U.S. AIR FORCE

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

New Boston Space Force Station



(See INRMP signature pages for plan approval date)

ABOUT THIS PLAN

This installation-specific Environmental Management Plan (EMP) is based on the United States Air Force's (USAF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which includes Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); Department of Defense Instructions (DoDIs); USAF Playbooks; federal, state, and local requirements; Biological Opinions; and permits are referenced.

Certain sections of this INRMP begin with standardized, USAF-wide "common text" language that address USAF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the USAF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by the approved plan owner.

NOTE: The terms "Natural Resources Manager," "NRM," and "NRM/POC" are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DoDI 4715.03, Natural Resources Conservation Program.

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DOCUMENT CONTROL

Standardized INRMP Template

In accordance with (IAW) the Air Force Civil Engineer Center (AFCEC) Environmental Directorate (CZ) Business Rule (BR) 08, *EMP Review, Update, and Maintenance*, the standard content in this INRMP template is reviewed periodically, updated as appropriate, and approved by the Natural Resources Subject Matter Expert (SME).

This version of the template is current as of 26 June 2020 and supersedes the 2018 version.

NOTE: Installations are not required to update their INRMPs every time this template is updated. When it is time for installations to update their INRMPs, they should refer to the eDASH EMP Repository to ensure they have the most current version.

Installation INRMP

Record of Review—The INRMP is updated no less than annually, or as changes to natural resources management and conservation practices occur, including those driven by changes in applicable regulations. IAW the Sikes Act and Department of the Air Force Manual (DAFMAN) 32-7003, *Environmental Conservation*, the INRMP is required to be reviewed for operation and effect no less than every 5 years. An INRMP is considered compliant with the Sikes Act if it has been approved in writing by the appropriate representative from each cooperating agency within the past 5 years. Approval of a new or revised INRMP is documented by signature on a signature page signed by the Installation Commander (or designee), and a designated representative of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries when applicable (DAFMAN 32-7003).

Annual reviews and updates are accomplished by the installation NRM and/or a Section Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the Section Natural Resources Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of USFWS, state fish and wildlife agency, and NOAA Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signing the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans.

INRMP APPROVAL/SIGNATURE PAGES

Add signature pages.

EXECUTIVE SUMMARY

This New Boston Space Force Station (NBSFS) Integrated Natural Resources Management Plan (INRMP) provides guidance and assigns responsibility for management of natural resources located on NBSFS. NBSFS occupies 2,864 acres in Hillsborough County of south-central New Hampshire, approximately 12 miles west of Manchester. Most of the station is comprised of unimproved (undeveloped) land that is managed for natural resource protection, outdoor recreation, and timber production.

The station supports a variety of native species (including threatened and endangered [T&E] and rare species), natural habitats, and ecosystems. The NBSFS INRMP supports the military mission of the station by ensuring the long-term sustainability of those species, habitats, and ecosystems, thus proactively avoiding conflicts associated with natural resource compliance issues. Natural resources are managed at NBSFS using an adaptive management process that integrates new findings and a developing understanding of human impacts on natural systems into future strategies and plans. Consequently, the INRMP is a living document that is modified in response to new information in a timely fashion. Implementation of the NBSFS INRMP is under the direction of the Natural Resources Planner at NBSFS. The INRMP is subject to annual reviews and updates, as appropriate, and full revision every 5 years, as required by DAFMAN 32-7003, Environmental Conservation. The INRMP was developed in consultation with the U.S. Fish and Wildlife Service (USFWS) and the New Hampshire Fish and Game Department (NHFGD). The INRMP is compatible with the current New Hampshire Wildlife Action Plan (NHWAP), as many of the Species of Greatest Conservation Need (SGCN) are present on NBSFS.

The 23d Space Operations Squadron (23 SOPS), a component of Space Delta 6, is the sole military presence at NBSFS. The squadron is 1 of 7 Satellite Control Network Remote Tracking Stations that form a worldwide network of satellite command and control stations to provide U.S. Space Command with satellite command and control capability.

Important components of the NBSFS INRMP include forest management, fish and wildlife management (including T&E and other protected species), water resources protection, wetlands protection, wildland fire management, outdoor recreation, and integrated pest management. Forest management techniques are applied to sustain healthy ecosystems with sufficient diversity to support native plants and animals, including T&E and rare species, while allowing timber production and sales. Wildland fire management at NBSFS, including prescribed burning, targets the maintenance of native species through creation and maintenance of appropriate habitats and control of competing invasive nonnative species.

The NBSFS INRMP describes the overall management goals and objectives at NBSFS. It identifies the projects that the installation plans to implement over the next 5 years to support those objectives. Goals, objectives, and projects have been developed for 5 specific natural resource management topics: an effective natural resources program; T&E and rare species populations; forests, wetlands, and natural habitats; control of invasive nonnative plant species; and outdoor recreation.

Goals, objectives, and projects associated with maintaining an effective natural resources program at NBSFS focus on appropriately training staff to accomplish goals, remaining in compliance with environmental law, and minimizing impacts and restoring damage to base lands.

Goals, objectives, and projects associated with the management of T&E and rare species on NBSFS focus on improving the understanding of the distributions, habitat use, and habitat needs of those species; developing management strategies to sustain or improve habitat conditions; and ensuring that populations of these species continue to exist or expand on NBSFS.

Goals, objectives, and projects associated with wetlands management on NBSFS focus on sustaining highquality wetland habitats by monitoring trends, identifying threats, and restoring degraded wetlands. Wetlands at NBSFS perform important ecological functions such as maintaining water quality, controlling floods, and recharging groundwater, and they also provide habitat for plant and animal species, including listed and rare species. Wetlands degradation could be caused by invasive nonnative plants, natural succession, encroachment of human developments, and runoff from developed or disturbed areas. Monitoring wetland change and developing response actions before problems arise or worsen are important components of the NBSFS INRMP.

Goals, objectives, and projects associated with the management of rare natural communities on NBSFS focus on sustaining high-quality, rare natural communities by monitoring trends, identifying threats, and restoring degraded communities. Degradation could be caused by invasive nonnative plants, natural succession, encroachment of human developments, and runoff from developed or disturbed areas. Monitoring community change and developing response actions before problems arise or worsen are important components of the NBSFS INRMP.

Because over 90% of NBSFS is forested, forest management is the dominant tool for natural resource management on NBSFS. Goals, objectives, and projects associated with forest management at NBSFS target the development of an overall forest management program that integrates the varied and sometimes disparate needs of a variety of forest-dependent species.

Currently, invasive nonnative plant species problems at NBSFS are limited to the impacts of relatively few species that have been effectively managed through repeated treatment. The most problematic species is the autumn olive (*Elaeagnus umbellata*), but other invasive nonnative species occur at relatively low densities. Invasive insect species at NBSFS are a significant issue, as the hemlock woolly adelgid (HWA, *Adelges tsugae*) and elongate hemlock scale (*Fiorinia externa*) are causing significant tree mortality and are difficult to control. Ongoing monitoring will identify emerging nonnative species concerns.

Outdoor recreation at NBSFS involves hunting, fishing, and wildlife viewing. Goals, objectives, and projects associated with outdoor recreation at NBSFS aim to develop a well-established, nonconsumptive, nature-oriented recreational program (e.g., hiking, birding) that capitalizes on opportunities for outdoor education. In addition, management of hunting and fishing programs can result in high-quality hunting and fishing experiences for staff and visitors.

1.0 OVERVIEW AND SCOPE

This Integrated Natural Resources Management Plan (INRMP) was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the U.S. Air Force (USAF). They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of USAF adaptability in all environments. The USAF has stewardship responsibility for the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the USAF natural resources program is to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of USAF lands to support the military mission of the installation. The plan outlines and assigns responsibilities for the management of natural resources, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act is the legal driver for the INRMP.

1.1 Purpose and Scope

The INRMP is the principal tool for managing natural resources on New Boston Space Force Station (NBSFS), previously known as New Boston Air Force Station. Each military installation in the United States under the jurisdiction of the Secretary of Defense must prepare and implement an INRMP unless a determination is made that the absence of significant natural resources makes preparation of such a plan inappropriate. INRMPs are prepared to ensure and document compliance with the Sikes Act (16 United States Code [U.S.C.] § 670 et seq.), which provides for cooperation of the Departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States. INRMPs are prepared to assist the Installation Commander with the conservation and rehabilitation of natural resources, consistent with the Sikes Act and other federal laws. Both the New Hampshire Fish and Game Department (NHFGD) and the U.S. Fish and Wildlife Service (USFWS) identified NBSFS as a Category I installation (Najjar 1998). This classification indicates that NBSFS has suitable habitat for fish and wildlife conservation and management. An INRMP is required for Category I installations (DAFMAN 32-7003 3.4.1).

The NBSFS INRMP establishes natural resource management goals and objectives that are consistent with the station mission and ensures no net loss in the capability of NBSFS lands to support that mission. The NBSFS INRMP ensures that natural resource conservation and other mission activities are integrated and consistent with federal mandates for land stewardship.

1.2 Management Philosophy

NBSFS is largely undeveloped and supports a variety of native species and natural habitats and ecosystems. The NBSFS INRMP supports the military mission of the station by ensuring the long-term sustainability of those species, habitats, and ecosystems, thus proactively avoiding conflicts associated with natural resource compliance issues.

The base comprehensive planning process, as described in Air Force Instruction (AFI) 32-1015, Integrated Installation Planning, establishes a systematic framework for decision-making related to the development of USAF installations. It incorporates USAF programs to identify and assess development alternatives and ensure compliance with applicable federal, state, and local laws, regulations, and policies. The comprehensive planning process incorporates a wide range of data and information that allows commanders

to logically and thoroughly analyze a variety of factors before making a decision that affects the installation or the surrounding community. The NBSFS INRMP supports this planning process by providing direction for those activities associated with natural resource management and conservation and by ensuring that mission activities and station development are considered in the context of the NBSFS ecosystem. The INRMP ensures that there is adequate knowledge of station resources and identifies the appropriate management strategies to provide for the sustainability of those resources.

The NBSFS INRMP was developed in consultation with the USFWS and NHFGD to determine appropriate management and conservation practices for natural resources on the station. The INRMP implements ecosystem management at the station by setting goals for desired ecological conditions. Ecosystem management principles and guidelines presented in DoD Instruction (DoDI) 4715.03, Natural Resources Conservation Program, were considered during development of this plan. These principals include:

- Maintenance or restoration of native ecosystems where practical and consistent with the military mission
- Maintenance or restoration of ecological processes, such as fire and other disturbance regimes, where practical and consistent with the military mission
- Maintenance or restoration of hydrological processes in streams, floodplains, and wetlands when feasible
- Application of regional approaches to implement ecosystem management by collaboration with other DoD components; other federal, state, and local agencies; and adjoining property owners
- Providing for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the station mission

Other considerations for management of natural resources on NBSFS include:

- Maintenance or reestablishment of viable populations of all native species when practical and consistent with the military mission
- Implementation of programs to control or eradicate invasive nonnative species on NBSFS
- Management of rare species (Heritage Status Ranks of G1 through G3, N1 through N3, and S1 through S3) and rare natural communities, when practical and consistent with the military mission

Natural resources are managed at NBSFS using an ecosystem-based, adaptive management process that integrates new findings and a developing understanding of human impacts on natural systems into strategies and plans. Consequently, the INRMP is a living document that is modified in response to new information in a timely fashion.

The INRMP serves as a key component of the Installation Development Plan, which provides background and rationale for the policies and programming decisions related to land use, resource conservation, facilities and infrastructure development, and operations and maintenance to ensure that they meet current requirements and provide for future growth. The INRMP supports the mission by identifying the natural resources present on the installation, developing management goals for these resources, and integrating these management objectives into the military requirements for mission operations/support and regulatory compliance to minimize natural resource constraints.

This INRMP outlines the steps needed to fulfill compliance requirements related to natural resources management and fosters environmental stewardship. It is organized into the following principal sections:

• An overview of the current statuses and potential future conditions of the natural resources

- Identification of potential impacts to or from natural resources
- The key natural resource management areas addressed
- Management recommendations that incorporate the installation's goals and objectives for natural resource management areas
- Specific work plans for effective implementation of the INRMP

Management issues and concerns, as well as goals and objectives, are developed from analysis of all the gathered information and are reviewed by NBSFS personnel involved with or responsible for various aspects of natural resources management. The INRMP was developed using an interdisciplinary approach and is based on existing information of the physical and biotic environments, mission activities, and environmental management practices at NBSFS. Information was obtained from a variety of documents, interviews with installation personnel, on-site observations, and communications with both internal and external stakeholders. Coordination and correspondence with these agencies is documented and satisfies a portion of the requirements of 32 Code of Federal Regulations (CFR) 989, Environmental Impact Analysis Process. Goals and objectives require monitoring on a continuous basis and management strategies are updated whenever there are changes in mission requirements, adverse effects to or from natural resources, or changes in regulations governing management of natural resources.

1.3 Authority

The Sikes Act, 16 U.S.C. § 670a, requires an INRMP be written and implemented for all DoD installations with significant natural resources. This plan has been developed cooperatively between the installation, the USFWS, and NHFGD. The USAF natural resources program ensures continued access to land, air, and water resources to conduct realistic military training and testing, as well as to sustain the long-term ecological integrity of the resource base.

This INRMP is developed under and proposes actions in accordance with (IAW) applicable DoD and USAF policies, directives, and instructions. Department of the Air Force Manual (DAFMAN) 32-7003 provides the necessary direction and instructions for preparing an INRMP. Issues are addressed in this plan using guidance provided under legislation, Executive Orders (EOs), Directives, and Instructions, including DoDI 4715.03; Air Force Policy Directive (AFPD) 32-70, Environmental Considerations in Air Force Programs and Activities; and DAFMAN 32-7003. DoDI 4715.03 provides direction for DoD installations to establish procedures for an integrated program for multiple-use management of natural resources. AFPD 32-70 discusses general environmental quality issues, including proper cleanup of polluted sites, compliance with applicable regulations, conservation of cultural resources at USAF installations. The "Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP" Table, included as Appendix A in this plan, summarizes key legislation and guidance used to create and implement this INRMP. Refer to the complete listing of AFIs, DAFMANs, the Federal Register, and the U.S.C. to ensure that all applicable guidance documents, laws, and regulations are reviewed.

A number of other laws, regulations, and directives authorize the management of natural resources on NBSFS (<u>Section 14.1.1</u>).

Installation-specific policies, including state and local laws and regulations are summarized in the table below.

Policy	Description
New Hampshire Revised	Defines wildlife and threatened species and what acts are prohibited.
Endangered Species	Discusses penalties for violation and the Threatened and Endangered
Conservation Act of 1979	Species Compensatory Mitigation Fund

Table 1-1. Installation-specific policies (including state and/or local laws and regulations)

1.4 Integration with Other Plans

This INRMP is a component to the Schriever Installation Development Plan, District 6, NBSFS. The NBSFS General Plan (2012) also supports the military mission by providing comprehensive land use planning considering infrastructure, soils, landform, cultural resources, natural resources, and other environmental concerns. The INRMP also overlaps with the installation's Integrated Pest Management Plan (IPMP; <u>Tab 3</u>—Integrated Pest Management Plan (IPMP)) in addressing nuisance wildlife and invasive species control. Integration with the Integrated Cultural Resources Plan (ICRMP; <u>Tab 2</u>—Integrated Cultural Resources Management Plan (ICRMP)) ensures that natural resources projects follow National Historic Preservation Act compliance procedures. The INRMP is mutually supportive and not in conflict with the Wildland Fire Management Plan (WFMP; <u>Tab 1</u>—Wildland Fire Management Plan). The INRMP provides the driving need for a WFMP, whereas the WFMP provides protocols and responsibilities for wildland fire management.

INRMP revisions and concurrence with the final plan must be coordinated through the installation chain of command. The Natural Resources Manager (NRM) must ensure that the INRMP; ICRMP; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) cleanup plans; IPMP; and any other plans that may affect natural resources are mutually supportive and not in conflict.

2.0 INSTALLATION PROFILE

Table 2-1. Installation profile

(OPR)overall responsibility for implementing the natural resources management program and is the lead organization for monitoring compliance with applicable federal, state, and local regulations.Natural Resources Manager/Point of Contact (POC)Mare: Stephen Najjar Phone: 603-471-2346 Email: stephen najjar@spaceforce.milState and/or local regulatory POCs (Include agency name for Sikes Act cooperating agencies)Wendi Weber, U.S. Fish and Wildlife Service Scott R. Mason, New Hampshire Department of Fish and GameTotal acreage of wetlands228Total acreage of forested land2.700Does installation have any Biological Opinons? (If yes, list title and date, and identify where they are maintained)U.S. Fish and Wildlife Service concurred with the May Affect. Not Likely to Adversely Affect determinations in the Integrated Natural Resources Management Plan Biological Assessment in March 2024. New Boston Space Force Base must follow all conservation measures listed in the Biological Assessment to prevent take of threatened and endangered species. Refer to Table 7-1 for conservation measures.Natural Resources Program Applicability (Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0)Imagement of Threatened, Endangered, and Host Nation-Protection Imagement of Section Imagement of Section Imagement of Section Imagement Imagement of Section Imagement Imagement <th>(OPR)ovmain locNatural Resources Manager/Point of Contact (POC)Na PhState and/or local regulatory POCs (Include agency name for Sikes Act cooperating agencies)WTotal acreage managed by installation2,8Total acreage of wetlands22Total acreage of forested land2,7Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)U.Natural Resources Program Applicability (Place a checkmark next to each program that must be implemented at the installation.⊠</th> <th>verall responsibility for implementing the natural resources anagement program and is the lead organization for onitoring compliance with applicable federal, state, and cal regulations. ame: Stephen Najjar hone: 603-471-2346 mail: stephen.najjar@spaceforce.mil Vendi Weber, U.S. Fish and Wildlife Service cott R. Mason, New Hampshire Department of Fish and ame 864 28 700 .S. Fish and Wildlife Service concurred with the <i>May</i> <i>ffect, Not Likely to Adversely Affect</i> determinations in the ttegrated Natural Resources Management Plan Biological ssessment in March 2024. New Boston Space Force Base ust follow all conservation measures listed in the iological Assessment to prevent take of threatened and mangered species. Refer to Table 7-1 for conservation</th>	(OPR)ovmain locNatural Resources Manager/Point of Contact (POC)Na PhState and/or local regulatory POCs (Include agency name for Sikes Act cooperating agencies)WTotal acreage managed by installation2,8Total acreage of wetlands22Total acreage of forested land2,7Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)U.Natural Resources Program Applicability (Place a checkmark next to each program that must be implemented at the installation.⊠	verall responsibility for implementing the natural resources anagement program and is the lead organization for onitoring compliance with applicable federal, state, and cal regulations. ame: Stephen Najjar hone: 603-471-2346 mail: stephen.najjar@spaceforce.mil Vendi Weber, U.S. Fish and Wildlife Service cott R. Mason, New Hampshire Department of Fish and ame 864 28 700 .S. Fish and Wildlife Service concurred with the <i>May</i> <i>ffect, Not Likely to Adversely Affect</i> determinations in the ttegrated Natural Resources Management Plan Biological ssessment in March 2024. New Boston Space Force Base ust follow all conservation measures listed in the iological Assessment to prevent take of threatened and mangered species. Refer to Table 7-1 for conservation
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Natural Resources Program	Natural Resources ProgramImage: Constraint of the sector of t	ADGUTAG
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⊠ Forest Management		Grounds Maintenance
		Forest Management
⊠ Wildland Fire Management		Wildland Fire Management
□ Agricultural Outleasing		Agricultural Outleasing
⊠ Integrated Pest Management Program	\square	Integrated Pest Management Program
□ Bird/Wildlife Aircraft Strike Hazard (BASH)		Bird/Wildlife Aircraft Strike Hazard (BASH)
□ Coastal Zone and Marine Resources Management		Coastal Zone and Marine Resources Management
Cultural Resources Protection	\square	Cultural Resources Protection
Public Outreach		
		Public Outreach

2.1 Installation Overview

2.1.1 Location and Area

NBSFS is located in south-central New Hampshire, approximately 12 miles west of Manchester (Figure 2-1). The 2,864-acre site is located within the towns of New Boston, Amherst, and Mont Vernon in Hillsborough County (Figure 2-2). Basic information about the installation is provided in Table 2-2.



Figure 2-1. New Boston Space Force Station



Figure 2-2. Map of the New Boston Space Force Station (NBSFS) installation boundary within Hillsborough County, New Hampshire

				Describe Natural
	Main		Addressed in	Resource
Installation/GSU	Use/Mission	Acreage	INRMP?	Implications
New Boston Space Force	Satellite	2,864	Yes, in	Mission has limited
Station/23d Space Operations	Communication		Section 2.1	implications
Squadron				-
1				

Table 2-2. Installation/Geographically Separated Unit (GSU) location and area descriptions

2.1.2 Installation History

The land on which NBSFS is located was predominantly used for small and large-scale farming between the time of European settlement until the federal government acquired the site. Much of the land at the time of acquisition was reverting back to forest. In autumn 1941, the federal government bought the land and used it until 1956 as an active air-to-ground bombing and strafing range in support of Grenier Field in Manchester, New Hampshire (O'Rourke and Elliott 2003). During that time, it was known as the New Boston Bombing and Gunnery Range. The USAF acquired rights to the site in 1957 for use as a satellite-tracking station.

On 01 October 1959, the 6594th Instrumentation Squadron was activated at NBSFS (O'Rourke and Elliott 2003). Satellite support operations began on 01 April 1960 using van-mounted equipment while permanent buildings were being constructed. By summer 1964, the station's dual satellite tracking, telemetry, and commanding capabilities were operating in permanent facilities. In the early 1960s, the Operations Area was cleared of unexploded ordnance before the permanent facilities for the satellite-tracking mission were constructed. In March 1972, it was announced that Grenier Field would close in September, and support facilities including base supply, transportation, fire protection, and civil engineering were moved to the station.

The 6594th Instrumentation Squadron was redesignated as Detachment 2, Air Force Satellite Control Facility, Air Force Systems Command, on 01 October 1979 (O'Rourke and Elliott 2003). Eight years later, it was redesignated as Detachment 2, 2d Satellite Tracking Group, and ownership was transferred from Air Force Systems Command to Air Force Space Command. On 01 November 1991, the squadron was redesignated as 23 SOPS. In summer 2020, NBSFS was transferred from the USAF to the U.S. Space Force.

Currently, the satellite-tracking mission is conducted from the Operations Area (Figure 2-1); the remainder of NBSFS is managed for military training, recreation, natural resources conservation, and cultural resources protection.

2.1.3 Military Missions

The 23 SOPS, a component of the U.S. Space Force, Space Operations Command, Space Delta 6, is the sole military presence at NBSFS. The squadron is 1 of 7 Satellite Control Network Remote Tracking Stations that form a worldwide network of satellite command and control stations to provide U.S. Space Command with critical satellite command and control capability (USSF 2024). The 23 SOPS provides launch, operation, and on-orbit support for more than 190 military satellites, communication satellites, and North Atlantic Treaty Organization and other allied nation satellites. NBSFS is occasionally used for military training exercises (Argonne National Laboratory [ANL] 1990, 1999*a*). The types of military training exercises include; tactical maneuvers, combat patrolling, emergency response, and land navigation

by various military units of the U.S. Department of Defense. Military training exercises have occurred at NBSFS since 1974.

As of October 2024 the New Hampshire Army National Guard is considering establishing a 300 meter rifle range capable of supporting M-4 training (<u>Appendix J</u>).

The tenants are listed in <u>Table 2-3</u>.

Table 2-3. Listing of tenants and natural resources responsibility

Tenant Organization	Natural Resources (NR) Responsibility
Source B and Source B Antenna, NOPS	No NR responsibility for tenant; antenna only
Source N	No NR responsibility for tenant; antenna only

2.1.4 Natural Resources Needed to Support the Military Mission

The satellite communication mission at NBSFS does not typically require significant assistance from the Natural Resources office. Primary assistance includes support with site selection for new mission equipment and management of vegetation. In the event of increased NHARNG training activities and usage on NBSFS, additional support may be needed.Similarly, executing the mission requires few natural resources.

2.1.5 Surrounding Communities

NBSFS is located in central Hillsborough County, New Hampshire. The estimated population size for the county in 2020 was 427,354, which equates to a population density of 482.5 persons per square mile (U.S. Census Bureau [USCB] 2024*a*). The closest cities to NBSFS are Manchester (population 115,141, USCB 2024*a*), located 10 miles east of NBSFS, and Nashua (population 91,161, USCB 2024*a*) located 15 miles south of the installation. Concord (population 44,503, USCB 2024*a*), the State Capital, is located approximately 20 miles north of NBSFS. Smaller communities in the vicinity include Mont Vernon (population 2,584, USCB 2024*a*), New Boston (population 6,164, USCB 2024*a*), Goffstown (population 18,550, USCB 2024*a*), Bedford (population 23,704, USCB 2024*a*), and Amherst (population 11,898, USCB 2024*a*).

The land surrounding NBSFS is a mosaic of forest, farmland, and residential developments. The communities near NBSFS have experienced population growth and are located within one of the most rapidly expanding residential areas of New England. Population growth in the county between 2010 and 2020 was estimated at 5.5% (USCB 2024*a*). Residential development is expected to continue in the area surrounding NBSFS.

2.1.6 Local and Regional Natural Areas

There are no major natural areas or parks located within 10 miles of NBSFS. The Joe English Reservation (Town of Amherst conservation land) abuts NBSFS along the southwest portion of the installation. The reservation is approximately 500 acres in size and has a forest composition similar to that found at NBSFS. The Pulpit Rock Conservation Area (approximately 200 acres), which is a Town of Bedford conservation land, is located to the northeast of the station. There are other smaller conservation areas maintained by local towns in the vicinity, but none of them are adjacent to NBSFS.

2.2 Physical Environment

2.2.1 Climate

The region around NBSFS is characterized by a humid continental climate. Northwesterly winds predominate, bringing cold, dry air during the winter and historically bringing cool, dry air in the summer (Wood 1996), although occasional days with high humidity do occur during the summer, mainly before and after rainstorms. Stronger southerly winds occur during July and August, and easterly winds usually accompany summer and winter storms. For the 1994 to 2023 period, the annual average temperature in the area was 47.9 °F, with highest and lowest monthly average temperatures in July and January, respectively (Table 2-4). Temperature extremes in the region are broad, with the lowest recorded temperature being -35 °F (22 January 1961 at Massabesic Lake, NH) and the highest being 105 °F (03 August 1988 at Massabesic Lake). The Global Historical Climatology Network Daily stations that provide the historical climate data discussed here are at Milford, NH; Massabesic Lake; and Nashua 2 NNW, NH. These are at lower elevations than NBSFS. As a result, general trends and overall characteristics described from station data are pertinent to the regional climate, but conditions at NBSFS are likely to be somewhat cooler overall.

