by the Virginia Department of Agrioulture and Consumer Services to consider companion animal policies, the working group initially agreed that every domestic out should be responsibly owned and managed in a way that promotes animal welfare, public health, and envi- ronmental stewardship. Phodulive conversations were derailed, however, over the management of free-maning domestic outs:

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The Lāna'i Cat Sanctuary (LCS) is a 3.5-acre fenced facility on the island of Lana'i that operates in partnership with a private company, residents, and volunteers to provide a management solution for free-ranging domestic cats. The facility, which houses over 600 domestic cats, has permanent staff and volunteers and has become a tourist attraction, which provides an additional source of revenue. Free-ranging domestic cats are captured and turned in to LCS by Lana'i residents, the state wildlife agency, and the conservation arm of Pūlama Lāna'i, a private company that manages most of the land and hotels on Lana'i More information on LCS as well as information on what it takes to start a domestic cat sanctuary, can be found at www.lanaicatsanctuary.org/about-us.



# INTEGRATED MANAGEMENT SOLUTIONS

Management of free-ranging domestic cats is a critical component to maintaining the ecological integrity of wildlife conservation lands. Management programs on these lands should strive for zero free-ranging domestic cats to minimize conflicts with people and native wildlife. Numerous examples of successful management programs exist from sites across the globe, especially on islands, and such programs have achieved positive results for wildlife conservation (Nogales et al. 2004, Ratcliffe et al. 2009).

It would be beneficial for all conservation land managers to develop a management protocol to prevent, monitor, and manage free-ranging domestic cat incursions on lands they manage. The following decision free may be used as a guide to help managers consider the process, management alternatives, and best practices for achieving a goal of zero free-ranging domestic cats on wildlife conservation lands in a variety of circumstances (Fig. 3).

Below, we briefly review existing strategies to manage free-ranging domestic cats, including but not limited to those provided in Figure 3 (page 28), to allow managers to make informed decisions in line with their specific needs and capabilities. We recommend that management protocols prioritize non-fethal control to the extent practicable and that all managers receive specialized training and demonstrate proficiency in the techniques they may employ. For specific guidance on management techniques, human safety, and other considerations, see Vantassel (2013), Sikes et al. (2016), and the **Domestic Cat Disease** section of this document.

#### Prevention

Efforts to prevent the presence of domestic cats on conservation lands can help discourage long-term persistence and limit the likelihood of domestic cat establishment, making control efforts less burdensome. Prevention measures should be implemented in all cases.

#### Removal of Food, Water, and Shelter

Managers should take care to prohibit the purposeful or accidental provisioning of food, water, or shelter to domestic cats by staff or visitors. These resources, such as open trash receptacles, unsealed out-buildings, boxes and crates, and crawl spaces underneath buildings, not only encourage domestic cat immigration but also increase the likelihood of neoative interactions between

domestic cats, wildlife, and humans. Policies that prohibit the release, sheltering, and/or feeding of domestic cats on wildlife conservation lands should be enacted and enforced, and signs should be posted to notify the public of ongoing management. See the **Human Dimensions** and **Education and Outreach** sections of the document for communications guidance.

#### Public Engagement

Because domestic cat issues can often be influenced by human behavior (e.g., animal abandonment), public engagement will be an important component to preventing the presence of and managing domestic cats. See the Human Dimensions, Education and Outreach, and Partnerships sections of this document for further information on public engagement.

#### Inventory and Monitoring

To develop effective control efforts and reasonably confirm successful prevention or control of domestic cats on wildlife conservation lands, various techniques may be employed to determine presence of domestic cats and evaluate population size. Spotlight surveys, track surveys, hair snares, and camera traps have been used successfully (Edwards et al. 2000, Bengsen et al. 2011, Fisher et al. 2015). Traditional mark-recepture is less likely to be successful due to trap aversion (Fisher et al. 2015).

#### Control (options listed alphabetically) Adoption | Non-lethal

Where partnerships with animal shelters, rescue centers, and animal welfare organizations can be established, live-capture of domestic cats and delivery for adoption is an excellent management strategy. Efforts should be made to ensure adopted domestic cats will not be able to return, either through free-ranging or abandonment, to wildlife conservation lands. See live-capture methods below to learn more about effective methods.

#### Enclosure | Non-lethal

A domestic cat-proof enclosure may be constructed to temporarily or permanently house live-captured cats. Enclosures may be constructed on wildlife conservation lands, or domestic cats may be transported to existing off-site enclosures, such as domestic cat sanctuaries (e.g., Läna'l Cat Sanctuary). Proper care, including provision of food, water, and veterinary care, as well as waste disposal, and compliance with existing state and local laws is necessary, and managers should consider the long-term viability of enclosure options.

### Euthanasia and Humane Killing | Lethal

Euthanasia or humane killing of free-ranging domestic cats should follow American Veterinary Medical Associa-

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tion (AVMA) guidelines (https://www.avma.org/sites/default/files/2020-01/2020-Euthanasia-Final-1-17-20.pdf) to ensure respectful and humane treatment before, during, and after death (Leary et al. 2019, Leary et al. 2020). Any employed method must also meet all applicable local laws and regulations. Lethal practices should be focused on free-ranging domestic cats that are sick or injured, exhibit behavioral abnormalities, or are aggressive. Use of lethal traps should not be used due to the danger to non-target species, especially listed or rare apecies. Euthanasia or humane killing should occur in a secluded or discrete area out of view of the general public or other personnel.

### Exclosure | Non-lethal

A domestic cat-proof exclosure may be constructed to temporarily or permanently exclude free-ranging domestic cats from wildlife conservation lands. This strategy may be useful for relatively small areas but is generally cost-prohibitive for larger land areas and may inhibit movement of wildlife.