Precipitation is distributed relatively evenly throughout the year, with no distinct wet or dry season (Table 2-4). Annual precipitation for the 1994 to 2023 period averaged approximately 48 inches, with October being the wettest month, netting 5.1 inches on average, whereas February was the driest month, with 3.2 inches on average. Precipitation of 0.01 inches or more occurs on 143 days per year (approximately a third of the year, or just over 1 in 3 days. The region sees substantial snowfall during the late fall, winter, and early spring, totaling between 50 and 60 inches each year on average, with frequent major winter storms that bring several inches of snowfall in a day. Average monthly snowfalls exceeding 10 inches were reported from December through February. The last frost dates generally occur in late April, whereas the first frosts generally occur in mid-October.

	Mean Temperature	Mean Daily Maximum	Mean Daily Minimum	Precipitation-Water
Month	(°F)	Temperature (°F)	Temperature (°F)	Equivalent (inches)
January	23.3	33.3	13.4	3.4
February	25.9	36.8	15.0	3.2
March	33.9	44.8	23.1	3.8
April	45.9	57.9	33.9	4.2
May	56.6	68.6	44.6	3.9
June	66.2	77.5	54.8	4.3
July	71.6	83.0	60.2	4.2
August	69.8	81.5	58.2	3.7
September	62.5	74.1	50.8	4.2
October	50.2	61.6	38.7	5.1
November	39.5	49.8	29.2	3.6
December	29.9	39.2	20.6	4.7

Table 2-4. General weather statistics for the New Boston Space Force Station region, 1994–2023

Source: National Centers for Environmental Information Global Historical Climatology Network Daily Station Composite (Milford, NH; Massabesic Lake, NH; Nashua 2 NNW, NH)

A variety of extreme weather phenomena have the potential to cause impacts on station operations, logistics, and natural resource management. Coastal storms, referred to as nor'easters, can be a serious weather hazard in southeastern New Hampshire in general, but with diminishing impacts inland and towards the northern portions of the state (Ruffner 1985). Such storms generate very strong winds and heavy rain or snow. Additionally, storms of tropical origin affect or threaten New Hampshire approximately once every 2 to 3 years, although hurricane-force storms are relatively rare in the region due to its northern position. Thunderstorms are common and occur 15 to 30 times per year. These storms can bring substantial rainfall, resulting in localized and riverine flooding across the greater southeastern New Hampshire region. In rare cases, strong convective fronts can also produce tornadoes, although direct impacts at NBSFS have not been recorded. More common in the region is a phenomenon known as a "downburst" (in which strong convective thunderstorms result in the sudden downward movement of air, resulting in extreme straight line winds). Ice storms can also occur in the winter, which can suddenly deteriorate regional road safety, damage power delivery infrastructure, and create a risk of downed tree limbs. Ice storms are usually of short durations. However, a few widespread and prolonged ice storms have occurred in the broader region (City of Manchester and Southern New Hampshire Planning Commission 2018, New Hampshire Department of Safety 2023).

2.2.1.1 Climate Change

The climate in southeastern New Hampshire and at NBSFS is changing, with recent decades showing substantially warmer and wetter conditions than those of the early and mid-20th century. For example, the average daily maximum temperatures at Concord, located roughly 18.5 miles north of the main NBSFS facility, have increased by 2.4 °F since 1971. The daily average minimum temperatures have risen more rapidly, with a 3.8 °F increase since 1971 and a 7.2 °F increase in winter minimum daily temperatures over the same period (Lemcke-Stampone et al. 2022). More muted upward trends are observed in the composite climate record derived from the Massabesic Lake, Nashua 2 NNW, and Milford Global Historical Climatology Network Daily stations, with mean annual temperatures rising by 1.2 °F since mid-century and annual minimum temperatures increasing by 2.1 °F. These warming trends are also reflected at the county and state levels, with the state experiencing average temperature increases of approximately 3.0 °F since the early 20th century and Hillsborough County showing a 0.3 °F per decade increase in average annual temperatures since 1895 (Runkle et al. 2022, National Oceanic and Atmospheric Administration National Centers for Environmental Information [NOAA NCEI] 2024).

The region has also seen increases in average annual precipitation over the last several decades, with average annual precipitation increasing by nearly 6 inches since mid-century. County-level trends show a similar trajectory, with 7 of the 10 wettest years on record in Hillsborough County having occurred since 1996 and long-term records showing a notable 0.6 inch per decade upward trend overall (NOAA NCEI 2024). Statewide, increases in extreme storm event intensities and frequencies have also been observed, with recent decades showing an increase in heavy (2 inches per day) rainfall events (Runkle et al. 2022)

These trends are projected to continue over the remainder of the 21st century, although the magnitude of change varies depending upon the global emissions of greenhouse gas emissions considered in different scenarios. The Center for the Environmental Management of Military Lands (CEMML) at Colorado State University developed site-specific climate projections, focusing on climate data from 2026 to 2035 to represent the decadal average for 2030 and data from 2046 to 2055 for the decadal average for 2050 (CEMML 2019). CEMML developed projections for 2 future carbon-emission scenarios: Representative Concentration Pathway (RCP) 4.5 (moderate emission levels) and RCP 8.5 (high emission levels). For the decade centered around 2030, the RCP 4.5 and RCP 8.5 scenarios projected a similar degree of increase in average annual temperature (TAVE) of between 2.1 and 2.4 °F over the historical (1976 to 2005) average.

The 2 emission scenario projections showed higher warming by 2050, with the RCP 4.5 scenario exhibiting a warming of 3.2 °F. The RCP 8.5 scenario led to slightly greater warming of 3.6 °F (<u>Table 2-5</u>). For 2030, the RCP 4.5 scenario projects an increase in annual precipitation of 11%, whereas RCP 8.5 shows an increase of 5%. For 2050, RCP 4.5 projects an increase in precipitation of 7%, whereas RCP 8.5 shows a slightly greater increase of 12% (<u>Table 2-5</u>).

		RCP 4.5		RCP 8.5	
Variable	Historical	2030	2050	2030	2050
PRECIP (inches)	50.3	56.0	53.6	52.7	56.3
TMIN (°F)	35.3	37.3	38.2	37.5	38.7
TMAX (°F)	56.9	59.1	60.4	59.5	60.7
TAVE (°F)	46.0	48.0	49.1	48.7	49.6
GDD (days)	2,570	2,974	3,208	3,052	3,256
HOTDAYS (days)	2.6	10.4	17.4	16	17.3
WETDAYS (days)	1.0	0.2	0.5	0.3	0.8

Table 2-5. Summary of climate data for New Boston Space Force Station, extracted from LOCA-METDATA Community Climate System Model Version 4 (Coupled Model Intercomparison Project 5)

Definitions: GDD= Average annual accumulated growing degree days with a base temperature of 50 °F; HOTDAYS= Average number of hot days exceeding 90 °F; PRECIP= Average annual precipitation; RCP= Representative Concentration Pathway; TAVE= Annual average temperature; TMAX= Annual average maximum temperature; TMIN= Annual average minimum temperatures; WETDAYS= Annual average number of days with precipitation exceeding 2 inches in a day.

These localized future projection trends are also reflected in climate projections undertaken in recent years by the University of New Hampshire and various national efforts. For example, analyses by Wake et al. (2014) found that the southeastern New Hampshire region would likely see between 3 to 5 °F increases in annual average temperature by the mid-21st century, with between 4 to 8 °F increases possible by the 2100s. More recent work by Lemcke-Stampone et al. (2022) found even higher potential for warming in the Concord and Massabesic Lake areas, with end-of-century high temperatures increasing by nearly 10 °F over the 1980 to 2009 baseline. In both analyses, increases in precipitation are also projected, with regional increases of up to 20% possible by the end of the century. In summary, the future of southeastern New Hampshire will almost certainly be much warmer and is very likely to be much wetter as global climate change continues to unfold over the coming decades.

These changes will have effects during all seasons, with the most dramatic changes likely to emerge in winter. Increasingly, winter conditions will be shortened, with higher proportions of precipitation falling as rain instead of snow, later onset of freezing temperatures, and earlier onset of spring thaw conditions. During the summer, warm season temperatures will increase and extend into late spring and early autumn. In most projections, these increases in temperature also bring a heightened risk of extreme heat events, with daily high temperatures above 90 °F becoming increasingly likely. Summer periods will also likely see warming in wetlands, ponds, lakes, and streams, with resulting implications for wildlife reliant on these sites for habitat and food sources. The likelihood of extreme precipitation events is also projected to increase under most scenarios. Ultimately, natural resource management decisions on NBSFS will play an important role in determining operational viability and ecosystem integrity as these changes play out. These implications are discussed in <u>Section 7.16</u>.

2.2.2 Landforms

NBSFS is located within an area of hilly and mountainous terrain. The main physiographic features on NBSFS are Chestnut Hill in the northeastern section, Roby Hill in the southwestern section, and Joe English Hill in the northwestern section. Joe English Pond (Figure 2-3) is located in the center of the station. Elevations on NBSFS range from 340 feet above mean sea level (MSL) where Joe English Brook crosses the southeastern corner of the station to approximately 1,275 feet above MSL at the summit of Joe English Hill (Figure 2-4). The steepest areas of terrain include the near-vertical slopes on the southern cliffs of Joe English Hill and the northeast aspect of P-51 Hill, located south of Joe English Pond. The sides of the stream ravines in the south-central and southwestern portions of the station are also relatively steep. The most extensive, nearly level areas are the glacial till uplands that occur in the area east of Roby and Ice Ponds. Small, nearly level outwash plains or stream valley areas occur south of Joe English Hill, near Joe English Pond, and the surrounding Wells Bog (ENSR Consulting and Engineering 1993).



Figure 2-3. Joe English Pond



Figure 2-4. Joe English Hill in background

2.2.3 Geology and Soils

The bedrock geology underlying NBSFS consists of Pre-Quaternary metamorphic and igneous rocks. Generally, the bedrock is buried beneath glacial drift. Till is the dominant surficial deposit and is composed of an unsorted to poorly sorted mixture of clay, silt, sand, gravel, cobble, and boulders. However, swamp deposits and recent alluvium are also present. Glacial striations and drumlins (elongated or oval hills of glacial origin) are present throughout the area and provide evidence of general north-to-south glacial movement. Chestnut Hill (a drumlin) and Joe English Hill (moutonée) are 2 such glacial features.

Soil units, phases, and complexes of the area are described in the Soil Survey of Hillsborough County, New Hampshire, Eastern Part (Bond and Handler 1981). Twenty-three soil map units occur within the limits of NBSFS. Over 90% of the soils on NBSFS were formed in glacial till; the remainder formed in outwash plains, kame terraces, or stream valleys. Much of the Operations Area occurs on fill that was placed during the original development of the area. Soils formed in glacial till tend to be fine-textured and dense and contain many stones. Soils covering approximately half of NBSFS are classified as stony or very stony. The erosion hazard of the soils on NBSFS is slight if stabilized by vegetative cover; however, the soils have moderate to extreme erosion potential in bare areas because of their fine texture and the steep slopes present on portions of NBSFS. Activities that disturb or remove vegetation are likely to increase the erosion hazard, particularly on slopes (ENSR Consulting and Engineering 1993). Some areas of NBSFS contain exposed bedrock. A more detailed description of the soils of NBSFS, including soil maps, can be found in Bond and Handler (1981).

2.2.4 Hydrology

NBSFS contains several open waters and intermittent and perennial stream segments (Figure 2-5). The approximate area of the station's larger water bodies (including associated wetlands) are Joe English Pond, 19 acres; Green Tree Reservoir, 7.5 acres, Gardner Pond, 6.0 acres; Ice Pond, 2.8 acres; Roby Pond, 0.8 acres; Seavy Pond, 0.5 acres; and Deer Pond, 0.5 acres (Najjar 1998). The ponds range between 1 and 28 feet in depth. The only known water quality problem in these impoundments is an annual buildup of coliform bacteria during dry periods in the summer (Najjar 1998).

Joe English Pond, in the center of NBSFS, is the largest water body at the station (Figure 2-3, Figure 2-5). The water surface elevation is maintained at approximately 500 feet MSL by a beaver (*Castor canadensis*) dam. Joe English Pond was maintained by a dam until 2010, when the dam was removed. The maximum depth of the pond is approximately 25 feet. Culverts maintain hydrologic connection between the areas north and south of the causeway. Joe English Pond is designated by the state as a Class B water and is considered suitable for swimming and other recreational activities, fish habitat, and, after adequate treatment, water supply (Parsons Engineering Science, Inc. [PES] 1995).

Streams on NBSFS include those that flow into Joe English Pond from the upland to wetland areas of Murphy Swamp, Gardner Pond, Beaver Pond No. 1, Deer Pond, and Ice Pond. Drainage from Joe English Pond flows southeast in Joe English Brook, which exits the station boundary approximately 1 mile downstream of the pond. Joe English Brook is the largest onsite stream. It ranges from 10 to 20 feet wide and between 2 to 5 feet deep (PES 1995). Joe English Brook is designated as a Class B water by the state (New Hampshire Department of Environmental Services, personal communication, 2024).

There are 3 watersheds on NBSFS (Figure 2-5). Most of NBSFS is located within the Joe English Brook watershed, which flows southeast. Approximately half of the Operations Area is within the Bog Brook watershed, which flows northwest. Drainage from the northwestern portions of the station flows off site towards the west and north in the Meadow Brook watershed.



Figure 2-5. Watersheds and water bodies of New Boston Space Force Station (NBSFS)

The major aquifer system at NBSFS is in the bedrock. Fractured meta-sedimentary rocks that have adequate effective porosity, permeability, and thickness to provide a high degree of groundwater transmissivity in the aquifer system underlay NBSFS. Groundwater levels at NBSFS range from 73 feet below land surface to flowing artesian conditions near Joe English Pond. The NBSFS potable water supply is provided by groundwater from 5 wells (2 at the Operations Area, 1 at the Community Center [Building 161], 1 at the Joe English Pond Campground, and 1 at the trailer park). The 2 wells supporting the Operations Area pump to a 110,000 gallon storage tank (Building 135), then through a radon-stripping aeration device and chlorination treatment system to a 60,000 gallon storage tank in Building 107.

A wetland delineation performed in 1995 and 1996 identified 228 wetland areas totaling 198 acres (Figure 2-6) within the boundaries of NBSFS (PES 1996). Wetland complexes were identified in the central portion of NBSFS, associated with Joe English Pond; in the southeast, associated with Joe English Brook and Wells Bog; along West Meadow Road, south of Joe English Hill; along the Ice Pond drainage; and in the east central portion of the station, associated with Green Tree Reservoir. Most of the identified wetlands were classified as palustrine forested wetlands (60.4 acres) using the Cowardin et al. (1979) system of classification (PES 1996). Other wetland types on NBSFS include palustrine mixed (35.9 acres), palustrine open water (35.2 acres), palustrine scrub shrub (13.1 acres), and palustrine emergent wetlands (10.7 acres) (PES 1996). A more complete description of wetlands on NBSFS is presented in <u>Section 2.3.5</u>. Floodplains are also described in <u>Section 2.3.5</u>.



Figure 2-6. Wetlands within New Boston Space Force Station (NBSFS), with rivers, roads, and trails shown for additional context

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

According to Bailey's delineation of ecoregions of North America (Bailey 2016), NBSFS is within the Humid Temperate Domain–Hot Continental Division–Eastern Broadleaf Forest Province. Nine sections have been delineated in this province; the NBSFS region is located within the Lower New England Section and the Gulf of Maine Coastal Plain Subsection (Cleland et al. 2007, Bailey 2016).

Elevations in the Lower New England Section gradually descend to the coastal zone in a series of broad, hilly plateaus. Natural vegetation in the section is predominantly deciduous forest dominated by tall broad-leaved trees that provide a dense canopy in summer (Bailey 1995, 1998). A subcanopy of small trees and shrubs tends to be weakly developed, and a ground cover of herbaceous species is present only in spring, prior to emergence of the canopy. Vegetation types include northern hardwood, Appalachian oak, and northeastern oak–pine forest. Important vegetation types in different regions within the section include northern hardwood–hemlock–white pine, central hardwoods, coastal pitch pine, maritime oak, and maritime red cedar. Soils of the division are typically rich in humus and moderately leached. Forest land dominates 70% of the area, mostly in small holdings. Approximately 15% of the area is used for agriculture and approximately 10% is urbanized (McNab and Avers 1994). Regionally, the distribution of modern forest types corresponds well with that of pre-settlement forests.

The original ecosystem of the Lower New England Section was greatly altered by European settlement. Large predators (e.g., gray wolf, *Canis lupus*) were intentionally exterminated, and other large vertebrate populations were exterminated (e.g., moose, *Alces alces*), reduced, or restricted (e.g., white-tailed deer, *Odocoileus virginianus*; wild turkey, *Meleagris gallopavo*) by hunting and habitat loss (McNab and Avers 1994). Many of these species became reestablished with the regrowth of forests on abandoned agricultural lands. The large predators have not returned, and their niche has been partially filled by midsize predators (e.g., bobcat, *Lynx rufus*; coyote, *Canis latrans*). The loss of predators, habitat changes, and patterns of human settlement have resulted in imbalances between herbivores and plant resources. Early successional habitats are lacking in the Lower New England Section (McNab and Avers 1994).

The Lower New England Section has abundant water resources, including perennial streams, natural and artificial lakes and ponds, fresh and saltwater wetlands, and estuaries (McNab and Avers 1994). Stream gradients are generally low. Maximum monthly streamflows typically occur in March and April, but high peak flows may occur at any time of year and are typically associated with hurricanes or rain-on-snow events. Minimum monthly stream flows occur in August, September, and October. Most of the lakes and impoundments are small.

Ecological disturbance in the Lower New England Section results from fires, hurricanes, land use, climate change, tree diseases, and insect pests. Central and coastal New England areas have intermediate to high occurrences of fire and hurricane wind (once every 30 to 50 years) relative to more inland New England sites. On a landscape scale, modern forest characteristics and distributions are strongly affected by land use, particularly agriculture. Insects and diseases include the spongy moth (*Lymantria dispar*, formally known as the gypsy moth), emerald ash borer (EAB, *Agrilus planipennis*), beech bark disease (*Nectria spp.*), beech leaf disease (*Litylenchus crenatae ssp. mcannii*), elongate hemlock scale (*Fiorinia externa*), beech scale (*Cryptococcus fagisuga*), chestnut blight (*Chryphonectria parasitica*), Dutch elm disease (*Ceratocystis ulmi*), hemlock woolly adelgid (HWA, *Adelges tsugae*), pitch pine looper (*Lambdina athasaria pellucidarium*), hemlock looper (*Lambdina fiscellaria*), oak leaf tier (*Croesia semipurpurana*), red pine scale (*Matsucoccus matsumurae*), and red pine adelgid (*Pineus borneri*). Of these, elongate hemlock scale,

beech bark disease, beech leaf disease, HWA, and EAB are prevalent on NBSFS and are causing ecosystemlevel changes that are difficult to manage.

Beech leaf disease was documented in summer 2024 on NBSFS. The disease is caused by the *Litylenchus crenatae* ssp. *mcannii* nematode, a parasite that uses beech leaf and bud tissue to complete its life cycle. Parasitism causes damage or death to the foliage and buds, causing death of the branches and the entire tree. Trees in southern New England die rapidly after infection. The disease may cause mass mortality and die back of beech stands (Brazee 2024). Beech leaf disease symptoms are shown in Figure 2-7.



Figure 2-7. Beech leaf disease symptoms (Brazee 2024).

The Gulf of Maine Coastal Plain Subsection, in which NBSFS is located, has soils that are moderately deep tills deposited by glaciers, underlain by both igneous and metamorphic bedrock (Sperduto and Nichols 2004). Glacial drumlins are common in this subsection producing its characteristic rolling topography. The Merrimack River valley, filled with glacial outwash and glacial lake deposits, is a prominent feature of this Subsection.

2.3.2 Vegetation

2.3.2.1 Historical Vegetation Cover

A long history of human occupation and settlement in New Hampshire has resulted in significant changes in ecological conditions (Whitney 1994). The Native American practice of burning forested areas in late summer and autumn affected the forest structure and species distributions (Najjar 1998). European settlement began in the early 1600s with the clearing of the predominantly forested landscape for farms and villages. The tree species of the original forest included species that are typically found today: eastern white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*), paper birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), alder (*Alnus* spp.), and northern red oak (*Quercus rubra*). Clearing continued until the mid-1800s, when more than half of the land in southern New Hampshire was farmland. After the late 1800s, farms were commonly abandoned and many cleared areas began to revert back to forest. Farm abandonment continues to this day, but replacement with residential development has become increasingly more common than the natural succession that has occurred in previous decades. Logging on a large scale, especially of white pine, began in the middle 1800s and peaked in the early 1900s; managed timber harvest continues throughout New Hampshire.

Tree diseases and pests have resulted in important changes in forest composition. Perhaps the most important of these is the chestnut blight, which has virtually eliminated the formerly dominant American chestnut (*Castanea dentata*). Chestnut blight is caused by *Cryphonectria parasitica*, a pathogen originating from Asia, which was introduced around 1904 and led to the near elimination of American chestnut as a dominant overstory species (Rigling and Prospero 2018). Succession following the decimation of the chestnut has resulted in simple replacement of that species by its former associates. Sprouts from the old roots of American chestnut can be found today throughout the station, but these die before reaching maturity.

2.3.2.2 Current Vegetation Cover

Over 90% of NBSFS is forested. In 2023, CEMML classified 16 U.S. National Vegetation Classification Natural Vegetation communities and 1 Cultural Vegetation Community (<u>Table 2-6</u>). Plant species observed on NBSFS are listed in <u>Appendix B</u>. Much of the area surrounding NBSFS is rural, with interspersed farms, forests, and residential areas. Forest habitat on the station is consistent with the surrounding area, county, and region. Residential development of surrounding lands has increased since 2014, resulting in an increase in the ecological importance of the undeveloped land on the station. Figure 2-9 shows observed habitat types across NBSFS. Figure 2-10 shows typical forest habitat at NBSFS.

Vegetation Community	Acres	Percent				
Natural Vegetation Community						
American White Waterlily–Pond-lily Species–Watershield Aquatic Vegetation						
Alliance	63.31	2.19				
Common Buttonbush–Swamp-loosestrife Shrub Swamp Alliance	2.50	0.09				
Eastern Hemlock–Sweet Birch–Yellow Birch Forest Alliance	518.18	17.94				
Eastern White Pine–Eastern Hemlock Lower New England-Northern Piedmont Forest						
Association	1,324.88	45.88				

Table 2-6. Vegetation communities observed at New Boston Space Force Station (CEMML 2023)

Vegetation Community	Acres	Percent		
Gray Birch–Yellow Birch–American Red Raspberry Ruderal Shrubland Alliance	66.82	2.31		
Highbush Blueberry Peat Shrubland Alliance	7.29	0.25		
Narrowleaf Cattail–Broadleaf Cattail–Bulrush Species Deep Marsh Alliance	3.90	0.14		
Northern Red Oak–Sugar Maple–Yellow Birch Forest Alliance	741.49	25.68		
Northwest Territory Sedge–Upright Sedge–Lake Sedge–Blister Sedge Wet Meadow				
Association	1.68	0.06		
Orchardgrass-Fescue Species-Canada Goldenrod Ruderal Mesic Meadow Alliance	32.49	1.13		
Red Maple–Blackgum–Yellow Birch / Peatmoss Species Swamp Forest Association	16.38	0.57		
Sedge Species–Bluejoint Northern Wet Meadow Alliance	4.30	0.15		
Sensitive Fern–(Northern Maidenhair)–Orange Jewelweed–Plantainleaf Sedge				
Seepage Meadow Association		0.23		
Steeplebush–Blackberry Species Ruderal Wet Shrubland Alliance		0.34		
Swamp-loosestrife Shrub Swamp Association	1.28	0.04		
Woolgrass Wet Meadow Association	9.44	0.33		
Cultural Vegetation Community				
Warm-Season Open Lawn Cultural Subgroup	49.69	1.72		

 Table 2-6. Vegetation communities observed at New Boston Space Force Station (CEMML 2023)



Figure 2-8. Habitat types at New Boston Space Force Station (NBSFS); Source: CEMML (2023)



Figure 2-10. Forest habitat at New Boston Space Force Station

Coniferous Forest

Coniferous forest habitats on NBSFS are areas with a tree canopy comprised of 60% or more coniferous trees, especially eastern white pine or eastern hemlock. Areas dominated by eastern hemlock (such as the Eastern Hemlock–Sweet Birch–Yellow Birch Forest Alliance) typically have sweet birch (*Betula lenta*) and American beech (*Fagus grandifolia*) upper canopy associates and have dense leaf litter with little if any vegetation in the understory. Areas dominated by white pine (such as the Eastern White Pine–Eastern Hemlock Lower New England-Northern Piedmont Forest Association) commonly have maple, sweet birch, American beech, and oak (*Quercus* spp.) associates. Understories in these communities are typically diverse and comprised of young deciduous trees, including northern red oak, red maple, and sweet birch; shrubs such as American witchhazel (*Hamamelis virginiana*), mountain laurel (*Kalmia latifolia*), lowbush blueberry (*Vaccinium angustifolium*), and highbush blueberry (*Vaccinium corymbosum*); and herbaceous species such as Jack in the pulpit (*Arisaema triphyllum*), Solomon's seal (*Polygonatum pubescens*), bracken fern (*Pteridium aquilinum*), clubmoss (*Lycopodium* spp.), and pipsissewa (*Chimaphila umbellata*). Coniferous forest is well represented on NBSFS, especially in the southern portions of the station (Figure 2-9) and occupies a total of approximately 710 acres.

Deciduous Forest

Deciduous forest habitats on NBSFS include areas with a tree canopy comprised of 60% or more deciduous trees, especially northern red oak, black oak (*Quercus velutina*), American beech, white ash, sugar maple, red maple, and gray birch (*Betula populifolia*). The understory of deciduous forest is typically dominated by saplings of these and other deciduous trees, as along with occasional white pine and hemlock; shrubs such as witch hazel (*Hamamelis virginiana*), mountain laurel, and highbush blueberry; and herbaceous species such as wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), starflower (*Trientalis borealis*), clubmoss, wintergreen (*Gaultheria procumbens*), whorled wood aster (*Oclemena acuminata*), Indian cucumber root (*Medeola virginiana*), and hay-scented fern (*Dennstaedtia*)
punctilobula). Deciduous forest occupies approximately 540 acres on NBSFS, and the largest stands are located in the northeastern portion of the station (Figure 2-9).

Parkland

Parkland habitats at NBSFS include the former Joe English Pond Campground and areas near Deer Pond and Seavy Pond (Figure 2-9). Parkland habitats occupy approximately 47 acres on NBSFS and are characterized by maintained turf grass and ornamental trees and shrubs (see further description of maintained areas under Developed Land below). These areas are classified as the U.S. National Vegetation Classification Cultural Vegetation type Warm-Season Open Lawn Cultural Subgroup.

Shrublands

Shrublands at NBSFS are early successional communities commonly found in clear cuts and recently disturbed areas. Resultant vegetation is a diverse assemblage of low shrub species and regenerating saplings, including yellow birch (*Betula alleghaniensis*), gray birch (*Betula populifolia*), mountain laurel, lowbush blueberry, and Allegheny blackberry (*Rubus allegheniensis*), along with assorted grasses, ferns, forbs, and sedges.

Grasslands

At NBSFS, grassland communities are uncommon but include areas where pastures and agricultural fields have been abandoned. These communities comprise roughly 1% of the total installation. The Orchardgrass–Fescue Species–Canada Goldenrod Ruderal Mesic Meadow Alliance is dominated by and a mix of grasses and forbs, including redtop (*Agrostis gigantea*), creeping bentgrass (*Agrostis stolonifera*), flat-top goldentop (*Euthamia graminifolia*), red fescue (*Festuca rubra*), perennial ryegrass (*Lolium perenne*), Virginia pepperweed (*Lepidium virginicum*), oxeye daisy (*Leucanthemum vulgare*), common cinquefoil (*Potentilla simplex*), tall fescue (*Schedonorus arundinaceus*), red clover (*Trifolium pratense*), and white clover (*Trifolium repens*).

Wetlands

PES (1996) identified a total of 228 wetlands that occupied a total of 198 acres on NBSFS. Wetlands are areas containing vegetation adapted to saturated soil conditions. They are shown in Figure 2-9 and are described in detail in Section 2.3.5. At NBSFS, wetlands and swamps encompass several vegetation community types with a diverse assemblage of species. The Red Maple–Blackgum–Yellow Birch/ Peatmoss Species Swamp Forest Association is a forested swamp type at NBSFS found in basins within upland forests, commonly with an overstory of red maple and blackgum (*Nyssa sylvatica*) trees. Shrub wetland and swamp communities are various and include species such as common buttonbush (*Cephalanthus occidentalis*), swamp loosestrife (*Decodon verticillatus*) white meadowsweet (*Spiraea alba*), steeplebush (*Spirea* tomentosa), and highbush blueberry, typically occurring near shallow edges. Typical herbaceous wetland and wet meadow species are Northwest Territory sedge (*Carex utriculata*) rushes (*Juncus* spp.) sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), softstem bulrush (*Schoenoplectus tabernaemontani*), woolgrass (*Scirpus cyperinus*), eastern marsh fern (*Thelypteris palustris*), and broadleaf cattail (*Typha latifolia*). Floating vegetation is comprised of duckweed (*Lemna* spp.), variegated yellow pond-lily (*Nuphar lutea* ssp. *variegata*) and American white waterlily (*Nymphaea odorata*).

Open Water

Open-water habitat is an area of permanent water that supports little if any emergent vegetation. Openwater habitat is limited to Joe English Pond (Figure 2-9) and occupies 19 acres. This area was classified as a lacustrine wetland in PES (1996).

Disturbed Land

Disturbed lands on NBSFS are those areas with little vegetation or built structures such as clearcuts, gravel pits, or recently graded areas. Disturbed land occupies 37 acres (Figure 2-9).

Developed Land

Developed lands on NBSFS are areas that support buildings, parking lots, roads, or other built structures and include areas of mowed lawn and landscape plantings. Developed land on NBSFS is largely limited to the Operations Area in the northeast portion of the site (Figure 2-9) and occupies 44 acres.

<u>Section 7.7</u> describes the grounds maintenance practices at NBSFS. A variety of ornamental tree and shrub species have been planted in developed areas in addition to the use of several seed mixes (<u>Section 2.3.2.4</u>; Najjar 1998).

Rare Natural Communities

Nine locations (7 wetlands and 2 woodlands) support 5 rare natural community types on NBSFS (Argonne National Laboratory [ANL] 2011). Rare natural community types are protected in New Hampshire (Section 2.3.4). The areal extent of these rare natural community types totals approximately 36.5 acres and includes black gum–red maple basin swamps (5 locations, totaling 11.4 acres), a complex of 2 community types (highbush blueberry–mountain holly wooded fen and large cranberry short sedge moss lawn) at 2 locations (totaling 3.6 acres), a red oak–black birch wooded talus community (1 location, totaling 8.6 acres), and an Appalachian oak–pine rocky ridge community (1 location, totaling 12.9 acres).

Black Gum-Red Maple Basin Swamp

Black gum–red maple basin swamps are ranked as S3 in the state and are considered a diagnostic community of temperate peat swamp systems (Figure 2-11; D. D. Sperduto, New Hampshire Natural Heritage Bureau [NHNHB], personal communication, 2005). Although only one black gum–red maple basin swamp was described in LaGory et al. (1997), several other wetlands had been identified as potential black gum–red maple basin swamps by NBSFS Natural Resources staff since 1995. A total of 5 black gum–red maple basin swamps were surveyed in 2009. All these sites showed characteristics consistent with the black gum–red maple basin swamp description provided in Sperduto and Nichols (2004), including size, geographic situation, hydrological features, and vegetative structure and composition. None of the sites showed any indication of disturbance, either natural or human-caused.



Figure 2-11. Black gum–red maple swamp (LaGory et al. 2011)

Highbush Blueberry–Mountain Holly Wooded Fen and Large Cranberry–Short Sedge Moss Lawn (Murphy Swamp)

The NBSFS feature known locally as Murphy Swamp (Figure 2-12) is a 1.5-acre wetland system surrounded by upland mixed forest south of West Meadow Road and north of the road to Gate 15 (Figure 2-16). This wetland was surveyed in 1995; it was composed of 3 concentric vegetation zones that differed in species composition, structure, and water depth. The outermost zone that bordered upland forest consisted of a dense tall shrub thicket dominated by highbush blueberry and also contained mountain holly, common winterberry, chokeberry (*Photinia* sp.), and occasional white pine, red maple, and black gum (*Nyssa sylvatica*). This tall-shrub zone (up to 60 feet wide) transitioned into a zone of tall herbaceous species and low shrubs, dominated by tall sedges (identified in 1995 as *Carex rostrata*), large cranberry, scattered highbush blueberry (typically on hammocks), common buttonbush (*Cephalanthus occidentalis*), pod-grass (*Scheuchzeria palustris*), and sphagnum (*Sphagnum magellanicum*). The central portion of the wetland where the water was deepest had markedly shorter vegetation that included needle spikerush (identified in 1995 as *Eleocharis acicularis*), pod-grass, beaksedge (identified in 1995 as *Rhynchospora* sp.), three-way sedge (*Dulichium arundinaceum*), common arrowhead (*Sagittaria latifolia*), large cranberry (*Vaccinium macrocarpon*), sphagnum, and abundant sundews (*Drosera* sp.).

This wetland was identified as a coastal/southern acidic fen in LaGory et al. (1997). Comparing the Sperduto (1994) and Sperduto and Nichols (2004) classification systems and using descriptions presented in LaGory et al. (1997), Sperduto (2005*a*) determined that this wetland should be considered a medium-level fen system. Based on the 2009 survey results and further comparison to the descriptions provided in Sperduto (2005*b*), it is now believed that this designation was incorrect and that the wetland has characteristics most similar to those of a kettle-hole bog system or a poor-level fen/bog system. As described in Sperduto (2005*b*) these 3 systems are similar, but medium-level fen systems are hydrologically

open systems (i.e., hydrologically connected to a stream or lake), whereas the other 2 systems are hydrologically closed.

Two natural communities, a highbush blueberry–mountain holly wooded fen (S3S4) and a large cranberry– short sedge moss lawn (S3), are represented by the outer tall-shrub zone and the inner low-vegetation zone (Figure 2-12). The intermediate zone of tall herbaceous species and low shrubs between these communities represents a transitional area.



Figure 2-12. Murphy Swamp (LaGory et al. 2011)

Red Oak–Black Birch Wooded Talus

The red oak-black birch wooded talus community (S3S4, <u>Figure 2-13</u>) at the base of Joe English Hill (<u>Figure 2-16</u>) had 3 characteristically distinct areas: (1) dense woodland with large trees and a well-developed, diverse understory at the base of the talus slope; (2) discontinuous areas of mostly large talus rocks that supported scattered shrubs and small trees; and (3) at the highest elevation, a bench with well-developed soil and large trees. The community ended upslope at a sheer cliff that was largely devoid of vegetation.

The overstory and midstory vegetation in the lower-elevation portions of the community was dominated by large red oak, black birch, and sugar maple, with less abundant red maple, hophornbeam (*Ostrya virginiana*), and white ash. The diverse shrub and herbaceous layers were comprised of striped maple (*Acer pensylvanicum*), witch hazel, wood fern (*Dryopteris* sp.), wild sarsaparilla, polypody (*Polypodium* sp.), and white snakeroot (*Ageratina altissima*). Open areas with mostly rock cover supported shrubs including staghorn sumac (*Rhus typhina*) and young black birch. Dense foliose lichen covered many of the large boulders in this community.



Figure 2-13. Joe English Hill, Red Oak–Black Birch Wooded Talus (LaGory et al. 2011)

Appalachian Oak–Pine Rocky Ridge Community

The Appalachian oak-pine rocky ridge community (S3) (Figure 2-14) was 5.2 acres in size in 1995 and located upslope of the brow of the cliff that defined the upper boundary of the red oak-black birch wooded talus community (Figure 2-16). Lagory et al. (2011) reported that the uppermost community was incorrectly determined to be dry Appalachian oak hickory forest and should be considered an extension of the Appalachian oak-pine rocky ridge community. According to Sperduto and Nichols (2004), dry Appalachian oak-hickory forests are found on glacial till, terraces, dunes, or sand plains, not on rock ridges. Sperduto and Nichols (2004) also listed several species of hickory (Carya spp.) as characteristic of this community type, but no hickory species were found in either the 1995 or 2009 surveys. As described below, this area had the characteristics of an Appalachian oak-pine rocky ridge community. Combining these 2 areas results in a total community area of 10.2 acres. This areal estimate is a rough approximation because the exact boundaries of this community have not been determined. This combined oak-dominated community consists of 2 fairly distinct portions that correspond to the community boundaries in LaGory et al. (1997). These are treated as separate vegetation zones in our discussion here. The communities called oak-pine rocky summit woodland community and southern acidic rocky summit community in LaGory et al. (1997) make up the first, lower-elevation zone. The area delineated as dry transitional oak white pine forest in LaGory et al. (1997) makes up the second, higher-elevation zone.

The first, lower-elevation vegetation zone occurred on a relatively steep slope (approximately 30 degrees) with a substantial amount of rock slabs and exposed bedrock. For much of this zone the overstory was open and dominated by stunted (approximately 20 feet tall) red oaks and black oaks with fewer white oak, white pine, pitch pine (*Pinus rigida*), eastern red-cedar (*Juniperus virginiana*), and black birch. Standing dead snags of oaks and pines from previous natural and prescribed fires occurred along the northern portion of this zone. Scrub oak formed an often dense midstory, and the density of scrub oak was highest in the eastern portion of this zone. Understory vegetation was dominated by extensive patches of lowbush blueberry with

ground juniper (*Juniperus communis*), grasses, sedges, moss, bare rock, and saplings of canopy species. In addition, several clumps of the fern-leaved false foxglove were observed in exposed areas.

The second, higher-elevation zone was on a fairly level portion of the hill just upslope of Zone 1, and it supported taller trees. As discussed previously, this zone had been incorrectly classified as dry Appalachian oak–hickory forest in LaGory et al. (1997). The overstory of this zone was dominated by red oak, with lesser numbers of white oak (*Quercus alba*) and white pine. Understory was dominated by lowbush blueberry, grasses, and sedges. This zone had been strongly affected by a series of natural and prescribed fires (a wildfire in 1994 and 2 prescribed burns in 1999 and 2008) that had altered the community structure.

Although past fires have greatly altered Zone 2 of this community, the overall species composition observed in 2009 in both zones was relatively consistent with that described in the 1995 survey. The most notable change in species composition was the large increase in grass cover since 1995, presumably in response to the reduced tree canopy. Although this woodland community type is considered fire-adapted and likely requires regular fires to maintain community structure and composition (Sperduto and Nichols 2004), reestablishment of the mature tree canopy will probably take decades. No nonnative invasive species or other disturbances were apparent during the survey (LaGory et al. 2011).



Figure 2-14. Joe English Hill, Appalachian oak-pine rocky ridge (LaGory et al. 2011)

Mixed Tall Graminoid-Scrub-Shrub Marsh and Aquatic Bed (Chain Fern Bog)

The Chain Fern Bog contains 2 natural community types: (1) a mixed tall graminoid–scrub-shrub marsh (S4S5), which is a type of shallow emergent marsh, at the end of the southeastern arm, and (2) an aquatic bed community (S5) at the end of the southwestern arm. As indicated by their state ranks, neither of these community types is considered rare in the state.

The Chain Fern Bog is a 1.8-acre horseshoe-shaped wetland system that is surrounded by upland mixed forest in the northeast portion of NBSFS, adjacent to the site boundary and near a heavily used gravel road (Figure 2-15, Figure 2-16). This wetland was not surveyed in 1995. The wetland is surrounded by a mostly highbush blueberry thicket that also contains maleberry (*Lyonia ligustrina*), and along the upland border, mountain laurel. Within this thick border are occasional lowbush blueberry, red maple, black gum, paper birch, and bracken fern.

Within the shrub border, the wetland is a complex of open water, with some floating aquatic macrophytes (at the end of the southwestern arm of the wetland); marshy areas with three-way sedge and buttonbush (at the end of the southeastern arm of the wetland); and drier areas in between with shrubs and trees (mostly highbush blueberry, small red maple, and small black gum). Outflow from the wetland was from the southwestern arm into a small stream channel, but there was no apparent point of inflow.

Based on the descriptions in Sperduto (2005*b*), the wetland can be considered an emergent marsh-shrub swamp system. This conclusion is based on the wetland's open (i.e., not wooded) vegetative structure, occurrence on a primarily mineral substrate rather than peat, and a hydrogeomorphic setting that is depressional (i.e., occurs in a topographic depression) and open (i.e., hydrologically connected to a stream or lake).

No nonnative invasive species or other disturbances were apparent during the 2009 survey. Although the wetland is adjacent to a heavily traveled gravel road, no sign of sediment or water runoff into the wetland from the road was apparent, and a vegetated buffer separated the wetland from the road. In addition, the wetland's location near the site boundary makes it potentially susceptible to offsite land use impacts. Some houses are located near the wetland, just outside of the boundary (Figure 2-16).



Figure 2-15. Chain Fern Bog (LaGory et al. 2011)



Figure 2-16. Location of rare natural communities at New Boston Space Force Station

2.3.2.3 Future Vegetation Cover

NBSFS is expected to remain forested with a mix of Appalachian and northern hardwood species and eastern coniferous species. Woodlands and forests are susceptible to climate change. There is a temperature below which the equilibrium state of the forest appears constant but above which the equilibrium forest cover steadily declines. This threshold represents a point where some degree of forest loss is inevitable. As the threshold is exceeded, there is a gradual increase in the committed dieback, with changes that are more progressive than sudden. Therefore, forest vegetation at NBSFS may experience some degree of die-back before impacts are observed.

Slight changes in temperature and precipitation can potentially alter the composition, distribution, and abundance of species and the products and services they provide. The extent of these changes will also depend on changes in precipitation and fire. Increased drought frequency could also cause major changes in vegetation cover. Losses of vegetative cover, coupled with increases in precipitation intensity and climate-induced reductions in soil aggregate stability, will dramatically increase potential erosion rates. The combination of eroded sediment transport to streams, coupled with changes in the timing and magnitude of minimum and maximum flows, can affect water quality, riparian vegetation, and aquatic fauna.

Forested wetlands may also be vulnerable to changes. These ecosystems will face increases in air and surface water temperatures, alterations in the magnitude and seasonality of precipitation and runoff, and shifts in reproductive phenology and distribution of plants and animals (Comer et al. 2012). These ecosystems provide linear ecosystem connectivity, link aquatic and terrestrial ecosystems, and create thermal refugia for wildlife, all of which can contribute to ecological adaptation to climate change.

Rising temperatures will enhance soil decomposition, and together with reductions in rainfall, may also reduce plant productivity in large areas such as forests and riparian areas. Because riparian systems and the projected impacts of climate change are highly geographically variable, there is a pressing need to develop a localized understanding of climate change threats to riparian ecosystems at NBSFS (CEMML 2019).

Careful and periodic monitoring of forests and related environmental resources and processes will provide critical data for aiding in increasing adaptability to climate change driven impacts at NBSFS. Future management of vegetation at NBSFS can use monitoring data to form responses and formulate management plans to many different climate change induced scenarios.

2.3.2.4 Turf and Landscaped Areas

The NBSFS mission area is primarily mowed grass with some native and nonnative tree and shrub plantings. Several seed mixes are used in developed areas of NBSFS (Najjar 1998). A contractor mix, which is a mix of turf grasses including annual rye (*Lolium multiflorum*), perennial rye (*Lolium perenne*), tall fescue (*Schedonorus arundinaceus*), creeping red fescue (*Festuca rubra*), and Kentucky bluegrass (*Poa pratensis*), is used for lawn areas. A slope mix is used on steeper slopes to prevent erosion; slope mix consists of grasses and hardy low-growing forbs including hard fescue (*Festuca trachyphylla*), birdsfoot trefoil (*Lotus corniculatus*), crownvetch (*Securigera varia*), and white clover (*Trifolium repens*). A conservation mix is used in areas that are mowed less frequently or left unmowed. The conservation mix used at NBSFS includes creeping red fescue, annual rye, perennial rye, Kentucky bluegrass, white clover, and red clover (*Trifolium pratense*).

A variety of ornamental tree and shrub species have been planted in developed areas (Najjar 1998). These include Norway maple (*Acer platanoides*), clump birch (*Betula platyphylla*), crabapple (*Malus spp.*), pagoda dogwood (*Cornus alternifolia*), redosier dogwood (*Cornus sericea*), weeping forsythia (*Forsythia*)

suspensa), American cranberry bush (*Viburnum opulus*), Korean lilac (*Syringa meyeri*), juniper (*Juniperus* spp.), yew (*Taxus* spp.), mugo pine (*Pinus mugo*), burning bush (*Euonymus alatus*), rhododendron (*Rhododendron* spp.), azalea (*Azalea* spp.), and Colorado blue spruce (*Picea pungens*). Native species (e.g., white pine and sugar maple) have also been used in landscape plantings in the Operations Area.

2.3.3 Fish and Wildlife

A base-wide comprehensive survey was conducted from 1994 to 1996 (LaGory et al. 1997) to describe the ecological resources of NBSFS, including habitat distributions and characteristics (including rare natural communities) and plant and animal species, with an emphasis on federally and state-listed threatened and endangered (T&E) species and neotropical migrant bird species. The study covered a 2-year period to incorporate seasonal and annual variation. Much of the knowledge regarding ecological communities on NBSFS, described below, resulted from this study.

A total of 147 species of birds have been observed on NBSFS; 109 of these species are neotropical migrants (Appendix B). Common species at the station included Canada goose (*Branta canadensis*), broad-winged hawk (*Buteo platypterus*), tree swallow (*Tachycineta bicolor*), black-capped chickadee (*Poecile atricapillus*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), cedar waxwing (*Bombycilla cedrorum*), dark-eyed junco (*Junco hyemalis*), and common grackle (*Quiscalus quiscula*). At least 58 bird species breed on NBSFS, and 42 of these are neotropical migrants. The largest numbers of bird species (more than 80 species in each) were observed in wetlands, parkland, mature mixed forest, and mature deciduous forest. The fewest species (less than 50 species in each) were observed in developed, disturbed, and young coniferous forest (LaGory et al. 1997).

Several T&E species or New Hampshire Species of Special Concern have been documented on NBSFS. These include the American pipit (*Anthus rubescens*), eastern whip-poor-will (*Antrostomus vociferus*), northern harrier (*Circus hudsonius*), rusty blackbird (*Euphagus carolinus*), peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), cliff swallow (*Petrochelidon pyrrhonota*), pied-billed grebe (*Podilymbus podiceps*), bank swallow (*Riparia riparia*), and eastern meadowlark (*Sturnella magna*). These species and protection categories are further discussed in <u>Section 2.3.4</u>.

NBSFS has conducted fisheries surveys numerous times. To date, 14 species of fish have been documented at NBSFS (<u>Appendix B</u>). Most, if not all, waters that are capable of sustaining fish populations on NBSFS were sampled. NBSFS has both native and nonnative fishes, although all are common to the region. Two species have conservation status: the state-listed (Species of Special Concern) banded sunfish (*Enneacanthus obesus*) and American eel (*Anguilla rostrata*).

The most significant fish habitat at the station is in Joe English Pond, which supports a warmwater fishery. Fish species known to occur in Joe English Pond include American eel, brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), chain pickerel (*Esox niger*, Figure 2-17), golden shiner (*Notemigonus crysoleucas*), brown bullhead (*Ameiurus nebulosus*), largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), common shiner (*Luxilus cornutus*), and yellow perch (*Perca flavescens*).

Brook trout and rainbow trout are stocked annually in Joe English Pond. Rainbow trout and brook trout also have been stocked in Ice Pond and Roby Pond to provide an early spring fishery (PES 1995). Brook trout have also been stocked in Joe English Brook in the spring; however, summer water temperatures approach upper lethal limits for that species (PES 1995).

Surveys conducted in recent years (limited surveys in 2020 and full surveys in 2021 and 2022) in Ice, Joe English, and Roby ponds found common shiner, bullhead catfish, largemouth bass, yellow perch, bluegill, and pumpkinseed. Recent surveys noted low success rates and variable results due to the survey methods and inconsistent environmental conditions.



Figure 2-17. Chain pickerel

A total of 31 mammal species have been observed on NBSFS (<u>Appendix B</u>; LaGory et al. 1997, 2002). The eastern chipmunk (*Tamias striatus*), red squirrel (*Tamiasciurus hudsonicus*), coyote, and white-tailed deer are abundant, and the woodchuck (*Marmota monax*), red-backed vole (*Clethrionymys gapperi*), porcupine (*Erethizon dorsatum*), red fox (*Vulpes vulpes*), and fisher (*Pekania pennanti*) are common. Moose are present on NBSFS but have experienced recent population decreases due to tick parasitism.

NBSFS hosts a high diversity of bat species. Of the 9 species that inhabit New Hampshire, 8 were captured or detected during the bat surveys conducted in 2002. Species captured included the little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), northern long-eared bat (NLEB, *Myotis septentrionalis*), hoary bat (*Lasiurus cinereus*), red bat (*Lasiurus borealis*), tricolored bat (*Perimyotis subflavus*, formerly eastern pipistrelle), silver-haired bat (*Lasionycteris noctivagans*), and eastern small-footed bat (*Myotis leibii*). Of these species, the red bat is a Species of Special Concern and likely vulnerable (State Rank S3?B), the tricolored bat is considered critically imperiled (State Rank S1), the state-endangered hoary bat is under review for federal listing and a Species of Special Concern that is likely vulnerable (State Rank S3B), the silver-haired bat is a Species of Special Concern and likely vulnerable (State Rank S3B), the silver-haired bat is a species of Special Concern and likely vulnerable (State Rank S3B), the silver-haired bat is a species of Special Concern and likely vulnerable (State Rank S3B), the silver-haired bat is a species of Special Concern and likely vulnerable (State Rank S3B), the silver-haired bat is a species of Special Concern and likely vulnerable (State Rank S3B), the NLEB is federally and state-listed as endangered (State Rank S1), and the small-footed bat is state-listed as endangered (State Rank S1), and the small-footed bat is state-listed as endangered (State Rank S1), the only New Hampshire bat species not captured or detected in the survey was the federally listed Indiana bat (*Myotis sodalis*) (LaGory et al. 2002).

Several bat surveys, including mist netting (2006) and acoustic surveys (2017, 2019, 2023), conducted since 2002 have documented a similar species assemblage as the 2002 bat survey. Species confirmed by acoustic surveys are listed in <u>Table 2-7</u>.

	2019	2021	2023	2017	2023
Species	Stationary Site 6864			Stationary Site 83674	
Big brown bat	Х	Х	Х	Х	Х
Eastern small-				Х	
footed bat					
Hoary bat	Х	Х	Х	Х	Х
Little brown	Х	Х	Х	Х	Х
bat					
Northern long-				X	
eared bat					
Red bat	Х	Х	X	X	Х
Silver-haired	Х	Х	Х	Х	Х
bat					
Tricolored bat	X				X

Table 2-7. Bat st	pecies acoustically	v detected at New	Boston Spa	ce Force Station
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Twenty-three species of reptiles and amphibians have been observed on NBSFS (<u>Appendix B</u>—*Plant* Species at New Boston Space Force S). Common species include red-backed salamander (*Plethodon* cinereus), red-spotted newt (*Notophthalmus viridescens*), spring peeper (*Pseudacris crucifer*), wood frog (*Rana sylvatica*), pickerel frog (*Rana palustris*, Figure 2-18), painted turtle (*Chrysemys picta*), and garter snake (*Thamnophis sirtalis*) (LaGory et al. 1997).