### Live Capture | Non-lethal

Techniques for the live capture of free-ranging domestic cats include padded foot-hold traps and cage or box traps, among others (e.g., Fisher et al. 2015). Sikes et al. 2016). Capture methods should not cause injury or excessive stress and should limit exposure to weather and temperature extremes, limit time in the trap, and account for potential impacts to non-target species (Sikes et al. 2016).

### Sterilization | Non-lethal

Sterilization of cats on wildlife conservation lands by itself does not sufficiently address ongoing issues of concern, such as predation of wildlife and/or the transmission of zoonotic diseases (Jessup 2004, Gerhold and Jessup 2013, Roebling et al. 2013). Although sterilization of owned cats is a recommended practice, strategies that maintain domestic cats roaming on wildlife conservation lands (e.g., trap, neuter, release [TNR]) are incompatible with wildlife management goals and should be prohibited (e.g., AAWV 1996, TPWD 2014, AVMA 2018, TWS 2020).

Toxicant | Lethal (not currently permitted in U.S.) No toxicants are currently registered for domestic cat control use in the United States. In other countries (e.g., Australia and New Zealand), poisons such as sodium fluoroacetate (1080) and para-aminopropiophenone (PAPP) have been used to remove domestic cats (Moseby et al. 2009, Ratcliffe et al. 2009, Shapiro et al. 2010).



In 2018, following an Endangered Species Act lawsuit settlement, New York State Office of Parks, Recreation, and Historic Preservation (State Parks) took action to manage free-ranging domestic cats maintained at Jones Beach State Park. Within five months of the settlement, State Parks staff had trapped and removed twenty-six domestic cats and placed them all in private sanctuaries. State Parks also removed all support structures (i.e., feeding stations, shelters) for domestic cats and, per the settlement agreement, will continue to monitor for and remove all free-ranging domestic cats from the park into the future. For more information, see the Legal Issues section of this document.



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# MODEL REGULATORY AND LEGAL LANGUAGE

Regulatory and legal language can be a powerful tool to prevent the establishment of free-ranging domestic cats and to guide management on agency lands. To date, however, these tools have not been prioritized, and uncertainty remains in many states regarding current authorities pertaining to free-ranging domestic cats (AFWA 2017). For those states desiring to clarify their authorities, referring to existing state and federal regulations and other states' laws may serve as a starting point for future action. Below, we provide examples of state and federal regulations and statutes that may be helpful in guiding management.

#### State Regulations Florida Water Management Districts:

State regulations prohibit domestic cats on Suwannee River Water Management District lands (FAC §40B-9.131) and in the Southwest Florida Water Management District (FAC §40D-9.190). Domestic cats must be leashed on St. Johns River Water Management District lands (FAC §40C-9.180).

### Hawai'i Department of Land and Natural Resources:

State regulations prohibit animal abandonment and "feeding of colonies, strays, wildlife, or feral animals" on Hawai'l Division of Boating and Ocean Recreation property (HAR §13-232-57.1, HAR §13-232-57.2).

### Idaho Department of Fish and Game:

Regulations prohibit domestic cats from running at large on lands controlled by the Department when a person is not present to control or care for it (IAC §13.01.03).

#### New Mexico Division of Energy, Minerals, and Natural Resources:

All domestic cats in areas of the New Mexico State Parks system shall be restrained from running at large, controlled by their owners, and vaccinated in accordance with local laws; owners must pick up after their pets; and domestic cats are prohibited from certain parks and all visitor centers (NMAC §19.5.2.28).

#### Pennsylvania Department of Conservation and Natural Resources:

State regulations require that "an owner, keeper, or handler of a pet" may only have a pet in a state park if the animal is on a leash or in a cage or crate, the animal does not cause damage to property or resources, the animal is properly vaccinated and licensed as required by law, and any droppings are disposed of in a trash receptacle (17

### PA Code §11.212).

#### West Virginia Division of Natural Resources:

Regulations permit domestic cats in state park and state forest cabins and their immediate areas but prohibit them in lodges, swimming pools, and beach swimming areas (Natural Resources §58-31-2.12). These regulations also require that cats be 'restrained at all times on a sturdy leash" in and around campgrounds, picnic areas, playgrounds, designated roads and trails and "other similar intense public use areas." Owners are responsible for removing droppings, preventing noise and disturbances to other guests, and for all damage caused.

### Federal Regulations

#### Executive Orders

13112 | Invasive Species

This executive order directs agencies to prevent the introduction of invasive species and control invasive species once they have been introduced. This order was amended by EO 13751.

#### 13751 | Safeguarding the Nation from the Impacts of Invasive Species

This executive order amends EO 13112 and directs actions to continue coordinated Federal prevention and control of invasive species. Specifically, this order affirmed that it is the policy of the United States "to prevent the introduction, establishment, and spread of invasive species, as well as to eradicate and control populations of invasive species that are established."

#### **Bureau of Land Management**

The Bureau of Land Management's policy and guidance on the introduction of exotic species established that "exotic or domesticated species that have reverted to a feral state (feral species) that are adversely impacting native species and/or habitats should be controlled and/ or removed" (BLM 1992).

#### Department of Defense

The Department of Defense published a technical guide for all military installations in the United States as an example of stray animal control policy and the proper implementation of such a policy (Wildie et al. 2012).

#### Department of the Navy

Department of the Navy policy "requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations" and emphasizes that "privately-owned or stray animals will not be permitted to run at large on military reservations" (U.S. Navy 2002).