The Blanding's turtle (*Emydoidea blandingii*), spotted turtle (*Clemmys guttata*), wood turtle (*Glyptemys insculpta*), eastern hognose snake (*Heterodon platirhinos*), and smooth green snake (*Opheodrys vernalis*) have also been documented on NBSFS. These species are further discussed in <u>Section 2.3.4</u>.



Figure 2-18. Pickerel frog

Climate Change Impacts on Fish and Wildlife

Climatic deviations from historical conditions could have a significant effect on the health of wildlife populations and ecosystems, posing the second highest threat to wildlife after pollution in New Hampshire (NHFGD 2015). The New Hampshire Wildlife Action Plan (NHWAP) described 6 climate change effects that would impact wildlife in the state (NHFGD 2015): increases in extreme storms and flooding, shifts in plant communities, phenology, snow depth and winter ice, loss of thermal habitat, and invasive species. Increased air temperatures contribute to increased stream temperature, which may cause stress to native coldwater species such as brook trout (Culler et al. 2018). Sedimentation and decreased water depth from erosion, which can be amplified by increased storm intensity or in post-fire conditions, may also contribute to higher water temperatures and degraded fish ecosystem. Warmer water temperatures will favor species with a higher thermal tolerance such as yellow perch and largemouth bass (Eaton and Scheller 1996) and may negatively impact amphibians with narrow tolerances for temperature and moisture regimes (Olson and Saenz 2013). Increased storm intensity may impact species that nest along floodplains and stream banks, such as wood turtles and various birds.

Climate change is expected to cause ecosystem alterations within the hemlock hardwood pine forest community. Plant community shifts will result in not only spatial shifts but also losses or increases of habitats on which species rely. Cold- or snow-adapted specialists, such as the snowshoe hare, are more vulnerable to changes in forest composition or snowpack and may ultimately shift their range toward more suitable ecosystem (Sultaire et al. 2016). Additionally, new species that currently inhabit regions further south may become common at NBSFS as they shift their range northward. Biological events that are correlated with temperature such as spring budburst, insect emergence, and migratory bird arrival are occurring earlier in the year, and this trend is expected to continue (Carey 2009, Yue et al. 2015). These phenological shifts have the potential to decouple the timing of migratory peaks or hatching with food abundance. More broadly, milder winter conditions may also result in increases in currently cold-limited species such as parasitic beetles and ticks, whose reproductive activity will face more favorable conditions as the climate warms.

Individual species will likely react to these changing variables in unique ways that are expected to drive changes in the composition of plant and animal communities. Highly mobile species such as birds may readily follow such shifts, whereas other species may require corridors that provide suitable habitat and safety to facilitate dispersal. Nonnative, invasive species (including pathogens and disease) whose ranges were historically limited by temperature are expected to continue to spread northward and flourish with warmer temperatures (NHFGD 2015). The HWA is an invasive insect that deforests hemlock trees and, if untreated, can cause hemlock mortality (U.S. Environmental Protection Agency 2016, CEMML 2019). Hemlock provides a food source and valuable wintering and nesting ecosystem for many species, so the loss of this ecosystem would have detrimental impacts on wildlife.

2.3.4 Threatened and Endangered Species and Species of Special Concern

2.3.4.1 Species Protection Classifications

Endangered Species Act

The Endangered Species Act (ESA) protects federally listed T&E species by prohibiting their import, export, or take and implementing recovery plans through interagency cooperation. According to DAFMAN 32-7003, installations with known federally listed T&E species or habitats supporting T&E species must address T&E species conservation in their INRMP.

Consultation with the USFWS must be performed for USAF actions that may affect a listed species. These species include those documented to occur on base or those listed on the USFWS Information for Planning and Consultation website. If certain species on that website are determined to not exist on base, then no consultation is needed for those species.

Federal Candidate Species

Candidate species are those with a 12-month status review finding that listing under the ESA is "warranted but precluded" by species with higher listing priority. Candidate species do not have legal protection under the ESA, but conservation and recovery efforts should be made by the installation when practical and not in conflict with the installation's mission.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits killing, capturing, selling, trading, and transport of migratory bird species to ensure their population sustainability. Species protected by this Act are found in 50 CFR Part 10.13. Prior authorization to take a migratory bird species may be obtained by the USFWS if a special need exists or certain criteria are met (16 U.S.C. § 703712). EO 13186 provides guidelines and responsibilities for federal agencies to protect migratory bird species. A Memorandum of Understanding must be developed and implemented with the USFWS if the installation conducts missions that may harm migratory bird species.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits capturing, trapping, molesting, disturbing, obtaining, selling, hunting, or transporting bald eagles, golden eagles, their nests, feathers, or eggs (16 U.S.C. § 668-668c). NBSFS' missions, operations, and development cannot negatively impact or take these species unless proper permits are obtained.

New Hampshire State T&E Species

Similar to the ESA, New Hampshire maintains a T&E species list. The New Hampshire Environmental Conservation Act (New Hampshire Revised Statute § 212-A:7) prohibits the take or export of listed species. DAFMAN 32-7003, Section 3.38.2, states that installations will provide restoration and conservation efforts for state-listed species when not in conflict with the installation's missions.

New Hampshire Species of Greatest Conservation Need

The NHWAP is a comprehensive management guide that identifies the state's Species of Greatest Conservation Need (SGCN). New Hampshire SGCN have the potential to become threatened or endangered, but the status offers no legal protection. The NHWAP also identifies Key Habitats that are essential for the conservation of SGCN and provides guidance for conservation actions. NBSFS will protect and conserve these landscapes when not in conflict with the military mission. The 2015 NHWAP is being updated and the new version will be finalized in 2025. Proposed species lists for the 2025 NHWAP were used for this INRMP.

State of New Hampshire Native Plant Protection Act of 1987 (NH Revised Statute 217-A)

This Act establishes protection for T&E plants species and exemplary natural communities. Plant species and exemplary natural communities are identified within New Hampshire Code of Administrative Rules 300 and Sperduto and Nichols (2011), respectively. All rare natural communities are considered exemplary

and therefore afforded protection, whereas only exceptional occurrences of common natural communities are considered exemplary.

New Hampshire Revised Statute § 209:9

This statute protects bald and golden eagles and their young in New Hampshire from take.

Pollinators

Because of the integral role of pollinators in maintaining native habitats, compliance with existing laws, regulations, and policies related to pollinators is essential for sustaining the USAF mission. The pollinators with the highest level of protection are those listed under the ESA, MBTA, and/or state laws; however, all pollinators are afforded consideration under Presidential Memorandum 14946 (Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators). In response to this memorandum, the Air Force Civil Engineer Center (AFCEC) and USFWS issued the "U.S. Air Force Pollinator Conservation Strategy," which aims to sustain the mission and ecological integrity on USAF installations by implementing management practices that support pollinators, especially those with regulatory protections, and enhance their habitat.

2.3.4.2 Threatened & Endangered Species and Species of Special Concern

T&E and rare species that are known to occur on NBSFS are listed in <u>Table 2-8</u>. These include any species that have federal or state conservation status. The NLEB is the only federally endangered species found on NBSFS. Although not federally endangered, the tricolored bat has been documented onsite and is proposed to be listed as endangered sometime during 2024. The federally threatened small whorled pogonia (SWP, *Isotria medeoloides*) was identified on the installation in 2022. The monarch butterfly is a candidate species and an SGCN that has been observed on NBSFS both incidentally and during surveys. Several state-listed birds (pied-billed grebe, northern harrier, peregrine falcon, eastern whip-poor-will, bank swallow, cliff swallow, American pipit, eastern meadowlark, and the rusty blackbird), reptiles (Blanding's turtle, spotted turtle, and eastern hognose snake), and bat species (tricolored bat, NLEB, little brown bat, and eastern small-footed bat) have also been observed or detected at NBSFS. Although the bald eagle is not state-listed, it is legally protected in New Hampshire per New Hampshire Revised Statute § 209:9. In addition, several animal species that are considered rare (Special Concern or other rank) by the NHNHB, including the silver haired-bat, hoary bat, and wood turtle, have been observed on NBSFS.

Habitat change and disruption to food availability are major climate-related threats to all species at NBSFS. Habitat requirements, such as need for refugia, may change for some species as they employ behavioral adaptations. Prey populations or forage abundance may also be affected by changes in temperature and precipitation. Seasonal cues for prey or forage emergence may change, resulting in a mismatch between food availability and food needs of T&E species. Populations of some T&E species are further imperiled by life stages that are sensitive to the temperature and precipitation changes projected in the climate scenarios. Species-specific impacts of climate change are further discussed below.

Common Name	Scientific Name	Federal Status	State Status	State Rank			
	Fish						
American eel	Anguilla rostrata	_	SGCN, SC	S 3			
Banded sunfish	Enneacanthus obesus	-	SGCN, SC	S 3			
		Reptiles					
Spotted turtle	Clemmys guttata	Under Review	LT, SGCN	S2			
Blanding's turtle	Emydoidea blandingii	Under Review	LE, SGCN	S1			
Wood turtle	Glyptemys insculpta	Under Review	SC, SGCN	S3			
Eastern hognose snake	Heterodon platirhinos		LE, SGCN	S1			
Smooth green snake	Opheodrys vernalis	-	SGCN, SC	S3			
Eastern box turtle	Terrapene carolina carolina		SGCN, E	S1			
Birds							
American pipit	Anthus rubescens		SGCN, SC	S2B			
Eastern whip-poor-will	Antrostomus vociferus	-	SGCN, SC	S3			
Northern harrier	Circus hudsonius		LE, SGCN	S1B			
Rusty blackbird	Euphagus carolinus		SGCN, SC	S3B			
Peregrine falcon	Falco peregrinus		LT, SGCN	S2			
Bald eagle	Haliaeetus leucocephalus	BGEPA	NH Rev Stat § 209:9 (2022)	S2			
Cliff swallow	Petrochelidon pyrrhonota	-	LT, SGCN	S3B			
Pied-billed grebe	Podilymbus podiceps		LT, SGCN	S2B			
Bank swallow	Riparia riparia		SGCN, SC	S3B			
Eastern meadowlark	Sturnella magna	—	LT, SGCN	S3B			
Mammals							
Big brown bat	Eptesicus fuscus	—	SGCN, SC	—			
Silver-haired bat	Lasionycteris noctivagans	—	SGCN, SC	S3B			
Eastern red bat	Lasiurus borealis		SGCN, SC	S3?B			
Hoary bat	Lasiurus cinereus	Review in Fiscal Year 2028	SGCN, SC	S3B			
Eastern small-footed bat	Myotis leibii	—	LE, SGCN	S1			
Little brown bat	Myotis lucifugus	Under Review	LE, SGCN	S1			
Northern long-eared bat	Myotis septentrionalis	LE	LE, SGCN	S1			
Tricolored bat	Perimyotis subflavus	Proposed Endangered	LE, SGCN	<u>S</u> 1			

Table 2-8. Federally listed, state-listed, and rare plant and animal species at New Boston Space Force Station

Common Name	Scientific Name	Federal Status	State Status	State Rank		
Plants						
Small whorled pogonia	Isotria medeoloides	LT	LT	S2		
Invertebrates						
Monarch butterfly	Danaus plexippus	Candidate	SC, SGCN	S5		

Federal and State Status: LE= listed as endangered; LT= listed as threatened; NA= not applicable; SC= special concern; Under Review= Check U.S. Fish and Wildlife Service Environmental Conservation Online System for current listing status; BGEPA= Bald and Golden Eagle Protection Act.

State Rank Codes: S1= Critically imperiled because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. S2= Imperiled because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. S3= Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors (in the range of 21 to 100 occurrences).

State Rank Modifiers: B= Breeding status for a migratory species; N= Non-breeding status for a migratory species; ?= Rank is uncertain due to insufficient information at the State or global level.

Notes: State ranks do not confer any official or legal status to a species. These ranks are assigned by the New Hampshire Natural Heritage Bureau (NHNHB 2024) to provide information on the population status of species within the state. Some bird species found on NBSFS that are considered rare in New Hampshire only as breeders are not included in this table because they were not observed during the breeding season.



T&E species and Species of Special Concern are discussed below.

No federally designated critical habitat for T&E species occurs on NBSFS.

Pied-Billed Grebe

The pied-billed grebe (New Hampshire Threatened, SGCN, Rank S2B) has been observed on NBSFS during the breeding season (LaGory et al. 1997). An adult with 2 young was observed on 29 June 1994 on Roby Pond (Figure 2-19, Figure 2-25), and given the small size of the young, the nest may have been located on this pond. However, a nest was not found, and the pond does not have the characteristics of typical breeding habitat (LaGory et al. 1997). Breeding habitat in New Hampshire consists of open-water wetlands of at least 12 acres with extensive emergent vegetation, in which the grebes place a floating nest at least 50 feet from the shore (Foss 1994, NHFGD 2015). The only wetland on NBSFS possessing these characteristics is Joe English Pond, but pied-billed grebes have not been observed in this location during the breeding season. Roby Pond was searched for breeding pied-billed grebes in 1995 and 1996 and a recording of the territorial call of this species was broadcast at Roby Pond and other wetlands in June 1995. None of these attempts were successful in detecting grebes, but several individuals were observed on Joe English Pond during October and November 1994 and 1995. Surveys of Joe English Pond in spring, summer, and autumn 2004 (including the broadcasting of pied-billed grebe calls) did not detect any pied-billed grebes. The breeding status of pied-billed grebes on NBSFS is unclear.



Figure 2-19. Pied-billed grebe (Gough et al. 1998)

Northern Harrier

The northern harrier (New Hampshire Endangered, SGCN, Rank S1B) has been observed flying over Joe English Hill during autumn migration (Figure 2-25), but no harriers have been seen on the station grounds (LaGory et al. 1997). Statewide breeding surveys have not detected this species breeding in southern New Hampshire, but it is considered possible in the area (Foss 1994, NHFGD 2015). The northern harrier nests on the ground and hunts small mammals in open habitats such as wetlands or grasslands (DeGraaf and Rudis 1986, Foss 1994, NHFGD 2024*e*).

Eastern Whip-Poor-Will

Eastern whip-poor-wills (USFWS Bird of Conservation Concern, DoD Partners in Flight Teir 2 Mission Sensitive Species, SGCN, SC, Figure 2-20) were first documented (heard) on NBSFS during the biodiversity surveys in July 1994 and June 1995 (LaGory et al. 1997); both occurrences were in woodlands adjacent to the former Joe English Pond Campground (Figure 2-25). Surveys for whip-poor-wills have been conducted every summer (June or July) since 1998 by broadcasting a recording of whip-poor-will calls in various locations across the station and listening for responses. Whip-poor-wills were heard on some years in the Deer Pond Recreation Area, former Joe English Pond Campground, Cambell Road, Operations Area, and the top of Joe English Hill. Whip-poor-wills were most recently documented in 2023 by both physical surveys and acoustic monitoring. Breeding by this species occurs from mid-May through late July (Foss 1994, Hunt 2013, NatureServe 2024*a*), and it is very likely that it breeds on NBSFS in the mixed forest habitats where it has been heard. Whip-poor-wills prefer open, dry woodlands, often near openings, for nesting (Hunt 2013, NatureServe Explorer 2024*a*), and this habitat type is well represented on NBSFS. Most whip-poor-wills in New Hampshire are found in Hillsborough County, where NBSFS is located (Hunt 2022). NBSFS is also located between proposed primary and secondary whip-poor-will management areas in southern New Hampshire (Hunt 2013).



Figure 2-20. Eastern whip-poor-will (Photo: Cornell Lab of Ornithology)

Wood Thrush

The wood thrush (*Hylocichla mustelina*) is a neotropical migrant on the USFWS Birds of Conservation Concern list, a DoD Partners in Flight Tier 2 Mission Sensitive Species, and an SGCN (Figure 2-21). The species was documented on the installation during the 1994 to 1995 biodiversity survey and during several years when the installation participated in the Cornell Birds in Forested Landscape project. The wood thrush appears to be widely distributed in the forest at NBSFS. The wood thrush has a widespread breeding distribution across the eastern United States and southern Canada, but it has experienced strong population declines throughout much of its range. During the nonbreeding season, the species is restricted to a much smaller area in the shrinking lowland tropical forests of southern Mexico and Central America. Its flute-like song is enjoyed by birders, and thus it has become a prominent example of declining forest songbirds

in North America. The Atlantic Coast and New England, where this species is most common, have experienced some of the steepest declines (Partners in Flight 2021*b*).



Figure 2-21. Wood thrush (Photo: Cornell Lab of Ornithology)

Canada Warbler

The Canada warbler (*Cardellina canadensis*) is neotropical migrant on the USFWS Birds of Conservation Concern list, a DoD Partners in Flight Tier 2 Mission Sensitive Species, and an SGCN (Figure 2-22). The species was documented on the installation during the 1994 to 1995 biodiversity survey. No other information about presence is available for NBSFS.

The Canada warbler inhabits shady forest undergrowth year-round, making it vulnerable to forest loss. It spends most of the nonbreeding season in northern Andean forests, which are among the most threatened in the world, having experienced a 90% loss due to agricultural expansion (cattle, coffee, coca) and fuel wood production. On the breeding grounds, dense deer populations have over-browsed the shrubby layer that Canada warblers prefer. Additional potential threats to this species include habitat fragmentation from energy development and habitat desiccation from land draining and climate change (Partners in Flight 2021*a*).



Figure 2-22. Canada warbler (Photo: U.S. Fish and Wildlife Service)

Bald Eagle

The bald eagle (New Hampshire Species of Special Concern, State Rank S2, Figure 2-23) was observed on 5 occasions flying over NBSFS during the biodiversity survey (LaGory et al. 1997). All observations were of migrating individuals passing over Joe English Hill in the autumn, and no eagles landed on the station grounds. An individual bald eagle was observed during winter 1999, feeding on a deer carcass at Joe English Pond. Another eagle sighting was of an individual flying over the installation on 13 April 2021, although it could not be determined if it landed on the installation. Frequent use of the station grounds is not anticipated because Joe English Pond, the largest pond on NBSFS, is too small to provide suitable foraging or nesting habitat. Optimal habitat consists of habitats with 3.9 square miles of contiguous open water (Peterson 1986). The bald eagle is commonly observed across New Hampshire during the summer, and it winter in areas with open water such as Great Bay and the Merrimack and Connecticut rivers (NHFGD 2024*b*).



Figure 2-23. Bald eagle (Photo: U.S. Fish and Wildlife Service)

Peregrine Falcon

A pair of peregrine falcons (New Hampshire Threatened, SGCN, State Rank S2, Figure 2-24) was observed using the cliff face of Joe English Hill during March and April 2021 (Figure 2-25). The pair was also observed in a tree on Joe English Hill on 04 May 2021. The breeding status of the falcon on base is unknown as of spring 2024. The peregrine falcon is a wide-ranging species that uses many different habitats across the United States for breeding, wintering, and migration (White et al. 2002). Nests sites are almost entirely on vertical cliffs or constructed structures that possess physical characteristics similar to cliffs. Open landscapes and air spaces, in which peregrine falcons can locate and attack their prey in the air, are important components of most habitat types. Preferred habitats include mountainous terrain, agricultural land, wide river valleys, lake shorelines, ocean coastlines, and islands. The urban environment, with its high-rise buildings, major bridges, and tall smokestacks, has become an increasingly important habitat for peregrine falcons since the 1970s (Cade et al. 1996). The home range of a territorial individual can be relatively small (39 square miles) when prey populations are abundant but may be much larger (135 to 579 square miles) when prey populations are more dispersed (White et al. 2002). Peregrine falcons can potentially establish breeding territories anywhere in the United States, provided that areas with suitable nest sites and a sufficient prey base occur in close proximity. Cliffs are abundant in New Hampshire, and suitable nesting substrate does not appear to be a limiting factor in the state's peregrine falcon distribution (NHFGD 2015).



Figure 2-24. Peregrine falcon (Photo: U.S. Fish and Wildlife Service)



Figure 2-25. Rare bird locations at New Boston Space Force Station (NBSFS)

Banded Sunfish

Fisheries surveys conducted by USFWS in 2006 and 2007 documented banded sunfish (New Hampshire Species of Special Concern, SGCN, Rank S3, Figure 2-26) in the Wells Bog area of Joe English Brook (Roettiger 2006, 2007). This species occurs over sand or mud in sluggish, acidic, heavily vegetated waters, including ponds, pools, and backwaters of creeks, small to large rivers, and boggy brooks (Lee et al. 1980, Page and Burr 2011, NatureServe 2024*c*, NHFGD 2024*c*).



Figure 2-26. Banded sunfish (Photo: NJ Pinelands Commission)

American Eel

The American eel has been observed on two separate occasions on NBSFS. In 1987, USFWS observed American eels (New Hampshire Species of Special Concern, SGCN, State Rank S3, Figure 2-27) in one of the inlets to Joe English Pond. The 1987 survey and subsequent surveys in 2006 and 2007 failed to capture any American eels on NBSFS. Additionally, in 2024, the USFWS captured a single American eel in Roby Pond during a cast netting survey. The USFWS captured another American eel in Roby Pond in 2024, but it is unknown whether it was the same individual or not.

American eels are the only catadromous fish in North America. The term catadromous refers to fish born in the ocean that mature in freshwater and return to the ocean to spawn (USFWS 2024*b*). In New Hampshire, the American eel occupies a small amount of its historic range. The species is still common in accessible coastal rivers, lakes, and ponds, but it is much less abundance upstream of hydroelectric dams. The eel's body shape causes it to have a high mortality risk from hydroelectric dam turbines. Thus, its range in New Hampshire is mostly limited to coastal habitats and freshwater habitats downstream of hydroelectric dams (NHFGD 2024*a*). The USFWS has reviewed the status of the American eel in 2007 and 2015, finding both times that ESA protection for the species was not warranted.



Figure 2-27. American eel captured from Roby Pond in 2024 (Photo: U.S. Fish and Wildlife Service)

Tricolored Bat

Tricolored bats (Proposed Endangered, New Hampshire Endangered, SGCN, State Rank S1, Figure 2-28) have been detected multiple times on NBSFS. They have been detected using acoustic monitors in 2002, 2017, and 2019, and at a single location in 2023. Individuals were detected in the northwestern portion of NBSFS and near the Operations Area. The Operations Area is surrounded by mostly deciduous and mixed forest, but some wetland also occurs in the area.

Most importantly, a tricolored bat call was documented during the 2010 to 2014 winter acoustic monitoring of Joe English Hill. This may indicate the presence of a hibernaculum. Bat hibernacula are considered to be endangered in New Hampshire and are thus protected in the state.

Tricolored bats use a variety of habitats, depending on their behavioral activity. Generally, they inhabit areas with large trees and numerous edge habitats (Center for Biological Diversity 2024). They typically roost within buildings, tree cavities, clusters of dead leaves and needles, and rock crevices (Center for Biological Diversity 2024, USFWS 2024c). Tricolored bats feed exclusively on insects; thus, they are typically found foraging above bodies of water.



Figure 2-28. Tricolored bat (Photo: United States Fish and Wildlife Service)

Eastern Small-Footed Bat

The eastern small-footed bat (New Hampshire Endangered, SGCN, Rank S1, Figure 2-29) was captured in 2 different locations at NBSFS during a 2002 bat survey (LaGory et al. 2002). Both individuals were female, and one was pregnant. Given the date of the captures (23 June 2002), it is unlikely that either individual was migrating, and their capture may have indicated the presence of a maternity roost at NBSFS. This capture also represented the first reproductive-season capture of this species recorded in New Hampshire. The 2 capture sites (Figure 2-34) are surrounded by mostly mixed forest (approximately 50% or more of the area), relatively little coniferous or deciduous forest (less than 20% of each habitat type), and small areas of old-field and wetland habitats.

Since then, 10 eastern small-footed bats (3 in 2006 and 7 in 2007) have been captured at NBSFS. Seven of these (2 in 2006 and 5 in 2007) were equipped with radio transmitters and tracked for 7 to 10 days (LaGory et al. 2008*b*). A 2-year telemetry study that began in summer 2006 confirmed that the species roosts on Joe English Hill and that protection of the whole hillside is prudent. Eastern small-footed bats were again detected during 2010 to 2014 winter acoustic surveys and a 2017 acoustic monitoring survey.

Small-footed bats are considered some of the most uncommon bats of the eastern United States, and information about their range, habitats, and behaviors is lacking (Harvey et al. 1999; Bat Conservation International 2001, 2024; U.S. Forest Service 2024). The NHWAP indicates that there are too few data to effectively construct a range within the state. To date, there have been 3 summer capture locations in the state (at NBSFS, White Mountain National Forest, and the town of Surry) and 2 winter capture locations in Coos and Rockingham counties (NHFGD 2015).

Eastern small-footed bats most frequently roost in caves or rock outcroppings but occasionally roost in buildings and behind loose tree bark (Harvey et al. 1999; Bat Conservation International 2001, 2024; U.S. Forest Service 2024). Within New Hampshire, data suggest that these bats most often roost within rock crevices (NHFGD 2015). The 2 capture sites on base are relatively close to Joe English Hill (Figure 2-34). Rock slabs and crevices are abundant on the southern and eastern sides of Joe English Hill, and these features may be used by roosting small-footed bats. Other rock outcroppings occur on NBSFS and may also provide roosting areas for this species. As described above, bat hibernacula are protected in New Hampshire.



Figure 2-29. Eastern small-footed bat captured at New Boston Space Force Station, June 2002

Northern Long-Eared Bat

NLEBs (Federally Endangered, New Hampshire Endangered, SGCN, Rank S1, Figure 2-30) have been captured numerous times on NBSFS, including in a 2002 bat survey, 4 in 2006, and 10 in 2007. In acoustic monitoring surveys to document overwinter use of Joe English Hill by eastern small-footed bats, NLEBs were detected 38 times between 2010 and 2014. One NLEB call was identified during a 2017 acoustic monitoring survey. This decline is likely linked to white-nose syndrome (WNS), which is further described below. Detection locations are shown in Figure 2-34.

The current range of the NLEB includes 37 states, mostly in the eastern and northcentral United States, and is restricted to forested habitats (USFWS 2022). The NLEB is medium-sized and can be distinguished from all other *Myotis* species within its range by its long, narrow ears and tragus. The NLEB has longer ears than the other bats in the *Myotis* genus. The NLEB hibernates during the winter and forages and roosts in upland forest habitat during the summer. It eats insects such as moths, flies, beetles, and caddisflies. The NLEBs forage primarily through the understory of forested areas and catch prey in flight using echolocation and by gleaning motionless insects from vegetation (USFWS 2023).

In summer, NLEBs use a variety of forested and wooded habitats to roost, forage, and breed. They prefer hardwood or mixed pine-hardwood stands near wetlands (Caceres and Barclay 2000, USFWS 2022). In winter, NLEBs hibernate in small numbers, primarily in caves and mines (USFWS 2023). In New Hampshire, where they hibernate in mines but have also been found in a WWII bunker, they are more common in small hibernacula than in large ones (NHFGD 2015). In summer, maternity roosts consist of approximately 30 to 60 individuals in snags, tree cavities, or beneath the loose bark of the largest available trees (USFWS 2023).

The NLEB and some other hibernating bat species have experienced recent rapid population declines due to WNS. NLEB hibernate during the winter months in caves and mines with constant temperatures, high

humidity, and no air currents. WNS, which is caused by a fungus, infects bats during hibernation. Bats with WNS use up essential energy stores for surviving the winter, which results in strange behavior. In some cases, bats have been observed to leave their hibernacula too early and perish. Scientists have found 90 to 100% declines in bat populations at some hibernacula in the northeast during winter surveys.



Figure 2-30. Northern long-eared bat (Photo: United States Fish and Wildlife Service)

Eastern Red Bat

A total of 4 eastern red bats (New Hampshire Species of Special Concern, SGCN, Rank S3?B, Figure 2-31) have been captured on NBSFS during surveys. Two were captured during a 2002 bat survey (LaGory et al. 2002), and 4 were captured during the 2006 to 2007 survey (LaGory et al. 2008*b*). A total of 61 calls attributed to red bats were recorded during the June to July 2002 survey, but only 2 calls were detected during the 2011 acoustic transect survey (North East Ecological Services 2011). They were detected again in 2017, 2019, and 2023 during acoustic monitoring surveys. Detection locations are shown in Figure 2-34.

The red bat is found from the eastern edge of the Rocky Mountains across southern Canada to the Atlantic Coast, south through the central United States to central Florida, western Texas, southern New Mexico, and northern Mexico. Eastern red bats are some of the most abundant bats in many parts of their range.

Typically, eastern red bats live alone or in family groups consisting of a mother and her young, except when they group together while migrating to milder regions to hibernate. During winter, eastern red bats hibernate in variety of locations, including tree hollows and exposed tree trunks, as well as clumps of grass and in leaf litter in southeastern and south-central upland forests. During summer, they roost in foliage. Hanging by one foot, wrapped in their furred tail membranes, they are well-concealed and resemble dead leaves. In summer, these bats have been found roosting in several deciduous trees but also in Norway spruce (*Picea abies*), Scotch pine (*Pinus sylvestris*), red pine (*Pinus resinosa*), and tamarack (*Larix laricina*) (Bat Conservation International 2001).



Figure 2-31. Red bat (Photo: United States Geological Survey)

Hoary Bat

Two hoary bats (Federal Review in Fiscal Year [FY] 2028, New Hampshire Species of Special Concern, SGCN, Rank S3B, Figure 2-32) were captured in mist nets during a 2002 bat survey of NBSFS (LaGory et al. 2002). A total of 191 calls attributed to hoary bats were recorded during the June to July 2002 survey. One hoary bat was captured during 2007 and followed using telemetry equipment. A 2011 transect survey using acoustic detection recorded 38 calls at 8 of 15 sites (North East Ecological Services 2011). This species was detected again in 2017, 2019, and 2023 during acoustic monitoring surveys. Detection locations are shown in Figure 2-34.

The hoary bat occupies the widest range and variety of habitats of any New World bat from Argentina and Chile to Canada. The hoary bat is solitary, usually living alone or in small family groups consisting of a mother and her young, except during migration. Males and females mate during the fall.

Hoary bats are rarely seen during winter hibernation. They have been found in Spanish moss (*Tillandsia usneoides*), squirrel nests, woodpecker holes, and on the trunks of trees, relying on their coloration for camouflage. During summer, they prefer tree roosts in edge habitats close to feeding grounds. Most females have been found rearing young in deciduous trees, whereas males seem more likely to roost in conifers (Bat Conservation International 2001).



Figure 2-32. Hoary bat (Photo: Kentucky Department of Fish and Wildlife)

Silver-Haired Bat

Silver-haired bats (New Hampshire Species of Special Concern, SGCN, Rank S3B, Figure 2-33) were detected during a 2002 bat survey of NBSFS using Anabat acoustic monitoring (LaGory et al. 2002). A total of 51 calls attributed to silver-haired bats were recorded during the June to July 2002 survey. A 2011 transect survey using acoustic detection recorded 277 calls in 15 sites (Northeast Ecological Services 2011). The species was detected again in 2017 and 2019 during acoustic monitoring surveys. Detection locations are shown in Figure 2-34.

The silver-haired bat is a hardy and widespread species. Mating occurs primarily in the fall, prior to migration. The young appear to be raised primarily in the northern third of the United States and in Canada, yet pregnant females have been found in mountains as far south as Arizona. During winter, silver-haired bats migrate to regions with milder climates to hibernate. They use several habitats for this purpose, including small tree hollows, loose tree bark, wood piles, cliff face crevices, cave entrances, and on rare occasions, in buildings. Males and non-reproductive females often roost alone. Females form small nursery colonies in woodpecker or flicker holes, tree bole cavities, crevices, and under the bark of hollow trees such as basswood and black oak. These roosts can be from 12 to 36 feet above the ground, are usually on the south side of trees, and are generally located near water. Maternity colonies may contain 6 to 55 individuals that periodically move among several nearby roosts (Bat Conservation International 2001).



Figure 2-33. Silver-haired Bat (Photo: Kentucky Department of Fish and Wildlife)



Figure 2-34. Locations of rare bat observations on New Boston Space Force Station (NBSFS) in 2017 and prior

Spotted Turtle

The spotted turtle (Under Review, New Hampshire Threatened, SGCN, S2 Rank) was observed near Joe English Pond in June 2000 (Figure 2-35 and Figure 2-41; S. J. Najjar, NBSFS, personal communication, 2005). This species was not observed or captured during the biodiversity survey (LaGory et al. 1997), a turtle telemetry project that targeted capture of the spotted turtle (Najjar and Drake 2005*a*), or the 2004 Joe English Pond survey. After these studies, however, an individual spotted turtle was captured and equipped with a radio transmitter in 2006, another was captured in the chain fern wetland during 2010, and a third was captured during 2011 near the baseball field.



Figure 2-35. Spotted turtle on New Boston Space Force Station, June 2000

The spotted turtle is relatively inactive except in early spring (NatureServe 2024*b*), which may account for the lack of records on NBSFS. Preferred aquatic habitats of the spotted turtle are unpolluted, small, shallow bodies of water such as small marshes, marshy pastures, bogs, fens, woodland streams, swamps, small ponds, and vernal pools, especially those with a soft bottom and aquatic vegetation (DeGraaf and Rudis 1986, NatureServe 2024*b*). These habitats are present on NBSFS. Spotted turtles require upland habitats for nesting, and females may travel approximately 1,500 feet or more to suitable nesting habitats. Males can travel long distance in search of females. Thus, spotted turtles may be especially sensitive to road mortality due to their long-distance movements. Eggs are usually laid from June to July in the well-drained soil of marshy pastures or in grass or sedge tussocks, in open areas including dirt paths, and in sandy and sparsely vegetated areas, and their eggs hatch in August (DeGraaf and Rudis 1986, NatureServe 2024*b*).

Wood Turtle

The wood turtle (Under Review, New Hampshire Species of Special Concern, SGCN, Rank S3) has been observed once near the northern boundary of NBSFS in July 1999, along a road near a forested wetland (Figure 2-41). The biodiversity survey (LaGory et al. 1997) did not detect this species at the station, but Joe English Brook is another area on the base where they could potentially find habitat. The wood turtle frequents slow-moving, meandering streams, but it disperses from these habitats and into a variety of upland

habitats during the summer (DeGraaf and Rudis 1986, NatureServe 2024*d*). Eggs are laid in May and June in open areas with sandy or gravelly soils.

Blanding's Turtle

The Blanding's turtle (Under Review, New Hampshire Endangered, SGCN, Rank S1) is regularly observed on NBSFS and is known to successfully nest at the station (Figure 2-36, Figure 2-37, Figure 2-41).

Two studies were conducted in 2004 to better understand the occurrence and habitat relationships of Blanding's turtles on NBSFS: a turtle telemetry project (Najjar and Drake 2005*a*) and an ecological survey of Joe English Pond (ANL, unpublished). Prior to 2004, there were 17 records of Blanding's turtles on base, but these were largely based on incidental observations rather than specific surveys or studies, and all were in the northeastern portion of the station. Collectively, during the 2 aforementioned studies, wetlands in all portions of the station were surveyed. No Blanding's turtles were captured in Joe English Pond, despite a relatively intensive trapping effort (307 trap-days). Five adult Blanding's turtles (3 females and 2 males) were captured on NBSFS during the 2004 turtle telemetry project; 4 of these were fitted with radio-transmitters and relocated regularly during the summer and autumn. Another adult Blanding's turtle was captured off-site and released on NBSFS in cooperation with NHFGD.

The 2004 radio telemetry study evolved into long-term monitoring of Blanding's turtle movement and habitat use and is continued annually. NBSFS Natural Resources personnel use telemetry to track approximately 10 turtles through the field season (April to October) and document their locations. NBSFS has pit-tagged and marked (with numbers) approximately 43 individual turtles. DNA samples have been collected from approximately 20 individuals and provided to NHFGD. Forty different adults were observed from 2004 to 2020; most of these observations were in the northeastern portion of the station. Six turtle deaths were documented on NBSFS.

Observations from 2004 to 2020 suggested that turtles on NBSFS use a variety of wetland habitats (cattail marsh, high-bush blueberry wetland, vernal pools, and red maple swamp), deciduous forest, pine forest, and open lawn. Turtles traversed forest and lawn areas as they moved between wetlands. Blanding's turtles on NBSFS most commonly use several wetlands in the northeastern portion of the station. These include Maddening Pond, Green Tree Reservoir, a high-bush blueberry wetland, several cattail marshes, and a beaver-controlled wetland complex. Some movement was observed between wetlands and terrestrial habitats during the summer. Each tracked turtle selected an overwintering site within one of the wetlands occupied during other portions of the year.

Blanding's turtles lay their eggs in June and July in sandy soils of upland areas (DeGraaf and Rudis 1986). Because the preferred habitats of Blanding's turtles are in the northeastern portion of the station and near the Operations Area, there is a relatively great potential for vehicular mortality, especially as adults move towards nesting areas and as newly hatched young move from their nests to the wetlands. The observation of hatchlings in the Operations Area suggests that nesting is occurring in the vicinity. Crossing the roads is particularly hazardous due to the curbs along the paved roads in this portion of the station. These curbs make climbing out of the road difficult for turtles, especially for small individuals.

A management plan for Blanding's turtle was developed during 2012, based on documented habitat needs and challenges to survival created by improvements. NBSFS also conducted a study on road mortality and turtle-friendly improvements to road design. As such, NBSFS will minimize installation of new roadside curbs and evaluate removal or modification of existing curbs and new culvert technology to minimize impacts on Blanding's turtle movements on NBSFS.



Figure 2-36. Blanding's turtle at New Boston Space Force Station, May 2004



Figure 2-37. Hatchling Blanding's turtle on roadway at New Boston Space Force Station, 2004

Eastern Box Turtle

A single eastern box turtle (*Terrapene carolina carolina*, New Hampshire Endangered, SGCN, Rank S1) was observed by installation personnel on NBSFS in July 2024 (Figure 2-38). It is unknown whether the single observation in July 2024 was a dispersing individual or whether a reproducing population occurs on NBSFS.

Eastern box turtles inhabit a variety of habitats, including woodlands, wetlands, grasslands, and shrublands. They may estivate during summer under logs or in moist locations (NHFG 2024*d*).




Eastern Hognose Snake

The eastern hognose snake (New Hampshire Endangered, SGCN, Rank S1) has been regularly observed on NBSFS (Figure 2-39, Figure 2-41). The hognose snake burrows and prefers woodland habitats with sandy soils such as dry open pine forest or deciduous woods; the species can also be found in grasslands (DeGraaf and Rudis 1986). These habitats are fairly widespread on NBSFS. In June and July, this species lays eggs in the soil, especially under or in decaying logs. The eggs hatch from July to September. Eastern hognose snakes, while generally docile, can bluff to discourage potential predation. These dramatic displays include widening the head and neck, hissing, bluff striking, and playing dead. They typically never actually follow through and bite.

The occurrence of the eastern hognose snake on NBSFS was first confirmed from a roadkill on Campbell Road in 1997 (LaGory et al. 1997). Habitat in the area was early to mid-successional, deciduous forest that included red oak, gray birch, red maple, quaking aspen (*Populus tremuloides*), and striped maple. From 1997 to 2003, there were 11 confirmed records of hognose snakes on NBSFS. During this time, records were largely based on incidental observations, rather than specific surveys or studies. NBSFS staff identified 4 adult hognose snakes in May 2004 near the station's borrow pit. Two other hognose snakes were captured in June 2004.

The occurrence of hognose snakes at NBSFS prompted a concern for locating and protecting hibernation areas for the species at the station. In September 2004, more intensive searches of apparently suitable habitats were conducted to capture adults that could be implanted with a radio-transmitter to study their movements and habitat use (Najjar and Drake 2005*b*). Five hatchlings and a juvenile were found during these searches, but none were sufficiently large to receive a transmitter. Most of these snakes were captured near the Boresight Tower in the southwestern portion of the station (Figure 2-41). Telemetry studies were initiated in 2005 and continued through 2007 (LaGory et al. 2008*a*) to further elucidate habitat relationships and movement patterns of the eastern hognose snake on NBSFS. A detailed report of the findings was developed by LaGory et al. (2008*a*). Generally, hognose snakes were distributed across the installation and used many different habitat types. The average home range of the eastern hognose studied was 127.6 ± 36.3 acres.

NBSFS Natural Resources staff continue to record and report hognose sightings to NHFGD. One juvenile was identified in 2014 and 2 snakes were identified in 2016 (1 juvenile and 1 adult).



Figure 2-39. Eastern hognose snake on New Boston Space Force Station, May 2004

Smooth Green Snake

The smooth green snake (New Hampshire Species of Special Concern, SGCN, Rank S3) has been observed once on NBSFS (Figure 2-40, Figure 2-41). The snake was accidentally killed during a prescribed burn on an installation field in spring 2019.

Smooth green snakes may be found in a variety of open or lightly forested habitats such as pastures, old fields, wet meadows, marsh borders, coastal grasslands, pine barrens, blueberry barrens, and grassy hilltops (NHFGD 2015, NatureServe 2024*e*). Smooth green snakes feed primarily on invertebrates, including arthropods, caterpillars, grasshoppers, slugs, and earthworms. Females may lay 2 or more clutches of well-developed eggs per season (usually in July to August) in piles of rotting vegetation or sawdust, rotting logs and stumps, or mammal burrows (Ernst and Ernst 2003, Nature Serve 2024*e*). Ant mounds, rock crevices, and mammal burrows may be used during hibernation (Carpenter 1953, Ernst and Ernst 2003, NatureServe 2024*e*).



Figure 2-40. Smooth green snake (Photo: Jonathan Mays)



Figure 2-41. Location of rare reptile observations at New Boston Space Force Station in 2019 and prior

Monarch Butterfly

There have been several informal surveys for the monarch butterfly (Federal candidate, New Hampshire Species of Special Concern, SGCN, Rank S5) on NBSFS. NBSFS observed larvae and adult stage butterflies in July 2024 during informal surveys. The species has been incidentally observed on the installation.

In addition to its candidate status, the monarch is listed as a New Hampshire SGCN in the NHWAP. This species depends on habitats that host blooming flowers as nectar sources for adults. In addition, it is highly dependent on native milkweeds (*Asclepias* spp.) throughout its life cycle. Monarch eggs are laid on milkweed leaves, then the caterpillars feed exclusively on milkweed once hatched. Pupation also occurs on milkweed plants. Native milkweeds are found throughout the base, particularly in open fields and roadsides. The third summer generation of the Eastern population of monarchs migrates southward in August through November, where it overwinters on trees in Mexico. NBSFS lies within the summer breeding areas for the Eastern population (USFWS 2017).

The NHWAP lists the main threats to this species in the state as (1) mortality from the use of neonicotinoid and other pesticides; (2) habitat conversion from the loss of milkweed due to use of Roundup Ready corn and soy crops and subsequent herbiciding; (3) habitat degradation from the loss of nectar-producing plants due to herbicide drift; (4) habitat conversion from development; and (5) habitat degradation and mortality from invasive plants that act as dead-end hosts (i.e., attract the species for egg-laying but do not support caterpillars). Other threats to monarchs in New Hampshire include changes in precipitation and temperature that affect milkweed and nectar plant growth and larval growth; mortality from predation and parasitism of eggs and larvae; increased disease; problems introduced by capture, rearing, and release elsewhere of adult monarchs; and habitat degradation from aggressive roadside vegetation management.

Small Whorled Pogonia

The SWP (Federally Threatened, New Hampshire Threatened, Rank S2; <u>Figure 2-42.</u>) was first observed on NBSFS during surveys in 2022. These and subsequent surveys during 2023 and 2024 documented 23 SWP population locations dispersed across the installation, totaling approximately 99 total individuals (<u>Figure 2-43</u>, USACE 2024). The surveys focused on suitable SWP habitat sites, which were identified using desktop modelling. Desktop modelling identified 1,408 acres of suitable SWP habitat on NBSFS. However, SWP populations have also been document outside of 'suitable SWP habitat' on NBSFS.

As a perennial member of the orchid family, the SWP produces a smooth, hollow stem that is 2 to 14 inches tall and topped by 5 or 6 leaves in a circular arrangement (false whorl). This species may not flower every year and instead remain in a vegetative state during some growing seasons. When flowering, 1 or 2 flowers stand in the center of the whorl of leaves. The leaves are milky-green or grayish-green, and the flower is yellowish-green with a greenish-white lip. In the northern part of the species' range, plants with flowering buds emerge from the leaf litter in May and bloom in June. The SWP grows in a variety of upland, mid-successional, wooded habitats, usually in older hardwood and mixed wood stands of beech, birch, maple, oak, and white pine. It prefers acidic soils with a thick layer of dead leaves and sparse to moderate ground cover. This orchid is almost always found in proximity to features that create long-persisting breaks in the forest canopy; the tree canopy is relatively open. It often occurs on slopes near small streams. The SWP relies on mycorrhizal relationships to successfully germinate and provide nutrients to non-photosynthetic seedlings (von Oettingen 1992). SWP may have preferred mycorrhizal fungi species, and related studies are ongoing (Fryer 2019). SWP undergoes dormancy periods, generally ranging from 1 to 10 growing

seasons, when environmental conditions are unfavorable (Fryer 2019). Thus, repeated surveys may be necessary to document a population.



Figure 2-42. Small whorled pogonia on New Boston Space Force Station



Figure 2-43. Location of documented small whorled pogonia colonies at New Boston Space Force Station (NBSFS)

2.3.5 Wetlands and Floodplains

The wetlands of NBSFS were delineated and described in detail in PES (1996). The wetlands delineation project was separated into 2 tasks. Task 1 included intensive field delineation and on-the-ground mapping of wetlands using the standard delineation protocols of the U.S. Army Corps of Engineers Environmental Laboratory (1987) in a 350-acre study area in and adjacent to the Operations Area (PES 1996). Task 2 involved aerial photography, infrared photo interpretation, and mapping of wetlands for the entire installation. NBSFS conducts annual wetland monitoring since 2003 to determine current conditions, existing disturbance, and potential threats.

A total of 228 wetlands, occupying a total of 198 acres, were identified by PES (1996). A variety of wetland types were documented, including forested, emergent, scrub-shrub, open-water, riverine, lacustrine, and mixed wetlands (Figure 2-6). Wetland complexes occur in the central portion of NBSFS in and around Joe English Pond. In the southeast part of NBSFS, wetlands are associated with Joe English Brook and Wells Bog. In the northeast, they occur around Beaver Pond No. 1, and south of Joe English Hill, they occur along West Meadow Road (Figure 2-4). Other wetland complexes include those associated with the drainage between Ice Pond and Joe English Pond (Figure 2-44) in the southwest and the Green Tree Reservoir system in the east-central portions of NBSFS, respectively.



Figure 2-44. Joe English Pond

Wetland species on NBSFS include cattail (*Typha latifolia*), sedges (*Carex* spp.), rushes (*Juncus* spp.), Virginia chain fern (*Woodwardia* virginica), pitcher plant (*Sarracenia purpurea*), meadowsweet (*Spirea alba*), boneset (*Eupatoreum perfoliatum*), buttonbush (*Cephalanthus occidentalis*), leatherleaf (*Chamaedaphne calyculata*), sphagnum moss, sweet gale (*Myrica gale*), three-way sedge, red maple, and black gum.

A total of 116 palustrine forested wetlands, occupying approximately 60 acres, were identified in the wetland survey (PES 1996). Forested wetlands typically contain an overstory of trees, an understory of saplings or shrubs, and an herbaceous layer (Cowardin et al. 1979); the canopy can be deciduous, coniferous, or mixed forest types. The irregular topography, the forested nature of the station and particularly the extensive evergreen forests found in large areas of NBSFS suggest that there may be numerous, isolated forested wetlands that were not identified using the photographic techniques in the survey (PES 1996).

There are 21 palustrine emergent wetlands on NBSFS that occupy a total of 11 acres; many of these have been influenced by beaver activities (PES 1996). Emergent wetlands are characterized by erect, rooted, herbaceous wetland plants that are present for most of the growing season. At NBSFS, the emergent wetlands are predominantly persistent, dominated by vegetation that normally remains standing through the winter months (PES 1996).

There are 31 palustrine scrub-shrub wetlands, totaling 13 acres, on NBSFS (PES 1996). This type of wetland is dominated by short woody vegetation and can include young trees or true shrubs. Often, the scrub-shrub community is a successional stage leading toward a forested wetland (Cowardin et al. 1979).

There are 33 mixed wetlands, totaling 36 acres, on NBSFS. Mixed wetlands contain a variety of vegetation types that prevents a simple classification (e.g., combination of forested and scrub-shrub wetland types). The most common mixed wetlands were a combination of scrub-shrub and emergent marsh wetland types and scrub-shrub and forested wetlands (PES 1996).

NBSFS contains 24 open-water wetlands (palustrine unconsolidated bottom), totaling 35 acres (PES 1996). These wetlands are characterized by open water with less than 30% vegetative cover (Cowardin et al. 1979). The open-water wetlands include ponds with little wetland vegetation, or naturally occurring and beavercreated ponds with an abundance of emergent vegetation. Wells Bog and Beaver Pond No. 1 are examples of open-water habitats edged by emergent, scrub-shrub or mixed wetland environments (PES 1996). Vernal ponds and other depressions (potentially remnant bomb craters) provide other small, open-water bodies (PES 1996).

One riverine wetland (stream segment between Deer Pond and On-Orbit Drive), totaling 0.1 acre, occurs on NBSFS. Most other stream segments were classified as forested or scrub-shrub wetlands on the basis of the dominant shoreline vegetation. Only one lacustrine system (the deep water portion of Joe English Pond), totaling 43 acres, was identified (PES 1996).

The Federal Emergency Management Agency (FEMA) has not created flood maps specific to NBSFS. FEMA flood maps specific to NBSFS are expected to be created and delivered to NBSFS sometime in 2024. DAFMAN 32-7003 states that all installations must use FEMA maps when available for floodplain determination and construction planning purposes. As such, NBSFS will use flood maps created by CEMML in 2023 for the interim period. According to the CEMML maps, much of the 100- and 500-year projected flood area occurs within and adjacent to existing hydrological features, such as Joe English Pond, Wells Bog, Beaver Pond No. 1, Joe English Brook, and tributaries to Joe English Pond. Flood projections increase in the southern portion of the installation, as much of the installation drains through this area. The extent and depth of flooding is pronounced within the Joe English Pond, Wells Bog, and Beaver Pond No. 4 areas. However, the 500-year floodplain does not vary appreciably in width from that of the 100-year floodplain boundary. The depths and velocities of the 100- and 500-year floods are appreciable and may impact culverts crossing installation roads, specifically On-Orbit Road.

2.3.6 Other Natural Resource Information

NBSFS is significantly impacted by the presence of invasive species. Terrestrial invasive vegetation is present primarily in edge, disturbed, opening, and field habitat and is managed to prevent spread. NBSFS forest is impacted by HWA and elongate hemlock scale, both of which are causing hemlock tree mortality, and NBSFS is conducting management to protect the hemlock trees. <u>Section 7.11</u> provides additional invasive species information.

Table 2-9. Invasive species at New Boston Space Force Station

Scientific Name	Common Name			
Vegetation				
Berberis thunbergii	Japanese barberry			
Celastrus orbiculatus	Oriental bittersweet			
Centaurea stoebe	Spotted knapweed			
Cirsium vulgare	Bull thistle			
Elaeagnus umbellata Thunb. var. parvifolia	Autumn olive			
Euonymus alatus	Burning bush			
Fallopia japonica	Japanese knotweed			
Frangula alnus	Glossy buckthorn			
Lonicera japonica	Japanese honeysuckle			
Lythrum salicaria	Purple loosestrife			
Rosa multiflora	Multiflora rose			
Securigera varia	Crown-vetch			
Vincetoxicum nigrum	Black swallowwort			
Insects				
Adelges tsugae	Hemlock woolly adelgid			
Agrilus planipennis	Emerald ash borer			
Cryptococcus fagisuga	Beech scale			
Fiorinia externa Elongate hemlock sca				

2.4 Mission and Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

The NBSFS General Plan (2012) provides an overview of constraints to development on NBSFS. These constraints include those related to natural resources, as well as manmade and operational constraints. The constraint map developed for the General Plan is presented in <u>Figure 2-45</u>. Important natural resource constraints include T&E and rare species, rare natural communities, wetlands, ponds, and streams. Topography and soils also constrain development to some extent.