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### **National Park Service**

The National Park Service (NPS) requires that all pets be in a crate, cage, restrained on a leash, or otherwise contained at all times. Pets running at large may be impounded, and pets or feral animals observed "in the act of killing, injuring, or molesting humans, livestock, or wildlife may be destroyed" (36 CFR §2.15). NPS policy also states that "all exotic plant and animal species that are not maintained to meet an identified park purpose will be managed - up to and including eradication" if the species meets several qualifications, such as harming wildlife or causing a public health hazard (NPS 2006).

#### **U.S. Forest Service**

The U.S. Forest Service Manual (FSM) 2900 chapter on Invasive Species Management sets forth National Forest System policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species including vertebrates, invertebrates, plants, and pathogens (2011).

#### State Laws

State laws regarding domestic cats frequently, though not always, fall under agricultural code. We encourage agencies to review their state laws and to work with relevant agencies and personnel to establish and/or strengthen laws that effectively reduce the likelihood of harmful interactions between domestic cats and wildlife. as well as conflicts with natural resources managers or recreationists. Relevant topics include abandonment, sterilization, identification, vaccination, and control (e.g., leash law) of domestic cats. American Bird Conservancy has created model companion animal legislative language that may serve as a template for preventing domestic cat conflicts (ABC 2017).



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# Appendix

DISEASES OF CATS								
TYPE OF DISEASE	AGENT	T TRANSMISSION		CAT CLINICAL SIGNS	TREATMENT	PREVENTION		
VIRUSES								
Rabies	Rabres lyssavirus (Ahabdovindae)	Bite of a rabid animal, saliva	YES	salivation, seizures, dumb/ furrous behavior, encephalitis	None	Vaccination		
Feline leukemia/Feline immunodeficiency disease	FIV /FELV	"lateral" - cat saliva, blood, urine, feces; grooming, bite wounds, fighting, "vertical" - kittens in-utero/nursing -milk	NO	progressive multi-organ failure and debilitiation, blood dyscrasias	None	Vaccination		
Pseudorabies	PRV (Herpesvirus suis)	Oral. ingestion infected tissues	NO	intense pruitis, encephalitis	None			
Feline Infectious Peritonitis	Feline beta- eoronavirus	Fecal-oral	NO	wet /dry forms, multi-organ failure	Palliative care	Intranasal vaccine - not proven effective		
SARS	SARS bela- coronavirus	Ingestion (oral) infected prey, experimental intra-tracheal	Cats not known to be exposure source to humans	acule pneumonia	None	Prevent contact		
COVID19	SARS-Cov-2 beta- coronavirus	lateral transmission from infected humans and conspecifics; oral-nasal; inhalation; experimental intranasal	Cats not known to be exposure source to humans	sneezing, coughing, oculonasal discharge, rhinitis	None	Prevent contact		
Feline Panleukopenia (Feline Distemper)	Feline panleukopenia / parvo virus	Urine, feces, nasal secretions; contaminated bodding, cages, food dishes	NO	Depression, loss of appetile, high fever, lethargy, vomiting, severe diarrhea, nasal discharge, and dehydration: congenital feline cerebellar ataxia	Supportive care	Vaccination		
Avian/Swine Influenza	HPAI (H5N1, H1N1). other Type A influenza viruses	Ingestion (oral) infected prey	Cats not known to be exposure source to humans	tever, lethargy, respiratory distress, acute pneumonia, enecphalitis	None	Prevent contact		
BACTERIA								
Giardiasis	Giardia lamblia	Oral - contaminated water	YES	diarrhea +/- bloody	Antibiotics	Avoid contaminated water sources		
Crytosporidiosis	Cryptosporidium sp	Oral ingestion - contaminated water, food, feces	YES	fever, diarrhea, dehydration, lethargy	Supportive	Avoid contaminated water sources		
Flea-borne spotted. fever (cats)	Rickettsia typhi, R. felis	fleas	YES (cat-flea typhus in humans)	skin rash, fever	Flea products, antibiotics, supportive	flea control		
Ehrlichiosis/ Anaplasmosis	Rickettsia: Ehrlichia chafteensis and Ehrlichia ewingii; Anaplasma phagocytophilum	Ticks	YES (via lick - cals may be a reservoir hosl)	Acute and chronic stages; Anemia, lethargy, cough, enlarged lymph nodes/spleen, lameness	Topical insecticides, antibiotics, supportive care	Topical insecticides (Tick control)		
Babesiosis (Piroplasmosis)	Babesia felis	Ticks, cat bites, transplacental	ND	Anemia, depression, dark- colored urine, fever, and enlarged lymph nodes, shock	Anti-malarial + antibiotic, blood transfusion	Avoid contaminated water sources		
Cytauxzoonosis (Bobcat Fever)	Cytauxzoon felis	Ticks	ND	Severe anemia. fever, anorexia, dyspnea, and interus, rapid death	Anti-malarial + antibiotic; blood transfusion	Tick control		
Sylvatic plague (bubonic, pneumonic, septicemic)	Yersinia pestis	fleas	YES	swollen/abscessed peripheral lymph nodes, fever, pneumonia	Flea products, Antibiotics	flea control		
Tularemia	Franciscella tularensis	fleas, ticks, ingestion, aerosol	YES	high fever, enlarged lymph nodes, pneumonia	Antibiotics	Avoid contaminated water sources		
Borreliosis (Lyme disease)	Borrelia burgdorferi	Ticks	YES (via tick)	lameness, lever, swollen lymph nodes and joints: anorexia, chronic kidney, heart disease	Antibiotics	Avoid contaminated water sources		
Bordetellosis	Bordetella bronchiseptica	Aeropol	YES	"fever, nasal discharge, sneezing, coughing, lethary, submandibular lymphaderopathy"	Antibiotics	Intranatal vaccination		