Water features and wetlands constrain development on NBSFS (HB&A 2004). Seven miles of streams and 14 freshwater ponds, which occupy approximately 100 acres, exist on the station (Figure 2-6; HB&A 2004). Many of the ponds are bordered by wetlands, and the streams are bordered by riparian vegetation. Wetlands can be developed or disturbed, but such development is subject to permitting. Construction in wetlands usually results in greater cost, extensive mitigation, engineering problems, and removes or degrades valuable wildlife habitat.

Steep slopes can be a significant constraint to development at NBSFS. NBSFS is characterized by hilly terrain and depressions formed by glaciers. Elevations range from approximately 350 feet at Joe English Brook to 1,280 feet at the peak of Joe English Hill. The topography on NBSFS is variable, with slopes ranging from 0 to 3% in level areas to as much as 26 to 35% in steep areas.

The presence of bedrock in much of the area can add significantly to facility construction complexity and cost. Approximately 90% of NBSFS is covered with fine, dense, and stony soils, but exposed bedrock occurs in some places. Although some of these soils are well-drained, they are not particularly suited for agriculture. Except for areas where wetland soils are present, most soils on the station are suitable for construction (HB&A 2004).

Erosion poses constraints on development, infrastructure, and forestry at NBSFS. There are few erosion hazards on site, although some fine sandy loam soils are highly erodible in exposed, unvegetated, or steep areas (HB&A 2004). For example, the operation of heavy logging equipment during wet weather can damage vegetated areas and lead to erosion. There are also erosion problems associated with the steeper slopes on some gravel roads.



Figure 2-45. Map of natural resources constraints to mission planning at New Boston Space Force Station (NBSFS) according to the NBSFS General Plan (2012)

2.4.2 Land Use

NBSFS is primarily undeveloped forested habitat (coniferous, deciduous, and mixed forests) with interspersed historic gravel roads. The Operations Area located in the northeastern portion of the installation is the only significant development on the base. A few other developments are scattered across base, but they are small and largely consist of parkland habitat.

2.4.3 Current Major Mission Impacts on Natural Resources

The current satellite-tracking mission of NBSFS has no major impacts on the environment. Minor impacts are described below.

Air Emissions

Permitted air pollution sources at NBSFS include 2 large diesel-fuel backup generators at the station's power plant, 1 generator at Building 164, 2 generators at SATCOM (Building 145) and 1 generator in Building 104. These generators and other combustion sources are included in annual air emissions inventories for the station.

Wastewater Treatment and Discharge

The wastewater system at NBSFS is a series of simple collection systems with septic tanks for treatment and leach fields for reintroduction into the ground. The main septic system can handle approximately 19,600 gallons per day, which is more than sufficient for the station's daily needs. However, there is potential for the septic system to be overwhelmed by a significant rain event and potentially impacting surrounding natural resources by effluent and overflowing sewage (NBSFS General Plan 2012).

Hazardous Materials and Waste

The use and storage of hazardous materials and wastes could potentially impact natural resources at NBSFS. NBSFS stores and uses small amounts of paints, thinners, cements, adhesives, acids, cleaners, and other hazardous materials (HB&A 2004). However, an Installation Restoration Program evaluation indicated no significant health and safety concerns related to the presence of hazardous waste in the soil or groundwater from historic releases (HB&A 2004). Initially, upon review of that analysis, the New Hampshire Groundwater Protection Bureau indicated no further action would be required for cleanup at any sites at NBSFS. However, the U.S. Environmental Protection Agency (U.S. EPA) is currently reviewing the Hazardous Ranking System scoring of Installation Restoration Program sites on NBSFS, and this review could result in changes to the "no further action" status of some of these sites.

NBSFS employs multiple measures to avoid impacts to natural resources from hazardous materials and waste. This includes procurement, storage, and handling procedures, in addition to the Hazardous Waste Management and Spill Response Plan. All hazardous materials are procured and stored by the Hazardous Materials Pharmacy (Hazmart) in Building 120, where they are controlled and tracked by Air Force Enterprise Environmental Safety and Occupational Health Management Information System software. Once purchased, the materials are either stored in the Hazmart for distribution or given directly to various shops for day-to-day use. In most instances, these materials are stored in flammable material storage lockers.

NBSFS is permitted by the state as a small quantity hazardous waste generator (HB&A 2004). All hazardous wastes are stored at their generation points in proper containers and then staged at the Central Accumulation Area before being shipped off-site. NBSFS is now using the Defense Reutilization and Marketing Office to arrange transport and disposal of all waste. NBSFS also operates under a Hazardous

Waste Management and Spill Response Plan to control any spills of oil or hazardous substances. Future facilities must comply with the permits and the spill response plan.

Munitions of Explosive Concern

Munitions of Explosive Concern (MEC) and Munitions Constituents remain from the period when NBSFS was used as a bombing and strafing range (Section 2.1). MEC has been found in many areas of the station, but the highest concentrations are suspected to be in the vicinity of Joe English Pond, which was the primary bombing target area (HB&A 2004). Investigations of the pond bottom indicate an abundance of MEC, primarily in the deep water areas. In addition, shrapnel has been found in and around the Shooting Field (a former strafing range) and no timber operations are allowed in this area. All camping areas on site have been cleared, most of the installation has been surface-cleared, and signs have been posted that indicate off-limits MEC areas. Periodically, MEC have been found on NBSFS that have to be either removed or exploded in place.

The Military Munitions Response Program continues to investigate and manage the risks associated with the remaining MEC and Munitions Constituents on NBSFS. A Record of Decision for Joe English Pond has a Selected Remedy of Land Use Controls and Long-Term Management. A Land Use Control Implementation Plan is currently under development and will include use restrictions, signage, long-term monitoring of the surface water and sediment, and annual and 5-year reviews. Until the investigations are completed for the remaining Military Munitions Response Program sites and a base-wide Land Use Control Implementation Plan is developed, MEC management will follow the base's General Plan (2012 B. Dubner, USAF, personal communication, 2021).

MEC remediation activities have potential to adversely affect natural resources on NBSFS, including fish and wildlife, T&E and rare species, and wetlands. Impacts to these resources could result from a variety of activities associated with MEC remediation, including the draining of wetlands to gain access to MEC and digging or dredging to extract MEC for proper disposal. These activities have the potential to disrupt ecosystems, reduce the size of existing plant and animal populations, reduce the long-term carrying capacity of ecosystems, and increase nonnative plant invasion of disturbed habitats. Consequently, all MEC remediation activities at NBSFS will be planned and implemented in consultation and coordination with the USFWS, NHFGD, and NHNHB. Remediation actions in wetlands do not require a Section 404 dredgeand-fill permit from the U.S. Army Corps of Engineers, when accomplished under CERCLA. All MEC remediation activities and associated mitigation will be planned to minimize risk to important natural resources on NBSFS and to maintain the long-term sustainability of the ecosystems on which they depend.

Military Training

Military training historically conducted on NBSFS includes tactical maneuvers (force-on-force exercises), helicopter operations, land navigation exercises, emergency response (e.g., simulated vehicle accidents and natural disasters), reconnaissance and combat patrolling, establishment of field camps, and rock climbing and rappelling (ANL 1999*a*). Military units that have conducted training at NBSFS include the Army National Guard, the Army Reserve, the U.S. Marine Corps, and the Military Air Force Police.

An environmental assessment found that military training would result in only minor localized, short-term, or temporary impacts to the environment and have no significant effect on the human environment (ANL 1999*a*). Military training impacts are considered very small incremental additions to impacts resulting from ongoing mission operations and recreational activities. A mitigation plan provides specific mitigation measures for particular environmental issues of concern during military training (ANL 1999*b*). Maximum troop sizes are limited to 200 persons at any one time, no live ammunition can be used, and vehicles must

remain on roads. With the enactment of these mitigation measures, most of the minor impacts would becomeare negligible. The military training program at NBSFS is being updated to incorporate some changes to activities and their locations and will be evaluated in an environmental assessment.

Radio Frequency Hazards

Satellite tracking constitutes the main mission of NBSFS. The radio antennas employed at NBSFS have potential hazards associated with radio frequency radiation. The measured radio frequency hazards associated with NBSFS antenna systems are minimal (HB&A 2004). Although the systems are capable of transmitting at higher power, administrative precautions (safety training, periodic monitoring, and controlled areas) and engineering (software inhibitors, interlocks, and alarms) provide adequate safety measures that reduce the potential risk to a minimum. The mission area is shown in Figure 2-46. The current mission has no major adverse impact on the environment.



Figure 2-46. Mission area

2.4.4 Potential Future Mission Impacts on Natural Resources

Potential future mission impacts may be similar in character and magnitude to those currently occurring. In addition to the impacts listed in Section 2.4.3, the potential NHARNG land navigation course, 300-meter rifle range, andvehicle training may impact natural resources. The land navigation training area will entail 60 objective stakes will be installed in the training area. No more than 200 troops would participate in the training at any one time. Environmental considerations will be incorporated into the land navigation course if approved and constructed, such as avoidance and protection of SWP populations. Considering environmental considerations, limited disturbance to natural resources is expected from this activity.

The New Hampshire National Guard has requested permission to obtain a license to construct a small arms range complex at NBSFS, generally overlapping the strafing range. The New Hampshire National Guard is required to provide a planning charrette, including all the resources necessary to conduct required environmental assessments for the proposed range complex. Space Operations Command and the Department of the Air Force will review the planning charrette to determine the feasibility, issues, and

challenges of the range complex. Impacts to natural resources and associated conservation measures will be detailed within environmental assessments if the project advances. A memo describing the request and a proposal presentation are shown in <u>Appendix J</u>.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The USAF environmental program adheres to the Environmental Management System (EMS) framework and its Plan, Do, Check, Act cycle for ensuring mission success. EO 13834, *Efficient Federal Operations*; DoDI 4715.17, *Environmental Management Systems*; AFI 32-7001, *Environmental Management*; and International Organization for Standardization (ISO) 14001 standard, *Environmental Management Systems—Requirements with guidance for use*, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the EMS framework.

The natural resources program employs EMS-based processes to achieve compliance with all legal obligations and current policy drivers, effectively manage associated risks, and instill a culture of continual improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

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4.0 GENERAL ROLES AND RESPONSIBILITIES

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in the table below. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Table 4-1. General roles and responsibiliti	es
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Office/Organization/Job Title ^a	Installation Role/Responsibility Description		
Installation Commander	Responsible for approval of the Integrated Natural Resources Management Plan (INRMP) and		
	implementation		
Air Force Civil Engineer Center Natural Resources Media Manager/Subject Matter Expert/Subject Matter Specialist	Responsible for overall U.S. Air Force program management		
Installation Natural Resources Manager/Point of Contact	Responsible for implementation of the INRMP		
Installation Security Forces	Responsible for general law enforcement		
Installation Unit Environmental Coordinators (see Air Force Instruction 32-7001 for role description)	N/A		
Installation Wildland Fire Program Manager (WFPM)	The Installation Natural Resources Manager is also the WFPM; See New Boston Space Force Station Wildland Fire Management Plan for description		
Pest Manager	The Installation Natural Resources Manager is also the Pest Manager; See New Boston Space Force Station Integrated Pest Management Plan for description		
Range Operating Agency	N/A		
Conservation Law Enforcement Officer	N/A; New Hampshire Fish and Game Department provides this function		
National Environmental Policy Act (NEPA)/Environmental Impact Analysis Process (EIAP) Manager	Installation Natural Resources Manager is the EIAP Manager; Responsible for compliance with 32 Code of Federal Regulations 989 and NEPA implementation		
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	N/A		
U.S. Department of Agriculture, Forest Service	Responsible for implementation of assigned projects through cooperative agreement		
U.S. Fish and Wildlife Service	Responsible for implementation of assigned projects through cooperative agreement and for INRMP approval		

^a Listing is not in order of hierarchical responsibility

5.0 TRAINING

USAF installation NRMs/POCs and other natural resources support personnel require specific education, training, and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change, or to fulfill a permitting requirement.

Installation Supplement—Training

- Naval Civil Engineer Corps Officer School-sponsored Section 106 training
- DoD-sponsored Native American consultation training sponsored by AFCEC
- Wildland fire training (<u>Tab 1—Wildland Fire Management Plan</u>)
- NRMs at NBSFS must take the DoD Natural Resources Compliance course, endorsed by the DoD Interservice Environmental Education Review Board and offered for all DoD Components by the Naval Civil Engineer Corps Officers School (see https://netc.navy.mil/cecos/ for course schedules and registration information). Other applicable environmental management courses are offered by the Air Force Institute of Technology (https://www.afit.edu), the National Conservation Training Center managed by the USFWS (www.training.fws.gov), and the Bureau of Land Management Training Center (https://www.blm.gov/learn/national-training-center)
- Natural resource management personnel shall be encouraged to attain professional registration, certification, or licensing for their related fields, and may be allowed to attend appropriate national, regional, and state conferences and training courses
- The DoD-supported publication, *Conserving Biodiversity on Military Lands—A Handbook for Natural Resources Managers* (http://dodbiodiversity.org), provides guidance, case studies, and other information regarding the management of natural resources on DoD installations

Natural resources management training is provided to ensure that installation personnel, contractors, and visitors are aware of their role in the program and the importance of their participation to its success. Training records are maintained IAW the Recordkeeping and Reporting section of this plan (Section 6.0). Below are key natural resources management-related training requirements and programs:

• New personnel assigned to NBSFS are given a short verbal introduction to NBSFS resources. The briefing is documented on an in processing checklist which is signed upon completion.

6.0 RECORDKEEPING AND REPORTING

6.1 Recordkeeping

The installation maintains required records IAW AFMAN 33-363, *Management of Records*, and disposes of records IAW the Air Force Records Management System records disposition schedule. Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook, and in referenced documents.

Installation Supplement—Recordkeeping

Natural resources records are kept on the NBSFS Electronic Records Management drive, and paper files of older materials are kept in the official file IAW the Air Force Records Management System.

6.2 Reporting

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting AFCEC Natural Resources Media Manager and Subject Matter Specialist should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement—Reporting

NBSFS creates annual reports to NHFGD at any time that a special permit is issued. Reports are typically created annually for Blanding's turtle management.

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

Installation Supplement—Natural Resources Program Management

The natural resource management program at NBSFS is implemented primarily by the Natural Resources Management Office, which currently consists of the Natural Resources Planner and is assisted by U.S. Forest Service personnel, including an onsite wildlife technician. The Natural Resources Management Office oversees the management of unimproved lands, timber harvest operations, wildfire management, natural resource inventories, biological studies, T&E species management, and environmental assessment activities. Natural Resources personnel are also involved in educational outreach to NBSFS employees and visitors, especially regarding the occurrence of T&E species on the station. NBSFS Natural Resources and Morale, Recreation, and Welfare personnel work closely to manage the recreational programs at NBSFS. Services manages all camping, boat rentals, and snowmobile rentals.

NBSFS Natural Resources personnel interact with other federal and state agencies in implementing the natural resource management program on NBSFS. NBSFS has a cooperative agreement with the U.S. Forest Service for wildfire management on NBSFS. Natural Resources personnel regularly interact with the USFWS, NHFGD, and NHNHB regarding the management of protected species on NBSFS. Both the USFWS and the NHFGD were consulted during development of this INRMP and are signatory agencies on this plan.

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Fish and wildlife management at NBSFS is based on the principles of ecosystem-based and adaptive management (DAFMAN 32-7003 and DoDI 4715.03). Ecosystem-based management is "a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole" (DoDI 4715.03). Adaptive management is "a systematic process for continually improving natural resources management policy and practices by continually monitoring current operations and applying lessons learned to modify these programs as warranted" (DAFMAN 32-7003). As such, management at NBSFS primarily focuses on maintaining a diverse forest ecosystem at various stages of succession. This top-down approach allows the habitat and species to be managed in tandem.

In addition to managing for natural habitats, key components of fish and wildlife management on NBSFS are biological surveys, which are conducted to inventory resources and inform planning efforts. The Natural Resources Management Office plans to conduct a comprehensive base-wide survey to update information on the ecological resources of the station. This survey is further described in <u>Section 7.4</u>. The Natural

Resources Management Office will conduct other standalone surveys, such as those for breeding birds, as needed to maintain inventories for management and planning purposes.

One key principle of ecosystem management is the support and maintenance of natural processes or disturbance regimes such as wildfire. The NBSFS wildland fire program aims to maintain the natural process and benefits of wildfire. Similarly, windthrow, native fungi and parasites, stream and floodplain scouring, and other disturbance regimes are generally uninterrupted at NBSFS when they do not interfere with the mission or human safety. Further details regarding forest management or wildland fire management are provided in <u>Sections 7.8</u> and <u>7.9</u>.

Natural Resources personnel conduct several wildlife habitat improvement projects each year. Recent examples have included prescribed burning of fields, wildlife openings, and forest areas. In addition, the Natural Resources Management Office integrates habitat improvement features into forest management activities, and several timber harvests have been designed to meet habitat objectives. Examples include small clearcuts to increase browse production, forest thinning to increase mast production, shelterwood cuts to increase age diversity in forests, and reserve tree cutting to provide raptor perches.

A habitat improvement goal of the Natural Resources Management Office is to increase the area of early successional aspen–birch stands and maintain all of the old-fields at NBSFS. Overall, NBSFS has a limited amount of old-field and early successional forest but an abundance of mid- and late-successional forest with a mature age structure (Najjar 1998). The 2017 station-wide forest inventory indicated a lack of early successional forest species in all age classes. Early successional forest types provide critical habitat for a variety of species (Degraaf et al. 2006). Bird species that are dependent on early successional habitat are declining more than birds that are dependent on other habitat groups, albeit an artefact of loss of agricultural habitats created by European settlers (Hunt 2020). Increasing the area of early successional habitats is accomplished by using a combination of fire, mowing, and timber harvesting. Six small (3- to 8-acre) clearcuts have been created from 2016 to 2021 to increase diversity. Designing clearcut harvests for early successional habitat on NBSFS is challenging due to the proximity of cultural resources, wetlands, and slopes. In addition, NBSFS actively manages for fire-adapted communities through the Wildland Fire Management Plan (Tab 1—Wildland Fire Management Plan).

Within early successional management areas, regeneration of aspen and birch is accomplished by cutting poletimber or small sawtimber stands on 50- to 60-year rotations (Najjar 1998). Prescribed burning can encourage aspen seedling regeneration. Retention of some trees in cleared areas will provide important habitat features for a variety of wildlife species, including the red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), turkey vulture (*Cathartes aura*), olive-sided flycatcher (*Contopus cooperi*), and common raven (*Corvus corax*). In addition, retention of occasional groups of softwood saplings and poles on dry and wet sites would provide habitat diversity within the aspen–birch canopy.

Three wetlands (Green Tree Reservoir, Gardner Pond, and Seavy Pond) that were historically (1960s to 1980s) altered with dams to increase waterfowl production and provide recreational opportunities were scheduled for major repairs (Green Tree and Seavy) or programmed for funding (Gardner) in 2021. The dams were considered for removal or repair, and they were ultimately repaired due to the compliance and cost considerations associated with removal. The ponds will continue to provide habitat for waterfowl and recreational opportunities.

IAW the MBTA and EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, NBSFS avoids or minimizes adverse impacts to migratory birds and takes active steps to protect birds and restore or enhance their habitat on the station. Forest management and wildland fire management activities are conducted on NBSFS to improve habitat conditions for a variety of plant and animal populations, including

migratory birds. Although notification has not been necessary in the past, NBSFS would notify the USFWS if unintentional take of migratory birds that is reasonably attributable to NBSFS actions is having, or is likely to have, a measurable negative effect on migratory bird populations. Natural resource management activities on NBSFS are expected to provide an overall benefit to migratory bird populations at the station.

Activities associated with fish and wildlife resources on NBSFS include fishing, hunting, and wildlife watching (Najjar 1998). Demand for these activities is relatively high because of the station's regular use by the public and its relatively undisturbed nature. Recent outreach programs by Natural Resources personnel have increased awareness and interest in wildlife species at the station, and the staff have benefited from increased reporting of rare and other wildlife species. Natural Resources personnel have established interpretive signs and trails at NBSFS and developed educational literature and guides.

Climate Change and Fish and Wildlife Management

Monitoring fish and wildlife populations is essential to document climate-driven changes to species diversity and distribution at NBSFS. Presence/absence surveys are the most direct approach to provide useful information about change over time if surveys are conducted periodically and consistently. Hunting and fishing reporting provides useful data for tracking harvest patterns and population health. Adaptive management and monitoring may be used for habitat improvement projects to assess the impact and evaluate effectiveness of management actions. Monitoring programs to track timing of seasonal events and migration patterns may also be conducted to aid in future management planning.

Prevention and control of the spread of wildlife diseases is critical to protect native species and habitats. The NHWAP identifies known diseases of concern, including fungal diseases, chronic wasting disease in deer, and avian diseases such as avian cholera. Many of these diseases have become more common and/or are expected to increase in frequency as the climate changes. Diseases transmitted to humans through ticks, such as Lyme disease, are a major health and safety concern and areworsened by climate change. Ticks are abundant in tall grass and thick brush and often occur in high numbers right next to roads, paths, and game trails (Eaton 2016). The Natural Resource Management Office may have an increasing role in controlling the spread and prevalence of wildlife diseases through habitat and population management.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

The use of land and recreational facilities at NBSFS constitutes a conditional privilege extended by the Installation Commander. Guidelines for such use are provided in NBSFS Installation Instruction 32-7003 (available on USAF E Publishing https://www.e-publishing.af.mil) and are intended to allow the widest possible use of facilities that is consistent with the NBSFS mission, safety, and conservation programs. IAW DAFMAN 32-7003, Paragraph 3.32.3.1, all of NBSFS is designated as a closed installation. Access categories are limited to participants listed in DAFMAN 32-7003, Section 3.32.3.2, precluding general public and other user group access due to several considerations: There are contracted security forces on the installation, all traffic entering NBSFS must go by the space mission area, the mission area has no cantonment area fencing, and the installation lacks assigned wildlife law enforcement.

The Natural Resources programs are available to the following access categories IAW DAFMAN 32-7003, Section 3.32.3.2:

- Active-duty military (includes Reserve personnel on full-time orders and National Guard personnel on active duty (Title 10 Status)
- DoD civilians
- Active-duty military dependents and family members
- Military retirees
- DoD civilian retirees
- Employees of installation prime contractors (defined as a contractor operating under a 5-year or longer-term contract).

Individuals in all these categories have equal access to NBSFS facilities and follow the same use regulations and restrictions.

Authorized recreational activities include camping (tents, recreation vehicles, and recreational trailers), rock climbing, hunting, fishing, trapping, boating (non-gasoline), hiking, cross-country skiing, snowshoeing, ice skating, sledding, snowmobiling, archery, and group recreational activities. The station is used regularly during the summer months for recreation, but it is open all year. Boating is authorized on all NBSFS ponds, but motors and anchors are strictly prohibited. Snowmobiles are the only off-road recreational motor vehicle authorized for use on NBSFS. Snowmobile operation is generally restricted to trails over unplowed roads during the winter. Snowmobiles are available for rental on NBSFS. All-terrain vehicles are used by NBSFS personnel for official duties only. Hiking, jogging, snow-shoeing, cross-country skiing, and wildlife watching, and other forms of low-impact recreation are permitted in all unrestricted areas of the station. Bicycles are allowed on base roads but not on trails. Electric bikes are not currently authorized.

Unimproved camping is available at Ice Pond and Joe English Pond. Campsites are reserved on a firstcome, first-served basis. In addition, there are 2 permanent house trailers available for rental on the western side of Joe English Pond. The maximum length of stay at any individual campsite is 30 days. The normal summer camping season runs from early May to Columbus Day, but off-season camping is permitted. A self-guided nature trail originating from the former Joe English Pond campground is maintained by NBSFS. Similarly, the hiking/recreation trail network on Joe English Hill and Hill 51 are maintained by NBSFS, and trail maps of these trails are available to installation users.

Although many of the undeveloped portions of NBSFS are available for recreational use, most activity occurs at a few locations, including the camping grounds and trailer park around Joe English Pond, Ice/Roby Ponds, Seavy Pond, the Deer Pond Recreation Area, and the Community Center (Building 161). These areas occupy approximately 20 acres. NBSFS Natural Resources and Services personnel work closely to manage the recreational programs at NBSFS. Services staff oversee all camping equipment rental, boat rentals, and snowmobile rentals.

Hunting, fishing, and other outdoor activities at NBSFS are governed NBSFS Installation Instruction 32-7003. NBSFS issued 31 sportsman permits during 2023 (most recent year), which are valid for hunting and fishing. All individuals with DoD credentials currently have access to NBSFS. Individuals in all of these categories have equal access to NBSFS facilities and follow the same use regulations and restrictions. Recreational activities such as hiking, camping, fishing, and archery hunting are allowed when Force Protection Conditions are normal, Alpha, or Bravo. Higher Force Protection Conditions result in possible suspension of recreational activities.

The NBSFS fishing program is enjoyed by many NBSFS staff and visitors. Fishing is open throughout the year on NBSFS IAW state fishing regulations. An installation permit is required to fish, and 28 permits were issued during 2023, in addition to the sportsman's permits that also allow fishing. Youth under the age of 18 are not required to obtain a fishing permit. Joe English Pond is the installation's largest waterbody with trout and bass present. Several other ponds on site have fishing opportunities, including Roby Pond, Ice Pond, Deer Pond, Wells Bog, and Green Tree Reservoir. Although bass have been reported in the Green Tree Reservoir, the pond does not support a significant recreational fishery and is mostly used as a source of minnows for bait (Najjar 1998).

NHFGD and NBSFS personnel have stocked rainbow and brook trout in station ponds to improve recreational fisheries. Currently Joe English Pond and Ice Pond are stocked with brook and rainbow trout in spring. Joe English Pond is also typically stocked with rainbow trout in fall to support winter ice fishing. Warmwater species such as largemouth bass, brown bullhead, chain pickerel, bluegill, and perch are self-sustaining and are found in Roby Pond and Ice Pond. Joe English Pond supports a self-sustaining population of largemouth bass, and many of these bass reach trophy size.

The NBSFS hunting program is also enjoyed by many participants. All hunting on NBSFS must comply with New Hampshire hunting laws. A \$40 station sporting permit is issued to all hunters, who must also possess a valid New Hampshire hunting permit. Hunting on NBSFS is restricted to archery only. An archery range is maintained by NBSFS at Green Tree Field. Additional regulations regarding hunting areas, reporting, stands, blinds, and trail cameras are listed in New Boston Space Force Station Instruction 32-7003.

NBSFS has huntable populations of white-tailed deer, turkey, ruffed grouse (*Bonasa umbellus*), gray squirrels (*Sciurus carolinensis*), and snowshoe hare (*Lepus americanus*). Bear hunting is allowed but uncommon. Moose hunting is also allowed but is exceptionally uncommon, and the hunter must possess a NHFGD moose permit. White-tailed deer is the most popular game species on NBSFS, and many deer reach trophy size.

NBSFS began collecting information on deer harvests in 1995 (Najjar 1998). In 1996, NBSFS instituted a policy that all wildlife harvested on the station must be reported to the Natural Resources Planner. Data such as weight, sex, and location are collected on harvested animals and used to track harvest patterns and population health. The number of deer harvested has varied annually from 0 (2001) to 11 (1997 and 2002). Since data collection started in 1996, a total of 206 deer have been harvested, and the average deer weight (using estimated and actual weights) was 125.83. Over the period of 1996 to 2020, 71 female deer were harvested and 135 male deer were harvested. Since 1996, the average annual harvest was 8.6 deer. In 2020, NBSFS hunters harvested 5 mature bucks, for an average harvest of 1.12 bucks per square mile. The buck harvest from 2017 to 2020 is shown in Figure 7-1. The 2020 harvest was very close to the NHFGD Management Plan (2016–2025) goal for Management Unit K of 1.18 adult bucks (1.5 years or older) per square mile. NBSFS will continue to collect hunter harvest and usage data to inform the hunting program and maintain a high-quality hunting experience.



Climate Change Impacts on Outdoor Recreation and Public Access to Natural Resources

Climate change could impact outdoor recreation over time. Warmer winters may result in shorter seasonal snow cover, which would reduce opportunities for snow-based recreation such as snow-shoeing and cross-country skiing. Some popular fishing species such as brook trout and rainbow trout that have been stocked at NBSFS may no longer be viable in certain ponds or streams if water temperatures rise above their thermal tolerance.

Hemlock forests, which provide wintering habitat for white-tailed deer and important cover for ruffed grouse, turkey, and snowshoe hare, are threatened by the HWA (NHFGD 2015) and elongate hemlock scale. These invasive insects can cause extensive mortality in hemlock forests, but they cannot survive cold winters. As winter temperatures rise, hemlock forests will be more vulnerable to these pests, threatening the habitat of many game species.

Climate change is projected to increase the prevalence of vector-borne diseases, as warmer temperatures are more suitable for vectors such as mosquitoes and ticks. The blacklegged tick (*Ixodes scapularis*), which carries Lyme disease, anaplasmosis, and babesiosis, is increasingly common in New Hampshire (Eaton 2016). Best practices to reduce the risk of tick bites should be made available to all individuals participating in recreational activities (CEMML 2019).

7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

NBSFS has no conservation law enforcement. The NHFGD Conservation Officer patrols NBSFS and is available upon request.

7.4 Management of Threatened and Endangered Species, Species of Special Concern, and Habitats

Applicability Statement

This section applies to USAF installations that have T&E species on USAF property. This section is applicable to this installation.

Program Overview/Current Management Practices

Management of T&E species and Species of Special Concern at NBSFS primarily focuses on data collection, species protection, and habitat management. Biological surveys provide valuable information about rare species' distributions, habitats, movements, and behaviors, and they inform management and planning efforts by NBSFS. Proper management and planning helps ensure the conservation of rare species and avoidance of potential mission restrictions.

Much of the information known about T&E species and their habitats emerged from the 1994 to 1996 biodiversity survey on NBSFS, described in <u>Section 2.3.4</u>. NBSFS is planning to conduct another comprehensive biodiversity survey, as the previous effort is outdated. The survey is programmed and will focus on wildlife, insects, vegetation, and fungi across the installation. The survey will be critical to understanding changes in species distribution on NBSFS, as the forest cover is changing due to invasive species, wildlife diseases, and a warming climate. The upcoming comprehensive base-wide survey will also help identify the occurrences and extents of species with potential for listing under the ESA, including the wood turtle, spotted turtle, monarch butterfly, little brown bat, and hoary bat.

Since the biodiversity study was completed, multiple surveys have provided specific rare species information. These studies include several bat surveys, including both mist-net and acoustic surveys; numerous fisheries surveys; surveys for eastern whip-poor-wills and American bitterns (*Botaurus lentiginosus*); annual trapping and telemetry monitoring of the Blanding's turtle; a multiyear telemetry survey of the eastern hognose snake; a telemetry survey for the eastern small-footed bat; and an ongoing survey for SWP (since 2022). Many of these surveys will be continued, along with additional surveys, to maintain the information necessary to properly manage T&E species. Surveys will be conducted for Blanding's and spotted turtles; SWP; selected avian species, including American bittern, Cooper's hawk, northern goshawk (*Accipiter gentilis*), whip-poor-will, and peregrine falcon; eastern hognose snake; fisheries, focusing on native brook trout, American eel, and banded sunfish; and bats, with specific focus on the NLEB, tricolored bat, and small-footed bat.

NBSFS implements protections for T&E species to maintain and enhance their populations. NBSFS maintains and implements 3 species-specific management plans, including the Blanding's Turtle Management Plan (Appendix G—Blanding's Turtle Management Plan), Hognose Snake Management Plan (Appendix H), and the Small-footed Bat Management Plan (Appendix I—Small-footed Bat Management Plan). These plans include both protection measures and management strategies specific to each species. In addition to implementation of these plans, NBSFS will implement Best Management Practices (BMPs) developed by DoD Partners in Amphibian and Reptile Conservation (DoD PARC) for both the Blanding's turtle (DoD PARC 2022) and spotted turtle (DoD PARC 2019) when practicable and not in conflict with the mission. Additionally, all T&E species are considered during the Environmental Impact Analysis Process and are protected by the thoughtful timing of mission activities, prescribed burning, and other actions that may impact T&E species. Direct impacts to listed and rare species are minimized through the educational outreach program and project stipulations included for all construction projects. Thus, NBSFS staff and on-site contractors are made aware of the possible presence of Species of Speciel Concern and

told to notify Natural Resources staff of any observations. In addition, all timber operations, prescribed burns, and construction projects must be approved and overseen by Natural Resources staff.

An important objective of the overall natural resources program at NBSFS is to provide the necessary habitat for the continued existence of protected species at NBSFS. Natural resource management on NBSFS aims to maintain habitat diversity at the station using timber management practices and prescribed burning as tools. Based on the ecological requirements of rare and protected species on NBSFS, this approach is expected to maintain the viability of these populations and their habitats over the long term.

Federally Listed T&E Species

NBSFS consults with the USFWS as needed to ensure compliance with the ESA, avoid mission restrictions, and benefit listed species. Informal consultations with USFWS are routinely conducted as part of National Environmental Policy Act (NEPA) assessments. As of spring 2024, no biological opinions have been issued by USFWS for U.S. Space Force actions on NBSFS. In December 2023, NBSFS developed a Biological Assessment to facilitate informal consultation with the USFWS for INRMP activities that may affect the SWP, NLEB, and tricolored bat due to their recent discoveries or uplisting. The USFWS concurred with NBSFS' determinations in March 2024, stating that NBSFS' proposed actions and conservation measures (Table 7-1) will result in insignificant or discountable effects to the species.

Section 7 of the Biological Assessment contains numerous conservation measures that NBSFS will be implementing to reduce adverse impacts on these 3 species. These conservation measures are described below.

Forest Management Conservation Measures					
Bats, Forest	All forest management activities will occur more than 0.5 mile from a known,				
Management	occupied hibernacula.				
	New Boston Space Force Station (NBSFS) will avoid cutting or destroying known,				
	occupied roost trees during the active season.				
	NBSFS will avoid clearcuts (and similar harvest methods, e.g., seed tree,				
	shelterwood, and coppice) within 0.5 miles of known roost trees.				
	No known active roost trees will be felled unless there is a human health or safety				
	concern. Prior to this occurring, NBSFS will notify the USFWS of its plans to				
	remove an active roost tree.				
Bats, Tree	NBSFS will remove non-hazardous trees only during the inactive season (01				
Removal	November–15 April).				
	NBSFS will make all reasonable attempts to remove hazardous trees during the				
	northern long-eared bat (NLEB) inactive season (i.e., 15 October–14 April).				
	When hazardous trees need to be removed during the active season, the tree will				
	first be disturbed to cause any bats that may be using the tree as a roost site to				
	abandon the tree before it is cut.				
Small Whorled	The 2022-2024 SWP surveys identified 23 SWP populations and approximately				
Pogonia (SWP),	99 individuals within 1,408 surveyed acres at NBSFS (USACE 2024). These				
Forest	surveys will be valid for the entirety of the management goals of the 2025 INRMP				
Management	(i.e., 5 years).				

Table 7-1. Biological Assessment conservation measures

Forest Management Conservation Measures				
	No forest management activities will take place within 300 feet of known SWP			
	individuals/populations.			
	Prescribed Burning Conservation Measures			
Bats	All prescribed burns will occur more than 0.5 miles from any currently known			
	NLEB hibernaculum.			
	When environmental conditions are favorable, when burn objectives can be met,			
	and when resources are available to conduct burns, NBSFS will make all			
	reasonable attempts to conduct prescribed burns in NLEB habitat during the bat's			
inactive season (01 November–15 April). Most prescribed burns a				
	continue to be conducted during November, March, and April, when burn			
	conditions are most favorable for meeting burn objectives.			
	No known active roost trees will be cut or removed.			
	If bats are in torpor, exposure to heat and smoke during fires can cause harm (death			
	or injury) of adults and juveniles. All prescribed burns will take place on days with			
	temperatures of 50 °F or higher.			
Off-site smoke impacts are managed through prior planning activities and				
	day monitoring and operational adjustments. A burn plan is developed for each			
	burn unit, which details the prescribed conditions (e.g., wind direction, wind			
	speed, humidity, temperature, transport wind speed, mixing heights) for a burn to			
	occur. Prior to the start of a burn, smoke is modeled using predicted burn day			
	conditions. During a prescribed fire, atmospheric conditions, fire behavior, and			
	smoke are monitored, and adjustments to operational techniques are made to			
	reduce any potential off-site impacts.			
SWP	See SWP rows above.			

 Table 7-1. Biological Assessment conservation measures

NBSFS is currently working with USFWS to develop management protocols for the SWP, NLEB, and tricolored bat. Some of the initial management steps for these 3 species are listed in the table above and mainly include protections. For future actions affecting the NLEB, the NBSFS will follow USFWS guidance for NLEB consultation, which is expected to be published in summer 2024. NBSFS is also planning to conduct surveys for these species to better inform management and protection actions. Repeated surveys of potential SWP habitat may be necessary to identify previously dormant individuals or small populations. In areas determined to be unsuitable SWP habitat, NBSFS may conduct pre-disturbance clearance surveys. Clearance surveys are necessary given the documentation of SWP in several areas deemed 'unsuitable habitat' by the 2022-2024 SWP surveys (USACE 2024). Additional management protocols relating to this species, specifically including forestry management and prescribed fire, are forthcoming upon further discussion. Once the appropriate information has been collected, NBSFS is planning to develop a SWP management plan. Additional surveys for the NLEB and tricolored bat may provide valuable information on their occurrence, distribution, and habitats on base. If detected, follow-up surveys may help determine locations of any maternity colonies or roosts so that these areas can be protected.

Exemplary Natural Communities

At NBSFS, protection of rare natural communities is crucial to retain the ecological services that they provide. Degradation to these communities could arise from establishment of invasive nonnative species, threats from human development, natural succession of the community, and runoff of pollution or sediment from land disturbance. Monitoring trends and changes to these communities will provide insight into the progression of threats to the community and aid in the development of a management response plan before problems become irreversible.

Managing Protected Pollinators

The DoD's policy is to use BMPs, as appropriate, to protect pollinators (Office of the Under Secretary of Defense 2014). As mentioned in <u>Section 2.3.4.2</u>, the monarch butterfly is the pollinator with the greatest protections on NBSFS, as it is a candidate for federal listing. The Natural Resources Management Office will follow the monarch management protocols from the USFWS once they are published. Until then, specific guidance for managing for monarch habitat is detailed in the USAF Pollinator Conservation Reference Guide (USFWS 2017).

One of the key activities planned for the upcoming 5-year period is to establish a survey to identify monarch habitat use on the installation. A broader pollinator survey would also help inform management, as several SGCN pollinators (e.g., *Bombus affinis*) may also be present on the installation. Furthermore, coordination with other offices on NBSFS, including the Pest Management Office, will be essential to support pollinators on the installation (Sections 7.11 and 7.15; USFWS 2017).

Climate Change Impacts on T&E Species

Management actions needed to protect T&E species will be influenced by the speed at which the climate changes, the nature of the climatic changes, and the ability of the species to respond to those changes. An ecosystem approach that prioritizes functional diversity, maintenance of habitat, habitat variability, and connectivity can increase resiliency of fish and wildlife populations under climate change. Proactive management that anticipates change can help extend the period over which species can respond adaptively to changing climate and avoid catastrophic losses associated with extreme events, thus building additional resiliency into already stressed ecosystems (CEMML 2019). Given the uncertainty that is inherent in managing species under changing environmental conditions, implementation of adaptive management and ongoing monitoring will be increasingly important.

7.5 Water Resource Protection

Applicability Statement

This section applies to USAF installations that have water resources. This section is applicable to this installation.

Program Overview/Current Management Practices

Water resources and wetlands are described in <u>Sections 2.3.5</u> and <u>2.2.4</u>. The only known water quality problem on the station is an annual buildup of coliform bacteria in some impoundments during dry periods in the summer (Najjar 1998). Water resources at NBSFS are described in <u>Sections 2.2.4</u> and <u>2.3.5</u>.

Potential nonpoint sources of water pollution at NBSFS include runoff from unpaved roads, construction areas, and timber harvest sites. Nonpoint source pollution from timber harvesting is regulated by the *New Hampshire Best Management Practices for Erosion Control on Timber Harvesting Operations* (New Hampshire Division of Forests & Lands [NHDFL] and University of New Hampshire Cooperative Extension 2016). This document presents laws and regulations governing timber harvesting activities that

have the potential to degrade water quality. Sedimentation and erosion from construction projects are also regulated by the U.S. EPA under their stormwater program. Projects that disturb 5 or more acres must be permitted under EPA's General Permit for Stormwater Discharges from Construction Sites (Baseline Construction Permit). This permit requires the use of BMPs for sediment and erosion control. NBSFS is currently in compliance with both of these policies. A mitigation plan was developed for military training activities that included actions to prevent nonpoint source pollution of surface waters on NBSFS (ANL 1999*a*). NBSFS will also maintain all gravel forest roads (over 10 miles) IAW the above-listed BMP document. NBSFS may install gates on roads not intended for routine travel to prevent erosion.

NBSFS will collect water quality data in conjunction with the fisheries survey and explore integration of data gathering standards with State of New Hampshire water quality monitoring efforts.

7.6 Wetland Protection

Applicability Statement

This section applies to USAF installations that have existing wetlands on USAF property. This section is applicable to this installation.

Program Overview/Current Management Practices

DAFMAN 32-7003 requires installations to develop and maintain a current inventory of wetlands and waters on lands controlled by the Department of the Air Force. Additionally, alteration of wetlands is limited at military installations IAW EO 11990 (Protection of Wetlands) and by public law (i.e., the Clean Water Act). There are 228 wetland areas totaling 198 acres on NBSFS. Wetlands are further described in <u>Section 2.3.5</u>.

NBSFS conducts wetland monitoring on NBSFS to determine current conditions, existing disturbance, and potential threats. The potential sources of impacts on wetlands at NBSFS are similar to the sources of impact to water resources discussed in <u>Section 7.5</u>. These include runoff from unpaved roads, construction areas, timber harvest sites, and climate change. These impacts are managed through BMPs, as described in <u>Section 7.5</u>. Direct impacts to wetlands are avoided to the extent practicable and evaluated in NEPA assessments for any actions having the potential to affect the environment. "Findings of No Practical Alternative" are prepared, when necessary, to comply with 32 CFR Part 989.

Wetlands at NBSFS are vulnerable to changes associated with projected temperature and precipitation increases. Potential impacts to wetlands from climate change are discussed in <u>Section 2.3.2.3</u>.

7.7 Grounds Maintenance

Applicability Statement

This section applies to USAF installations that perform ground maintenance activities that could impact natural resources. This section is applicable to this installation.

Program Overview/Current Management Practices

Approximately 65 acres of NBSFS are considered improved. Most improved grounds are found in and around the Operations Area and recreation areas. Lawns are mowed regularly and limed and fertilized occasionally. Many native and locally adapted tree species are planted or occur naturally in developed areas. Trees are pruned as needed, but most trees in the improved areas require little attention. Pesticides are not applied on NBSFS by the roads and grounds shop for landscape management reasons (i.e., weed control).

Herbicide is used to maintain grass under the restricted area fence via contract once per year. There is little solid waste generated during grounds maintenance. The developed portions of the installation are infested with invasive species, primarily autumn olive and oriental bittersweet (*Celastrus orbiculatus*). There is no evidence of nonpoint source pollution impacts at this time from any fertilizer use on base. There is no permanent irrigation system at the station, but some areas are watered as needed with hoses and portable sprinklers.

7.8 Forest Management

Applicability Statement

This section applies to USAF installations that maintain forested land on USAF property. This section is applicable to this installation.

Program Overview/Current Management Practices

NBSFS actively manages most of its 2,550 acres of forest land for timber harvest (Najjar 1998). Approximately 225 acres are not managed for harvest due to their inaccessibility or the presence of wetlands. NBSFS forest have been actively managed since 1985 through harvesting and other management practices, including manual thinning and prescribed burning. Proceeds from timber harvests are deposited in the USAF Forestry account. Table 7-2 shows the timber harvest data for the station from 2011 to 2021.

Harvest Name	Year(s)	Total Board Feet	Acres
West Rock, Recreational Vehicle, Archery Range	2011	173,615	37
HWA	2012	57,400	20
Laurel Lane	2013	66,195	11
Melendy Farm	2017	97,075	10
Mack Hill Clear Cuts	2016	186,620	18
Campbell Road	2018-2019	164,525	36
Shooting Field South*	2019-2021	338,000	70
Total	N/A	1,083,430	202

Table 7-2. Timber harvest at New Boston Space Force Station, 2011–2021

The biodiversity survey (LaGory et al. 1997) categorized forest types on NBSFS as coniferous (710 acres), deciduous (540 acres), or mixed (1,300 acres). These forest types are described in <u>Section 2.3.2.2</u>, and their distribution is shown in <u>Figure 2-9</u>. Natural Resources staff conducted an inventory of NBSFS forests during summer 1996, 2007, and 2017. Base-wide forest inventories are conducted every 10 years, with the next inventory scheduled for 2027. This planned inventory will provide updated data on the distribution and types of forests and a general age structure of forest stands.

7.8.1 Forest Management Goals

The overall goal of forest management at NBSFS is to produce forest products while maintaining a healthy and diverse forest that continues to support the T&E species, rare species, and natural communities that are dependent on them. Properly managed, NBSFS forests will contain a representation of many age classes of trees and diverse ecological communities. In contrast to the 1993 INRMP for NBSFS, which emphasized production of white pine and red oak (the most commercially important species on the station), the 1998

INRMP and the current INRMP emphasize forest health and function. The current INRMP and all versions since 2006 use a community or ecosystem-based approach, in which all species are considered important parts of the forest. To avoid forest fragmentation, no new forest roads are to be constructed. All rare natural communities and T&E and rare species are to be protected from the impacts of timber harvesting. Prevention of invasive and nonnative insects and disease are additional high-priority goals for NBSFS forest management.

NBSFS forests are being managed on a 100- to 150-year rotation, with retention of older reserve trees to provide a diverse forest with many age classes and species (Najjar 1998). In areas where early successional forest species are desired, rotation lengths can be considerably shorter. Stands will be thinned to the stocking levels recommended for specific management goals (e.g., browse production, thermal cover, nesting habitat).

Najjar (1998) estimated the sustained yield in 1,000 board feet (MBF) for white pine, red oak, and hemlock on NBSFS based on the 1996 forest inventory. The estimated sustained yield per year for these species was 373 MBF, 167 MBF, and 78 MBF, respectively. Attempts to model the sustained yield have not been made since 1996, as the annual average harvest is well under the estimated yield and the management approach has shifted away from timber production.

7.8.2 Forest Management Practices

Even-age and uneven-age forest management practices are used at NBSFS to accomplish forest- and habitat-management goals. Even-age management practices include:

- Clearcutting: Removal of the entire stand in a single cutting, with reproduction obtained by natural seeding from adjacent stands, from trees cut in clearing operations, or by coppice regeneration. This method is used at NBSFS to establish early successional forest types.
- Strip clearcutting: A modified clearcut method in which a long narrow strip of trees is removed and regeneration is obtained by seeding in from trees in adjacent uncut strips. The adjacent uncut trees provide shade and shelter to the seedlings in the cut strips. Strip cutting is an accepted method of regenerating hemlock at rotation age.
- Patch clearcutting: A modified clearcutting method where only small patches of forest are removed, creating small even-aged stands from natural regeneration.
- Shelterwood cutting: Removal of a mature stand in a series of cuttings that extend over a relatively short portion of the rotation to allow the establishment of essentially even-aged stands under the partial shelter of seed trees. The shelterwood method is considered the best method of regenerating hemlock. A 2-stage shelterwood cutting is considered the most successful method for white pine management. Shelterwood cutting is the simplest method of regeneration.

Uneven-age methods consist of the removal of trees, either as single scattered individuals or in small groups at relatively short intervals. This removal is repeated indefinitely to encourage continuous reproduction and maintain an uneven-aged stand. At NBSFS, hemlock regeneration is accomplished by group selection (Najjar 1998). Mature patches that are scheduled for regeneration are cut in small groups, and openings in the canopy are no larger than half the height of dominant trees.

Regeneration methods at NBSFS include shelterwood cuts for white pine, hemlock, and red oak; clearcutting for aspen and birch; and group selection for hemlock. A regeneration cut of approximately 20 acres is targeted each year on NBSFS. Approximately 5 acres of forest is targeted for clearcut each year to maintain a component of early successional forest.

Reserve trees can be left in a regeneration cut if full sunlight is not necessary (e.g., white pine and hemlock removal cuts). Five to 10 reserve trees/acre can be left to provide structural diversity. In clearcuts for aspen regeneration, 2 or 3 reserve trees/acre can be left, but too many reserve trees may interfere with regeneration. Regeneration cuts can be conducted with both conventional and whole-tree harvesting methods. Regeneration cuts are to be monitored for adequate regeneration within the first 5 years after cutting. If regeneration fails, fire may be used to prepare a seed bed for natural regeneration.

7.8.3 Forest Harvest Techniques

Conventional logging at NBSFS involves the manual felling, limbing, and bucking of trees with a chainsaw (Najjar 1998). A cable skidder is used to drag the trees to a road-side staging and processing area, in which they are cut to product length (generally, 8- to 16-foot logs). The remaining branches and leaves (slash) are left in place to decompose. Most environmental damage from conventional logging results from the skidder tires creating deep ruts in soft soil (Figure 7-2; Najjar 1998). Residual stand damage can be a problem if the temporary skid roads are not laid out to prevent injury to residual trees.



Figure 7-2. Timber harvest at New Boston Space Force Station

Whole-tree harvesting is usually performed with a feller-buncher, grapple skidder, and a whole-tree chipper. The feller-buncher is used to cut the trees and place them in stacks for the grapple skidder to pick up and drag them to the roadside landing. At the staging area, trees are cut into logs and the branches and leaves are chipped. Environmental damage from whole-tree harvesting can occur from skidding, resulting in soil disturbance and residual stand damage. This operation requires a large amount of space for the staging area.

With whole-tree harvesting, slash is not left on the forest floor. There is a concern that this practice could lead to nutrient depletion because the tree branches, twigs, and leaves have much higher nutrient concentrations than do the trunks. By removing this material from the forest, the overall removal of nutrients is increased disproportionately to the yield of usable biomass.

Precommercial thinning is the cutting of undesirable stems with a clearing saw or a chainsaw. Cut stems are left on the forest floor to promote natural decomposition. Pre-commercial thinning does not usually involve any heavy equipment use and is conducted by NBSFS Natural Resources staff and staff from the U.S. Forest Service.

Commercial thinning of merchantable size classes is performed by logging contractors. Trees that are to be removed are designated by Natural Resources staff with paint marks, flagging, or area constraints. Logging contractor operations are checked several times a week to ensure that they are in compliance with all harvesting laws and to ensure that residual damage is minimal. Thinning can be conducted by both conventional logging and whole-tree harvesting.

All logging operations at NBSFS follow the *New Hampshire Best Management Practices for Erosion Control on Timber Harvesting Operations* (NHDFL and University of New Hampshire Cooperative Extension 2016) to avoid direct and indirect adverse impacts to cultural resources, wetlands, and surface waters. Areas to be harvested are screened for the presence of documented archeological sites, T&E species, and rare species.

All timber harvests are planned by the Natural Resources staff at NBSFS. Harvests are carefully developed to avoid adverse impacts to the mission and important ecological or water resources. Harvesting is primarily conducted during winter, summer, or autumn to avoid the spring season, when damage to wet soils is more likely. All identified archeological sites are avoided while performing harvests, and stone walls are preserved through avoidance and management practices. Timber harvesting is suspended in bat habitat during the bat pup season from June to August. This process ensures that forest resources support habitat for dependent wildlife species.

Timber harvest contracts are processed through a USAF contracting office and follow the requirements and processes for timber sales that are identified in DAFMAN 32-7003. Logging contractors are responsible for compliance with all state harvesting laws and Occupational Safety and Health Administration regulations. IAW state timber harvesting law (NH RSA 227-J:5), an "Intent to Cut Wood" and "Report of Wood Cut" must be filed by the logging contractor in the town in which the harvest takes place.

NBSFS has harvested 202 acres of forest from 2011 to 2021, removing 1,083,430 board feet of timber (Table 7-2). Looking forward, NBSFS is planning 2 harvests in Forest Management Units 18 and 22 in response to HWA and elongate hemlock scale infestations. Several other harvests for habitat improvement will be considered in Units 2, 6, 13, 19, 20, and 25. Timber harvest volumes have ranged from 57,000 board feet to 338,000 board feet. Recent harvests have focused on removing elongate scale-infested and HWA-infested hemlock.