DISEASES OF CATS									
TYPE OF DISEASE	AGENT TRANSMISSION		ZOONOTIC	CAT CLINICAL SIGNS	TREATMENT	PREVENTION			
BACTERIA cont.									
Bartonellosis (cat. scratch disease)	Bortonella henselae	Fleas	YES	subclinical bacteremia. occasional endocarditis	Antibiotics	Flea control			
Haemobartonellosis (Feline Infectious Anemia)	Mycoplasma haemofelis	Fleas, ticks	NO	severe anemia, depression, weight loss, dyspnea, jaundice, acute death	Antibiotics; blood transfusion	Flea/fick control			
Campylobacteriosis	Campylobacter jejuni	Oral ingestion - contaminated water, food, feees	YES	Dianhea, carrier state	Antibiotics	Avoid raw/ undercooked food			
Helicobacteriosis	Helicobacter felis; H. pylori	Oral ingestion - contaminated water, food, feces	YES	Gastritis	Antibiotics (limited)	Sanitation			
Salmonellosis	Salmonella spp.	Infected foods (offal, live prey, uncooked meat), contaminated water, tecal/oral shed (carriers).	YES	Fever, vomiting, diarrhea, or asymptomatic carrier	Antibiotics	Sanitation			
Pasteurellosis	Pasteurella multocida	normal oral flora, cat bites	YES	asymptomatic; bite or scratch wounds/ abscess	Antibiotics	Avoid contaminated water sources			
Staphyloenecosis	Methicillin-resistant Staph. aureus (MRSA)	reverse zoonosis from human contact	YES	asymptomatic carrier		Avoid cross- contamination			
PARASITES									
Toxoplasmosis	Toxoplasma gondii	Ingestion (oral)	YES	generally asymptomatic -cal is definitive host (fecal shedding ooycysts)	None				
Baylesascariasis (roundworm)	Baylesascaris procyonis	Fecal-oral	YES	encephalitis, larval migrans		Parasiticides			
Roundworm Infection (cats)/Ocular & visceral larval migrans (humans)	Toxocara cati	Fecal-oral	YES	may be asymptomatic or weight loss, diarrhea, tecal shed roundworm eggs		Parasiticides			
Hookworm Infection (cats) /Cutaneous Jarval migrans (humans)	Uncinaria sp., Ancyclostoma sp.	Fecal-oral	YES	may be asymptomatic or diarthea, weight loss, anemia, tecal shed hookworm eggs		Parasiticides			
Tapeworm (cats)	Dipylidium caninum	Fleas	YES	Diarrhea, weight loss, proglottids in feces		Parasificides			
<u>Tremalode Alaria</u> infection (alariosis)	Alaria spp (A. alata, A. musielae, etc)	Fecal-oral	YES	carnivores -including cats - are definitive hosts: trematode ova shed in feces, cercanial stages develop in intermediate/ paratenic hosts consumed as prey species for camivores. Human cases from game meat	Parasiticides - definitive host	Parasilicides			
Scabies	Sareoptes seablei.	Lateral transmission. contaminated bedding	VES	pruritis, alopecia, papular skin lesions, secondary dermatitis	Mitaeides	Decontaminate environment and bedding			
FUNGAL									
Sporotrichosis	Sporothrix schenckii	skin abrasions, bites/scratches, inhalation		"draining puncture wounds similar to fight wound abscesses"	Antifungals				
Dermatophytosis (Ringworm)	Microsporum canis, Trichophyton sp.	Topical/ direct dermal contact, contaminated bedding, carrier state	YES	Patchy alopecia, pruitis, scaly dermatitis, nail-bed infections	Antifungal baths, topical or oral medications	Decontaminate enviroument, Improve husbandry			

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APPENDIX J Naval Submarine Base New London



# APPENDIX J. SUBASE NLON FOREST/TREE CARE AND REPLACEMENT GUIDELINES



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# J.1 SUBASE NLON FOREST/TREE PLANTING AND CARE GUIDELINES

The following tree planting and care guidelines originally from the International Society of Arboriculture are provided as guidance to ensure successful establishment of tree seedlings or saplings. Additional information on all aspects of tree selection, planting, pruning, and care of new trees can be found at <u>https://www.isa-arbor.com/Online-Learning/More-Resources</u> and clicking on the icon link "View Planting Details and Specifications". This information is also accessible directly at the <u>http://www.urbantree.org/index.shtml</u> and then clicking the appropriate information link (e.g., Tree Quality, Planting, etc.).

# J.1.1 New Tree Planting

The ideal time to plant trees and shrubs is during the dormant season, in the fall after leafdrop, or early spring before bud-break. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. *Before you begin planting your tree, be sure you have had all underground utilities located prior to digging*.

If the tree you are planting is balled and burlapped, or bare rooted, it is important to understand that the tree's root system has been reduced by 90–95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit what is known as **transplant shock**. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow-up care, will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish in its new location. Carefully follow eight simple steps and you can significantly reduce the stress placed on the plant at the time of planting.

- 1. Dig a shallow, broad planting hole. Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball. It is important to make the hole wide because the tree roots on the newly establishing tree must push through surrounding soil to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
- Identify the trunk flare. The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see Figure J-3). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.
- **3.** Place the tree at the proper height. Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and no more. The majority of the roots on the newly planted tree will develop in the top 12 inches of soil. If the tree is planted



too deep, new roots will have difficulty developing due to a lack of oxygen. It is better to plant the tree a little high, 1 to 2 inches above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see Figure J-3). To avoid damage when setting the tree in the hole, always lift the tree by the root ball, and never by the trunk.



- 4. Straighten the tree in the hole. Before you begin backfilling, have someone view the tree from several directions to confirm it is straight. Once you begin backfilling, it is difficult to reposition.
- 5. Fill the hole gently but firmly. Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped, cut and remove the string and wire from around the trunk and top 1/3 of the root ball (see diagram). Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.
- 6. Stake the tree, if necessary. If the tree is grown and dug properly at the nursery, staking for support is not necessary in most home landscape situations. Studies have shown that trees will establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism, or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth. Leave protective staking in place as long as necessary.
- 7. Mulch the base of the tree. Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, protects against harsh soil temperatures, both hot and cold, and reduces competition from grass and weeds. Some



good choices are leaf litter, pine straw, shredded bark, peat moss, or wood chips. A 2- to 4-inch layer is ideal. More than 4 inches may cause a problem with gas exchange. When placing mulch, care should be taken so that the actual trunk of the tree is not covered. This may cause decay of the living bark at the base of the tree. A mulch-free area, 1 to 2 inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

8. Follow-up care. Keep the soil moist but not soaked; overwatering will cause leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less frequent watering. Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting, and wait to begin necessary corrective pruning until after a full season of growth in the new location.

(Taken from the International Society of Arboriculture at: <u>http://www.isa-arbor.com/consumer/planting.htm</u>)

# J.1.1.1 How to Plant with a Dibble Bar

1. Push the blade vertically into the soil then pull the handle toward you to open the hole.



2. Set the seedling 1 to 3 inches deeper than the nursery depth with the roots straight.



3. Push the blade into the soil just behind the planting hole then pull the handle back to close the bottom of the hole. Push the handle forward to close the top of the hole.





4. Pack the soil firmly with your heel.



(Taken from the Soluth Carolina Forestry Commission at <u>http://www.state.sc.us/forest/plantgdref.pdf</u>)

### J.1.1.2 How to Plant Bare-root Trees

- 1. It is best to plant bare-root trees immediately, to keep the fragile roots from drying out. If you can't plant because of weather or soil conditions, store the trees in a cool place and keep the roots moist.
- 2. Unpack tree and soak in water 3 to 6 hours. Do not plant with packing materials attached to roots, and do not allow roots to dry out.
- 3. Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a three-foot circular area. To aid root growth, turn soil in an area up to 3 feet in diameter.
- 4. Plant the tree at the same depth it stood in the nursery, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add soil amendments.





- 5. Shovel in the remaining soil. It should be firmly, but not tightly packed with your heel. Construct a water-holding basin around the tree. Give the tree plenty of water.
- 6. After the water has soaked in, place a 2-inch deep, protective mulch area 3 feet in diameter around the base of the tree (but not touching the trunk).
- 7. Water the tree generously every week or 10 days during the first year of establishment.

(Taken from the Soluth Carolina Forestry Commission at <u>http://www.state.sc.us/forest/plantgdref.pdf</u>)

### J.1.2 Pruning Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, it will shorten the tree's life.

### J.1.3 Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure.

### J.1.4 When to Prune

Most routine pruning to remove weak, diseased or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree.

A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.

Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

# J.1.5 Making Proper Pruning Cuts to Mature Trees

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If the trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar (see Figure J-1).





# Figure J-2. On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar.

If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12 to 18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb, leaving the 12- to 18-inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark (Figure J-2).



Figure J-3. Use the 3-cut method to remove a large limb.

# J.1.6 How Much Should be Pruned?

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. A widely accepted rule is never to remove more than one fourth of a tree's leaf bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large, mature trees is usually limited to the removal of dead or potentially hazardous limbs.

# J.1.7 Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure, and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, then only a thin coating of a non-toxic material should be applied.



# J.1.8 Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches. Save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances, which stimulate new root production. Unpruned trees establish faster, with a stronger root system than trees pruned at the time of planting. (From International Society Arboriculture at http://www.isa-arbor.com/consumer/pruning.html )

# J.1.9 Recognizing Hazard Trees

Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages, surges, fires, and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

# J.1.9.1 Tree Hazard Checklist

Consider these questions . . .

- 1. Are there large dead branches in the tree?
- 2. Are there detached branches hanging in the tree?
- 3. Does the tree have cavities or rotten wood along the trunk or in major branches?
- 4. Are mushrooms present at the base of the tree?
- 5. Are there cracks or splits in the trunk or where branches are attached?
- 6. Have any branches fallen from the tree?
- 7. Have adjacent trees fallen over or died?
- 8. Has the trunk developed a strong lean?
- 9. Do many of the major branches arise from one point on the trunk?
- 10. Have the roots been broken off, injured or damaged by lowering the soil level,
- 11. installing pavement, repairing sidewalks or digging trenches?
- 12. Has the site recently been changed by construction, raising the soil level or installing lawns?
- 13. Have the leaves prematurely developed an unusual color or size?
- 14. Have trees in adjacent wooded areas been removed?
- 15. Has the tree been topped or otherwise heavily pruned?

# J.1.9.2 Managing Tree Hazards

One of these treatments may help make your tree safer. Reducing the risk associated with hazardous trees can take many forms.

- 1. **Prune the tree**. Remove the defective branches of the tree, because inappropriate pruning may also weaken a tree,
- 2. **Provide routine care**. Mature trees need routine care in the form of water, fertilizer (in some cases), mulch and pruning as dictated by the season and their structure.

Several treatments are best done by a Certified Arborist



- 1. **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.
- 2. **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

# J.2 SUBASE NLON FOREST/TREE REPLACEMENT GUIDELINES

Connecticut is a naturally heavily forested state with approximately 60 to 67 percent covered by forests (Connecticut Tree Protective Association 2021a). Trees provide multiple ecosystem services including stabilization of soils with roots, maintaining soil health (e.g., decomposition of leaf litter and hosting mycorrhizal fungi), regulating temperature and provide shade, sequester carbon, filter air pollutants, filter rainwater and slow stormwater runoff, and provide food (e.g., nuts and seeds) and shelter (e.g., nest sites for birds and roost sites for bats) for wildlife.

The removal of healthy, native trees is sometimes necessary to complete construction, renovation, or other projects. The following replacement guidelines may be required for projects at SUBASE NLON and NSA Saratoga. The NRM will conduct a review of projects that involve the removal of native trees and will identify applicable mitigation/tree replacement requirements. Tree mitigation is the act of compensating for healthy tree removal by planting a proportionate number of replacement trees. The goal of tree mitigation is to maintain or enhance the urban and natural forest on SUBASE NLON by minimizing the loss of existing trees, particularly large mature trees that take many years to replace. A project-by-project review is necessary because each project may have different circumstances. In some cases, onsite mitigation/tree replacement may be incompatible with the project and replacement may have to occur in another location. Tree species are adapted to different soil types and soil moisture content which must be considered in selecting locations for mitigation. Other factors that may be considered in selecting replacement tree species and location are the overall natural resource management goals and needs on both SUBASE NLON and NSA Saratoga and potential susceptibility of a tree species to disease pathogens. Many of these decisions cannot be prescribed but only provided as considerations to use in decision-making. In the following sections information is provided on potential tree species to use for tree replacement, availability of Connecticut native trees and shrubs, information on tree species requirements, and tree plant and care guidelines. Because of the potential volume of information that could be included here, electronic links have been included in Appendix J that provide access to tree characteristics information. These sources are federal, state, and NGO websites that are likely to remain available.

# J.2.1 Tree Species

Tree species observed on SUBASE NLON are listed Appendix B, Table B-1 and are listed here in Table J-1. As noted in Section D.5, a flora species survey needs to be conducted on NSA Saratoga Springs to determine what plants species are located on the installation. Therefore, it is not known what tree species occur on NSA Saratoga Springs that are not listed in Table J-1. The web links for each species in Table J-1 access the information in the United States Department of Agriculture Plants Database (USDA 2021). Each species profile contains information on the plant characteristics (click the *Characteristics* tab) including morphology/physiology, growth requirements, reproduction, and suitability/use. Information on 12 to 20+ characteristics are provided for each of these categories. Figure J-1 illustrates page one of three pages of



information for white oak (<u>https://plants.usda.gov/home/plantProfile?symbol=QUAL</u>). For some species a Fact Sheet and/or Plant Guide in PDF and/or Microsoft WORD format is provided. In some circumstances a tree species not listed in Table J-1 may be considered for planting. Information for other species can be found in the same database by using either the common or scientific name.

See <u>https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg\_acru.pdf</u> for an example of a Plant Guide for red maple (*Acer rubrum*).

Table J-1. Tree species observed on SUBASE NLON with links to the United States Department of Agriculture Plants Database (<u>https://plants.usda.gov/home</u>).

Common Name	Scientific Name	Link to USDA Plant Database
Red Maple	Acer rubrum	https://plants.usda.gov/home/plantProfile?symbol=ACRU
Sugar Maple	Acer saccharum	https://plants.usda.gov/home/plantProfile?symbol=ACSA3
Speckled Alder	Alnus incana ssp. rugosa	https://plants.usda.gov/home/plantProfile?symbol=ALINR
Smooth Alder	Alnus serrulata	https://plants.usda.gov/home/plantProfile?symbol=ALSE2
Yellow Birch	Betula alleghaniensis	https://plants.usda.gov/home/plantProfile?symbol=BEAL2
Black Birch	Betula lenta	https://plants.usda.gov/home/plantProfile?symbol=BELE
Gray Birch	Betula populifolia	https://plants.usda.gov/home/plantProfile?symbol=BEPO
Hornbeam	Carpinus carolinana	https://plants.usda.gov/home/plantProfile?symbol=CACA18
Pignut Hickory	Carya glabra	https://plants.usda.gov/home/plantProfile?symbol=CAGL8
Mockernut Hickory	Carya tomentosa	https://plants.usda.gov/home/plantProfile?symbol=CATO6
American Chestnut	Castanea dentata	https://plants.usda.gov/home/plantProfile?symbol=CADE12
Atlantic White Cedar	Chamaecyparis thyoides	https://plants.usda.gov/home/plantProfile?symbol=CHTH2
Silky Dogwood	Cornus amomum	https://plants.usda.gov/home/plantProfile?symbol=COAM2
Flowering Dogwood	Cornus florida	https://plants.usda.gov/home/plantProfile?symbol=COFL2
Red Osier Dogwood	<i>Cornus sericea</i> (formerly <i>C.</i> <i>stolonifera</i> )	https://plants.usda.gov/home/plantProfile?symbol=COSES
American Beech	Fagus grandifolia	https://plants.usda.gov/home/plantProfile?symbol=FAGR
White Ash	Fraxinus americana	https://plants.usda.gov/home/plantProfile?symbol=FRAM2
Red Cedar	Juniperus virginiana	https://plants.usda.gov/home/plantProfile?symbol=JUVI
Tulip-tree	Liriodendron tulipifera	https://plants.usda.gov/home/plantProfile?symbol=LITU
Black Gum	Nyssa sylvatica	https://plants.usda.gov/home/plantProfile?symbol=NYSY
White Pine	Pinus strobus	https://plants.usda.gov/home/plantProfile?symbol=PIST
Cottonwood	Populus deltoides	https://plants.usda.gov/home/plantProfile?symbol=PODE3
Bigtooth Aspen	Populus grandidentata	https://plants.usda.gov/home/plantProfile?symbol=POGR4
Quaking Aspen	Populus tremuloides	https://plants.usda.gov/home/plantProfile?symbol=POTR5
Black Cherry	Prunus serotina	https://plants.usda.gov/home/plantProfile?symbol=PRSE2
White Oak	Quercus alba	https://plants.usda.gov/home/plantProfile?symbol=QUAL



Common Name	Scientific Name	Link to USDA Plant Database
Red Oak	Quercus rubra	https://plants.usda.gov/home/plantProfile?symbol=QURU
Black Oak	Quercus velutina	https://plants.usda.gov/home/plantProfile?symbol=QUVE
Beaked Willow	Salix bebbiana	https://plants.usda.gov/home/plantProfile?symbol=SABE2
Black Willow	Salix nigra	https://plants.usda.gov/home/plantProfile?symbol=SANI
Black Oak Beaked Willow Black Willow	Quercus rubra Quercus velutina Salix bebbiana Salix nigra	https://plants.usda.gov/home/plantProfile?symbol=QUVE https://plants.usda.gov/home/plantProfile?symbol=SABE2 https://plants.usda.gov/home/plantProfile?symbol=SANI

Sassafras	Sassafras albidum	https://plants.usda.gov/home/plantProfile?symbol=SAAL5
Eastern Hemlock	Tsuga canadensis	https://plants.usda.gov/home/plantProfile?symbol=TSCA
American Elm	Ulmus americana	https://plants.usda.gov/home/plantProfile?symbol=ULAM

### APPENDIX J

### Naval Submarine Base New London



Natural Res	ourcee Conservation Service									
Home Toples	Sam Downloads Partners Related Tools Help									
Basio Bearch	You are here: Home/Plant Profile									
Scientific Name 9 Go	General Images Synonyms Weband R	elated Links Sources Characteristics								
Characterizing Rearch	Quercus alba L.									
Duration Search	white oak									
Fact Sheets/Plant Guides										
Growth Habit Bearch	Characteristics									
image Search Invasive/Nexious Search	Morphology/Physiology									
Rarity Search	Active Growth Period	Spring and Summer								
Wetland Search	Bloat	None								
	C:N Ratio	High								
	Coppice Potential	Yes								
	Fall Conspicuous	Yes								
	Fire Resistant	No								
	Flower Color	Yellow								
	Flower Conspicuous	No								
	Follage Color	Green								
	Follage Porosity Summer	Dense								
	Follage Porosity Winter	Porous								
	Follage Texture	Medium								
	Fruit/Seed Color	Brown								
	Fruit/Seed Conspicuous	Yes								
	Growth Form	Single Stem								
	Growth Rate	Slow								
	Height at 20 Years, Maximum (feet)	25								
	Height, Mature (feet)	100.0								
	Known Allelopath	No								
	Leaf Retention	No								
	Lifespan	Long								
	Low Growing Grass	No								
	Nitrogen Fixation	None								
	Resprout Ability	Yes								
	Shape and Orientation	Erect								
	Taxicity	None								
	Growth Requirements									
	Adapted to Coarse Textured Solis	Yes								
	Adapted to Fine Textured Solis	No								
	Adapted to Medium Textured Solis	Yes								

Figure J-4. Example page (1 of 3) of plants characteristics available for tree species in the USDA Plants Database.



# J.2.2 Availability of Connecticut Native Trees

The Connecticut Department of Energy and Environmental Protection has published a list of sources for Connecticut native trees and shrubs (Picone 2005). This document was designed to assist in locating native stock sources of trees and shrubs native to Connecticut. The publication lists native trees and shrubs and provides a cross-reference to nurseries that may have tree stock available or who may be able to order a particular species.

### J.2.3 Tree Species Requirements

Several tree characteristics for trees found on SUBASE NLON are summarized in Table J-2. These include growth patterns, adaptation to soil conditions, drought and shade tolerance, relative production of fruit or seed. Tree characteristics were taken from the USDA Plants Database (USDA 2021). Additional characteristic of these trees species can be found in the online database as well as similar characteristics for other tree species not listed in Table J-2. A description and explanation of the plant characteristics in Table J-2 are presented in Table J-3.

Tree Species	Growth Form (single trunk vs. multiple stems)	Growth Rate	Height (20 years) (feet)	Height (mature) (feet)	Life Span	Soil Texture	Anaerobic tolerance	Drought tolerance	Shade tolerant	Fruit/Seed Abundance
Acer rubrum	trunk	rapid	35	68	short	all	medium	medium	intermediate	high
Acer saccharum	trunk	slow	20	100	long	coarse medium	none	medium	yes	high
Alnus incana ssp. rugosa	stems	moderate	16	16	short	fine medium	high	low	intermediate	low
Alnus serrulata	stems	rapid	12	30	moderate	all	high	low	no	low
Betula alleghaniensis	trunk	slow	25	75	moderate	all	low	medium	intermediate	medium
Betula lenta	trunk	moderate	15	60	moderate	coarse medium	none	medium	no	low
Betula populifolia	thicket	rapid	25	25	short	all	none	medium	intermediate	high
Carpinus carolinana	stems	slow	18	30	short	coarse medium	low	low	yes	medium
Carya glabra	trunk	slow	30	80	moderate	coarse medium	none	high	intermediate	medium
Carya tomentosa	trunk	slow	18	85	moderate	all	none	medium	intermediate	medium
Castanea dentata	trunk	rapid	35	115	long	medium	none	medium	no	medium
Chamaecyparis thyoides	trunk	moderate	20	50	long	coarse medium	high	none	intermediate	-
Cornus amomum	stolons	moderate	7	10	moderate	all	medium	low	intermediate	low
Cornus florida	stems	moderate	20	30	short	coarse medium	none	low	yes	medium

Table J-2. Selected characteristics of tree species found on SUBASE NLON.

### Naval Submarine Base New London



Tree Species	Growth Form (single trunk vs. multiple stems)	Growth Rate	Height (20 years) (feet)	Height (mature) (feet)	Life Span	Soil Texture	Anaerobic tolerance	Drought tolerance	Shade tolerant	Fruit/Seed Abundance
Cornus sericea	stems	moderate	12	12	moderate	all	high	low	no	low
Fagus grandifolia	trunk	slow	30	80	long	coarse medium	low	high	ves	medium
Fraxinus americana	trunk	moderate	40	90	moderate	coarse	low	low	no	high
Juniperus virginiana	trunk	slow	25	50	moderate	all	low	high	intermediate	medium
Liriodendron tulipifera	trunk	rapid	50	120	moderate	coarse medium	none	low	none	high
Nyssa sylvatica	trunk	moderate	30	95	moderate	coarse medium	low	low	yes	medium
Pinus strobus	trunk	rapid	40	150	moderate	medium	none	none	intermediate	medium
Populus deltoides	trunk	rapid	80	190	short	all	high	medium	no	high
Populus grandidentata	trunk	rapid	40	65	short	coarse medium	low	low	no	high
Populus tremuloides	trunk	rapid	40	65	short	all	low	low	no	high
Prunus serotina	stems	rapid	40	80	moderate	coarse medium	none	medium	no	high
Quercus alba	trunk	slow	25	100	long	Coarse medium	None	medium	intermediate	high
Quercus rubra	trunk	moderate	36	81	long	all	none	low	intermediate	medium
Quercus velutina	trunk	moderate	25	80	moderate	all	low	low	intermediate	high
Salix bebbiana	stems	moderate	12	12	moderate	all	medium	none	no	none
Salix nigra	stems	rapid	50	100	short	all	high	low	no	high
Sassafras albidum	trunk	moderate	24	75	moderate	coarse medium	none	high	no	medium
Tsuga canadensis	trunk	slow	22	105	long	coarse medium	none	low	yes	high
Ulmus americana	trunk	rapid	50	120	moderate	all	low	medium	intermediate	high

The summary information provides a quick guide to whether a particular tree species primary growth form is a single trunk or multiple stems that is more typical of shrub-like form. Mature tree height (feet) can be quite variable and is dependent on the site growing conditions. Soil texture is classified as fine, medium, and coarse and is often correlated with soil moisture. Soils with fine texture typically have more clay and silt particles that have a higher moisture-holding capacity than soils with coarse textures. Coarse textured soils often drain more quickly are often drier than finer textured soils. Anaerobic tolerance is an indication of whether a tree species can tolerate saturated (i.e., water-logged) soils. Saturated soils have lower oxygen levels than drier soils. A tree species listed as "none" or even "low" for anaerobic tolerance is an upland species that will not perform well on a wetland site or a site that is seasonally inundated by water. Shade tolerance is an indication of whether a species is adapted to growing in the shadow of other trees or requires full sun light to perform best. It should be noted that growth requirements for newly



plant trees may be slightly different until the tree becomes established, particularly the root system. New trees will be less drought tolerant until the root system is established.

Table J-3. Definition and explanation of tree characteristics in Table J-2. Full descriptions are available at <u>https://plants.usda.gov/assets/docs/PLANTS\_Help\_Document.pdf</u> under Growth Habits (USDA 2021).

	Definition and Description					
Plant Characteristic						
Growth Form	Trunk = single stem					
	Stems = multiple stems					
	Stolon = spreads by stolons					
	Thicket = thicket forming					
Growth Rate	Slow, moderate, or rapid					
Height (20 years) (feet)	Height at base age which is defined as 20 years in temperate areas					
Height (mature) (feet)	Estimate of median height at maturity which can be quite variable					
Lifespan (years)	Short: < 100 years; Moderate: 100 - 250; Long: >250					
Soil Texture (examples)	Coarse = sands, coarse sand, fine sands, and loamy sands;					
(Based on soil texture triangle,	Medium = silt, sandy clay loam, silty clay loam, and clay loam;					
see help documentation for	Fine = sandy clay, silty clay, and clay; and					
full soil type list)	All = adapted to all soil textures					
Anaerobic tolerance	None, low, medium, and high					
	(Typically found in water saturated soils)					
Drought tolerance	None, low, medium, and high					
	(Relative tolerance to drought conditions compared to other species with the same					
	growth habit from the same geographical region)					
Shade tolerant	Intolerant, Intermediate, Tolerant					
Fruit/seed abundance	None, Low, Medium, High					
	(The relative amount of seed produced compared to other species with the same					
	growth habit)					

# J.2.4 Tree Diseases and Pathogens

An addition consideration when selecting species for tree replacement is the potential susceptibility to diseases and other pathogens that could affect long-term establishment. For example, emerald ash borer is established in Connecticut. Planting white ash may require additional investment (i.e., treatments) to protect the trees in the future. Other diseases that have affected trees in Connecticut include white pine blister rust, chestnut blight, and Dutch elm disease (Connecticut Tree Protective Association 2021b). Douglas (2015) provides a guide to tree disease management for Connecticut arborists. Disease resistance cultivars may be available for some tree species based on recent tree breeding research. Other useful resources for information on tree diseases and pathogens and availability of disease resistant cultivars are the Connecticut Department of Energy and Environmental Protection (2021), Forestry Division and the Plant Disease Information Office of the Connecticut Agricultural Experiment Station (2021).



# J.3 APPENDIX J REFERENCES

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