Natural Resources personnel also manage a fuelwood program that is available to all persons who have access to the station. A fee of \$50 dollars is charged for a permit that allows the holder to cut up to 6 cords of fuelwood. Fuelwood lots are marked by Natural Resources staff in locations accessible by vehicle. To prevent invasive insect outbreaks, NBSFS prohibits firewood from being brought onto the installation.



Figure 7-3. Forest harvest units at New Boston Space Force Station (NBSFS)
7.8.4 *Timber volume*

Timber volume is a good estimate of the productivity of forested sites. It refers to the net volume, which is calculated or estimated by deducting the loss of sound wood to insects, diseases, or other damage from the gross volume.

The timber volume was calculated during a 2017 inventory at NBSFS (<u>Table 7-3</u>). The trees included in the timber volume figures in the table below include live trees of acceptable and unacceptable growing stock. If the field inventory for a stand did not specifically record timber defects on trees, a default of 0% was used. The total timber volume on this 2,800-acre stand was approximately 2,226,028 cubic feet of sawtimber plus 6,297,494 cubic feet of pulpwood, for a total of 8,523,522 cubic feet. The net board foot volume averaged 6,079.41 board feet per acre. The net pulpwood volume averaged 2,249.11 cubic feet per acre. The net cubic volume averaged 3,044.12 cubic feet per acre. Gross volume estimates were made using the International 1/4 inch log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Net Board Foot Volume (board feet)	Percent of Total	Net Pulpwood Volume (cubic feet)	% Total	Net Cubic Volume (cubic feet)	% Total
Eastern white pine (<i>Pinus strobus</i>)	5,915,835	35	1,349,835	21	2,094,339	25
Northern red oak (Quercus rubra)	5,800,021	34	1,999,393	32	2,758,772	32
Eastern hemlock (<i>Tsuga canadensis</i>)	2,872,853	17	1,121,324	18	1,518,198	18
Red maple (<i>Acer rubrum</i>)	1,030,723	6	867,190	14	1,011,060	12
Sweet birch (Betula lenta)	514,277	3	414,887	7	485,073	6
White ash (<i>Fraxinus americana</i>)	485,913	3	156,208	2	214,654	3
Yellow birch (Betula alleghaniensis)	179,181	1	78,703	1	103,833	1
American beech (Fagus grandifolia)	121,093	1	138,568	2	152,179	2
White oak (Quercus alba)	84,704	0	45,735	1	57,622	1
Sugar maple (Acer saccharum)	17,745	0	50,849	1	52,989	1

Table 7-3. Timber volumes from 2017 inventory at New Boston Space Force Station

Species	Net Board Foot Volume (board feet)	Percent of Total	Net Pulpwood Volume (cubic feet)	% Total	Net Cubic Volume (cubic feet)	% Total
Red pine (Pinus resinosa)	0	0	15,493	0	15,493	0
Paper birch (Betula papyrifera)	0	0	53,604	1	53,604	1
Black cherry (Prunus serotina)	0	0	4,907	0	4,907	0
Ash (Fraxinus spp.)	0	0	796	0	796	0
Total	17,022,344	100	6,297,494	100	8,523,522	100

Table 7-3. Timber volumes from 2017 inventory at New Boston Space Force Station

7.8.5 Composition

The total basal area of the overstory and understory combined, calculated in the 2017 inventory, was 126.3 square feet per acre. For the overstory only, the acceptable growing stock for timber was 85.9 square feet per acre and the basal area of unacceptable growing stock for timber was 40.3 square feet per acre. Relative dominance of tree species including basal area from the 2017 inventory is given in <u>Table 7-4</u>. Diameter and other relevant metrics of tree species inventoried in 2017 are given in <u>Table 7-5</u>.

Species	Basal area (sq. feet/acre)	Relative dominance (%)
Northern red oak (Quercus rubra)	38.18	30.24
Eastern white pine (Pinus strobus)	25.23	19.98
Eastern hemlock (Tsuga canadensis)	24.77	19.62
Red maple (Acer rubrum)	18.07	14.31
Sweet birch (Betula lenta)	8.30	6.57
American beech (Fagus grandifolia)	3.41	2.70
White ash (Fraxinus americana)	2.84	2.25
Yellow birch (Betula alleghaniensis)	1.82	1.44
Paper birch (Betula papyrifera)	1.25	0.99
Sugar maple (Acer saccharum)	1.02	0.81
White oak (Quercus alba)	0.91	0.72
Red pine (Pinus resinosa)	0.23	0.18

Table 7-4. Relative dominance by tree species from 2017 inventory at New Boston Space Force Station

Species	Basal area (sq. feet/acre)	Relative dominance (%)
Black cherry (Prunus serotina)	0.11	0.09
Ash (Fraxinus spp.)	0.11	0.09

Table 7-4. Relative dominance by tree species from 2017 inventory at New Boston Space Force Station

Table 7-5. Average diameter by species from 2017 inventory at New Boston Space Force Station

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
All species	8.24	14.09	14.69	9.61	11.45
Eastern white pine (<i>Pinus</i> strobus)	12.20	19.77	20.05	14.16	15.73
Red pine (Pinus resinosa)	12.00	15.00	15.00	12.65	12.65
White ash (Fraxinus americana)	10.65	13.54	13.54	11.30	11.30
Eastern hemlock (<i>Tsuga</i> canadensis)	8.45	13.13	13.84	9.50	11.16
Northern red oak (<i>Quercus rubra</i>)	8.22	14.48	14.63	12.50	
White oak (Quercus alba)	8.19	12.06	13.07	9.05	11.02
Black cherry (Prunus serotina)	8.00	8.00	8.00	8.00	8.00
Yellow birch (Betula alleghaniensis)	7.85	11.09	11.93	8.56	9.81
Sweet birch (Betula lenta)	7.56	11.05	11.95	8.33	10.16
Red maple (Acer rubrum)	7.19	9.99	10.75	7.79	9.07
Sugar maple (Acer saccharum)	6.79	9.44	10.00	7.25	7.81
American beech (Fagus grandifolia)	6.50	10.62	11.86	7.27	9.12
Paper birch (Betula papyrifera)	6.48	7.82	8.15	6.74	7.20
Ash (Fraxinus spp.)	5.00	5.00	0.00	5.00	0.00

White pine and red oak are the most commercially valuable species at the station. According to the 2017 inventory, white pine accounts for 35% of the board foot volume on base. The mean diameter of white pine on NBSFS was 12.2 inches, and the merchantable diameter was 20 inches. The large diameters of white pine on NBSFS indicate a mature forest. Most of the white pine found at the station is considered to be of good quality (i.e., straight and free of defects). Red oak is the most valuable tree species found on base and accounts for 34% of the board foot volume. The average mean stand diameter for red oak was 8.22 inches, with a merchantable diameter of 14.63 inches.

Hemlock is an important wildlife habitat species; dense young stands provide white-tailed deer with valuable winter habitat (Najjar 1998). Dense hemlock stands are present in the southern portion of the station. Hemlock accounts for 17% of the board foot volume. Per the 2017 inventory, the mean diameter for hemlock on NBSFS was 8.45 inches, and the merchantable diameter was 13.84 inches. The continued existence of significant hemlock stands on NBSFS is doubtful due to the infestations of HWA and elongate hemlock scale.

Red maple is a highly desirable wildlife browse food (Najjar 1998). White-tailed deer use red maple as an important source of winter food. In the 2017 inventory, the mean diameter for red maple was 7.19 inches, and the merchantable diameter was 10.75 inches.

Quaking aspen is another species that is important to wildlife. Aspen provides habitat for a variety of wildlife that needs young forests, including snowshoe hare, black bear (*Ursus americanus*), white-tailed deer, ruffed grouse, woodcock, and several smaller birds and animals. Ruffed grouse use aspen sapling stands for nesting, pole stands for overwintering and breeding, and older stands for nesting cover and winter food. As aspen accounts for less than 1% of the tree stems on NBSFS, it was not tallied during the 2017 inventory.

NBSFS has established 25 Natural Resource Management Units (<u>Figure 7-4</u>) that are based on natural features (streams, ponds) and access. More intensive forest and habitat inventories of each unit provide baseline information for planning management activities and future harvests.



Figure 7-4. Natural Resources Management Units at New Boston Space Force Station (NBSFS)

7.9 Wildland Fire Management

Applicability Statement

This section applies to USAF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section is applicable to this installation.

Program Overview/Current Management Practices

In April 2024, a Tier 1 WFMP (Tab 1—Wildland Fire Management Plan) was approved for NBSFS, and the plan is incorporated into this INRMP. The purpose of the WFMP is to provide management direction on safely suppressing wildfire at NBSFS at minimum cost and in a way that is consistent with land and resource management objectives. The plan describes the procedures to be followed in the event of a wildfire, assigns the responsibilities for fire-suppression decisions, defines the qualifications of firefighters, identifies interactions with cooperating fire departments in the area, and describes the process for presuppression activities, including the creation and maintenance of firebreaks and the use of prescribed fire for fuel management and meeting resource management objectives. In addition to prescribed fires, fuels management could be accomplished by mechanical treatment, including the use of chainsaws, brushhogs, and mowers to help remove or lop brush or broken treetops, boles, and limbs. Woody debris from activities such as roadside clearing may be burned, chipped, or transported to approved disposal areas to avoid fuel accumulation (Tab 1—Wildland Fire Management Plan).

The Natural Resources Management Office at NBSFS is responsible for all aspects of wildfire management on the installation. AFCEC provides resources and personnel to execute planned prescribed burns IAW the approved WFMP. A wildland fire module that supports NBSFS is located at Joint Base McGuire-Dix-Lakehurst in New Jersey. DoD civilian Natural Resources employees are the principal wildland firefighting staff at NBSFS; other DoD civilians who are fully trained to National Wildfire Coordinating Group standards and outfitted with personal protective equipment could be used to augment Natural Resources staff during emergencies or planned events.

Mutual-aid agreements with federal, state, and local fire-management agencies are planned to ensure adequate staffing and equipment coverage for wildfire suppression. Aid agreements and yearly operating plans must specify procedures for requesting assistance by any agency involved in those agreements. All fire-management personnel must meet USAF standards. However, the Installation Commander would have the authority to accept the risk of using unqualified firefighters in the event of an emergency.

All fire-management activities on NBSFS are consistent with the previously discussed forest management objectives. Prescribed fire techniques can be used to encourage oak or pine regeneration, reduce overstory or understory competition from undesirable tree species, or thin overstocked forest stands. Prescribed fires are planned to ensure that soils are not damaged by extreme heat (Tab 1—Wildland Fire Management Plan). Preference will be given to using existing artificial and natural fire breaks during wildfire and prescribed fire. Lines constructed during wildfires and prescribed fires will be rehabilitated to ensure that erosion does not occur. The frequency of prescribed burns is expected to be every 5 to 20 years for most areas, and the size of the burns will range from 10 to 50 acres. Recurring burn units at NBSFS are shown in Figure 7-5. A burn on Joe English Hill is shown in Figure 7-6.

Short-term impacts of prescribed fires on listed and rare species are expected to be offset by long-term habitat improvement (ANL 2003). Impacts to species are expected to be negligible over the long term, as only limited areas would be burned annually, relative to the amount of suitable habitat available at the

station. SWP monitoring data should be considered prior to prescribed burns in potential habitat to avoid negative impacts to the species.



Figure 7-5. New Boston Space Force Station (NBSFS) reoccurring burn units



Figure 7-6. Joe English Hill burn

Climate Change

The mission of NBSFS produces few wildfire ignitions (NBSFS WFMP) and wildfires in New Hampshire are rare (MTBS 2024). Projected climate conditions by 2100 indicate increases in fire potential relative to the minimal wildfire baseline. Miller (2019) projected very large increases in the Keetch-Byram Drought Index, a commonly used indicator of drought in wildland fire. Guyette et al (2014) projected fire probability increases of 20-80% by 2100. In both cases, the projected impacts to wildfire are relative to a low baseline and should be considered in that context.

More granular climate projections for 2050 (CEMML 2023) indicate a wetter, but warmer, future in which shifts in precipitation and seasonality would likely require adjustments to the prescribed fire program over the next several decades. The dormant season, when most prescribed burns occur, was projected to be shorter due to earlier spring greenup and later fall dormancy resulting from increased temperatures decreasing burn opportunities. April, in particular, is likely to suffer a substantial decrease in available burn days due to earlier greenup while also being substantially drier, potentially making burns then more risky. Additionally, precipitation is projected to increase roughly 20% overall, with substantial increases in December and February, likely further restricting dormant season burn options and making burn opportunities more sporadic.

Adjustments are likely necessary in the coming 2-3 decades to maintain prescribed burn program acreage and burn numbers. With a shorter dormant season, more rain during the dormant season months of December and February, and the loss of the end of the dormant season in April to earlier spring greenup combined with drier conditions, fewer days suitable to burning are likely. Sufficient flexibility to take advantage of the fewer days available may be required. In cases where necessary burns cannot be completed, it may be necessary to use alternative methods to achieve the same goal (e.g., control of invasive species via herbicide).

It is recommended the Wildland Fire Program Coordinator have many burns ready to implement at any given time to ensure opportunities are not missed. Planning at least two years ahead is recommended, including securing funding and ensuring pre-burn tasks are completed prior to burn season such as fuels pre-treatments, containment line preparation, and maintenance of apparatus and equipment. It may also be necessary to consider growing season burns, though that must be weighed against invasive species and other ecological concerns.

Projected vegetation changes suggest a trend toward more broadleaf tree species at the expense of coniferous species. This would further diminish fire activity potential except under the scenario in which oak species become substantially more common. On its own, such a change would elevate the fire potential in the spring before greenup and in the fall after the leaves fall for the year. In conjunction with the climate projections, however, there remains little opportunity for meaningful increases in wildfire frequency or intensity and, during some portions of the year, fire activity can be expected to drop relative to the current fire activity (CEMML 2019).

7.10 Agricultural Outleasing

Applicability Statement

This section applies to USAF installations that lease eligible USAF land for agricultural purposes. This section is not applicable to this installation.

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to USAF installations that perform pest management activities in support of natural resources management (e.g., invasive species, forest pests). This section is applicable to this installation.

Program Overview/Current Management Practices

Pests are defined in AFMAN 32-1053, Integrated Pest Management Program, as "arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, or other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable." USAF installations are directed to develop Integrated Pest Management Programs that promote and support military readiness, installation program planning and maintenance, pollution prevention, conservation of natural resources, and environmental compliance. Successful Integrated Pest Management Programs minimize the use of hazardous pesticides by emphasizing monitoring and sustainable methods of control such as habitat modification, biological control, cultural control, mechanical control, physical control, regulatory control, and genetic control. Invasive species management of all taxa is driven by EOs 13112 and 13751, whereas invasive plant management on NBSFS is federally driven by the Federal Noxious Weed Act (7 U.S.C. § 2814)

IAW the above regulations, NBSFS maintains an IPMP, which was most recently revised in 2022 (<u>Tab 3</u>— Integrated Pest Management Plan (IPMP)). An Invasive Plant Species Control Plan (IPSCP) was developed for NBSFS in 2005 by North Wind, Inc. (<u>Tab 4</u>—Invasive Plant Species Control Plan (IPSCP)). The IPMP provides management planning for invasive plant and pest species, which include insects and animals, and the Invasive Plant Species Control Plan provides guidance for invasive plant species. These plans are mutually supportive and not in conflict with the overall natural resources management program at NBSFS. The IPMP is reviewed annually and updated accordingly. Control of nonnative invasive plant species and animal pests benefits T&E species, rare species, and rare natural communities by promoting the maintenance of balanced ecosystems. Implementation of the WFMP discourages invasive plant species and maintains fire-adapted native plant communities. NBSFS also maintains an HWA Management Plan (2014) that outlines management and monitoring protocols to protect hemlock trees from the HWA (<u>Tab 5</u>—Hemlock Woolly Adelgid Management Plan (HWA)).

There are relatively few pest problems on NBSFS. Some invasive species and pests are listed in <u>Sections</u> 2.3.1 and 2.3.6. The IPMP has pest profiles for beavers, birds, vegetation, bees and wasps, ticks, ants, mice, bear, and nuisance animals (raccoons [*Procyon lotor*], striped skunks [*Mephitis mephitis*], Canada geese [*Branta canadensis*], and woodchucks) (<u>Tab 3</u>—Integrated Pest Management Plan (IPMP)). Control of these species involves measures to prevent conditions that attract pests, modification of conditions to prevent use, manual removal of pests, and use of approved pesticides. On NBSFS, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service–Wildlife Services is the principal control agency, but other organizations can be used (e.g., private trappers, private wildlife consultants) in consultation with NHFGD.

Invasive Insects

IAW New Hampshire Code Administrative Rule Agr. 3800, "no person shall collect, transport, import, export, move, buy, sell, distribute, propagate, or release any living insect species on the New Hampshire invasive species list." Prohibited insect species on NBSFS include the EAB, HWA, and spongy moth. Future invasive disease and insect species are also discussed below. Insect pests are addressed in the IPMP (<u>Tab 3</u>—Integrated Pest Management Plan (IPMP)), and HWA is managed IAW the installation's HWA Management Plan (<u>Tab 5</u>—Hemlock Woolly Adelgid Management Plan (HWA)).

Ash trees on NBSFS should be monitored and treatment should be considered for EAB. When EAB larvae feed under the bark, they damage the tree's vascular system, impacting its uptake of nutrients and leading to its death. Ash trees should be evaluated for ecological value, and treatment with a trunk injection of an approved pesticide should be considered for high-value trees to protect them from EAB damage.

The HWA was found on NBSFS in 2013 and threatens the survival of hemlock trees on the installation. The HWA feeds on the base of hemlock needles, which prevents nutrient transport through the tree, leading to tree damage and death over the course of 6 to 10 years. The HWA Management Plan outlines HWA monitoring and management. Hemlock trees are treated for HWA only if they are in a Hemlock Management Area or are a legacy tree. Hemlock Management Area locations and legacy tree qualifications are defined in the HWA Management Plan. HWA treatment includes biological, chemical, and forest management methods. The Natural Resource Management Office releases adult predatory beetles (*Laricobius nigrinus*) for biological control of the HWA on NBSFS. Chemical control of HWA consists of placing imidacloprid tablets (i.e., CoreTect), under the organic layer in the soil around the root collar of hemlock trees. The HWA chemical control target is 20 to 40 acres of hemlock trees available for HWA and elongate hemlock scale, which results in more manageable pest populations. The HWA Management Plan aims to reduce the number of hemlock trees in Hemlock Management Areas to a level that supports effective chemical control of HWA. Further details about HWA management are provided in the HWA Management Plan (Tab 5—Hemlock Woolly Adelgid Management Plan (HWA)).

Spongy moth monitoring should occur on NBSFS. Spongy moth caterpillars defoliate hardwood trees, which can cause tree death if defoliation occurs for more than 3 consecutive years. Management of spongy moths should be considered to protect hardwood trees if 3 consecutive years of tree defoliation occurs on NBSFS. If management is warranted, an EPA-approved *Bacillus thuringiensis* (naturally occurring

bacterium) insecticide should be sprayed on foliage, following label requirements, at the time of caterpillar egg hatch to prevent defoliation (Michigan State University 2024).

Oak trees on NBSFS should be monitored for oak wilt disease. Oak wilt (*Bretziella fagacearum*) is a fungal pathogen that causes oak trees to drop wilted leaves during the growing season. Oak wilt infects the tree's vascular system, depriving it of water and eventually killing it (NHDFL 2020). Oak wilt has not been detected in New Hampshire but does occur in New York. If oak wilt is detected in oak trees on base, NBSFS may consider removing infected trees to prevent the spread of the disease.

The spotted lanternfly (SLF, *Lycorma delicatula*) is an invasive insect that excretes sticky honeydew that can render outdoor and military equipment unusable. SLFs can be a public nuisance because they congregate in large numbers and have been known to swarm buildings, outdoor furniture, toys, and trees. The species is transported long distances when the SLF lays egg masses on vehicles, firewood, and outdoor furniture. The SLF has not been found in New Hampshire but does occur in Massachusetts. IAW DAFMAN 32–7003 3.61.5, the Armed Forces Pest Management Board (2022) recommends SLF prevention, including checking for an SLF license/certification that assures that deliveries are quarantined at commercial gates. Active prevention methods will ensure SLF does not invade NBSFS, protecting military operations and outdoor equipment.

Climate change projections for NBSFS predict milder winters due to fewer freezing degree days, which could increase the abundance of ticks and forest pests on the installation. HWA populations would likely increase under climate change, which would require increased biological and chemical control of that insect and forest management to protect hemlock trees.

Future forest pest monitoring should be conducted on NBSFS for southern pine beetle (*Dentroctonus frontalis*) due to their projected reduced winter mortalities.. The southern pine beetle carries a fungus that infects pine trees and damages their vascular system, killing the trees. If it is detected on NBSFS, infested trees should be removed to prevent spread. Early detection surveys should be conducted, and a passive tree disease monitoring protocol should be developed and implemented to identify new and increasing forest pests and pathogens. Eradication and management should be implemented to control any pests or pathogens identified. It is imperative to conduct forest management to maintain healthy tree stands that can better combat forest pests.

Invasive Plants

New Hampshire Code Administrative Rule Agr. 3800 mandates that "no person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, of species on the New Hampshire prohibited invasive species list." Prohibited invasive plant species on NBSFS include autumn olive, burning bush, glossy buckthorn (*Frangula alnus*), Japanese honeysuckle (*Lonicera japonica*), Japanese knotweed (*Fallopia japonica*), Japanese barberry (*e*), oriental bittersweet, spotted knapweed (*Centaurea stoebe*), black swallowwort (*Vincetoxicum nigrum*), purple loosestrife (*Lythrum salicaria*), and multiflora rose (*Rosa multiflora*). Other nonnative invasive plant species on NBSFS include bull thistle (*Cirsium vulgare*), sowthistle (*Sonchus oleraceus*), reed canary grass (*Phalaris arundinacea*), and crown-vetch. Invasive plant management is detailed in the NBSFS IPSCP (<u>Tab 4</u>—Invasive Plant Species Control Plan (IPSCP)). Currently, invasive nonnative plant problems on NBSFS are limited to the impacts of several species that are difficult to control. The most problematic species are autumn olive and oriental bittersweet, but other invasive nonnative species occur at relatively low densities and could be effectively controlled before their populations expand.

Autumn olive was planted by the Boy Scouts of America as part of a revegetation and reclamation project in old-fields and bombing and strafing ranges (<u>Tab 4</u>—Invasive Plant Species Control Plan (IPSCP)). It is now widespread on NBSFS and represents the most problematic of the invasive species at the station. It is primarily located along roadways, in recreation areas, and in old-fields. The IPSCP prescribes autumn olive management to include manual cutting and treatment of stumps with glyphosate (<u>Tab 4</u>—Invasive Plant Species Control Plan (IPSCP)).

Japanese knotweed and Japanese barberry are found in only a few locations and could be effectively controlled with herbicide or manual removal, respectively (<u>Tab 4</u>—Invasive Plant Species Control Plan (IPSCP)). Management of the other invasive plant species found on NBSFS includes prescribed burning, manual removal, herbicide treatment, and restoration of native vegetation to prevent recolonization. Early detection and management of invasive plant species as early in the invasion process as possible are imperative for effective management.

The IPSCP identified 18 other invasive plant species that not found on NBSFS but are known to occur elsewhere in New Hampshire and listed recommendations to prevent their establishment on NBSFS (Tab <u>4</u>—Invasive Plant Species Control Plan (IPSCP)). NBSFS follows these recommendations, which are listed below, to the extent practicable:

- Identify invasive plant populations. Early detection is always the best defense against noxious weeds. Treat intensively when a new or small patch is found. Educate operations and maintenance supervisors and managers on weed identification and the importance of controlling and preventing infestations.
- Require contractors or departments to clean equipment and vehicles with high-pressure air or water prior to use in the project area and before leaving infestation zones in construction areas.
- Use certified invasive weed-free imported materials (e.g., straw bales, erosion-control seed mixes) when and where needed during construction, reclamation, maintenance, and operations.
- Conduct follow-up invasive-weed surveys and weed-control treatments during the growing season following completion of construction and revegetation activities.
- Reseed disturbed sites with native species. In areas where grasses are recommended, use species that are tolerant of broadleaf herbicides, which can later be used to spot treat broadleaf weeds.
- After an area is seeded, establish a maintenance schedule to continue to water and fertilize to promote establishment. Maintenance activities should continue through a minimum of 1 growing season.
- When tilling for control, till only in the area with invasive plants so roots and seeds do not spread. Always clean equipment and machinery on site after working in such an area to prevent spread.
- In areas that are routinely mowed, set mowing schedules to mow before weeds go to seed, and schedule subsequent mowings often enough to prevent seed production.
- When using herbicides, take into consideration the effects on listed and rare species present in the area to be treated.
- When using mechanical manipulation, take into consideration its effect on introducing opportunistic weeds.
- When using herbicides and mechanical treatments in riparian areas, consider the effects of translocation of herbicides and erosion of streambanks and surrounding watershed areas.
- Consider the effects of control efforts on nontarget species. Assess the risks of invasive plants, erosion, loss of habitat, and visual degradation of an area.

• Analyze cost of control efforts and alternatives. Cost analysis could possibly rule out certain types of mitigation techniques. Review minimal mitigations that could control target species without affecting budget restrictions.

Treatments

Over the period from 2016 to 2021, NBSFS has treated various amounts of invasive vegetation and hemlock infested with HWA (Table 7-6). Figure 7-7 shows areas that have received the most treatments for invasive vegetation and HWA. Treatments have been successful at maintaining native habitats, but continued treatment will be necessary to manage invasive species. The local area surrounding NBSFS contains extensive invasive species populations with large seed banks.

Annual management of invasive plant species on NBSFS should be conducted to prevent their spread and establishment. The IPSCP should be updated and include a comprehensive invasive plant survey of NBSFS, identify future species, and provide management recommendations for target species. Invasive vegetation management should follow the updated IPSCP once it is completed. Management should include annual mowing, burning, and herbicide treatment of 20 to 40 acres of invasive plant species in fields, along road edges, and in other openings.

Year	Areas	Method	Invasive Species ^a	Acres
2021	Shooting Field, Camper	Herbicide foliar, cut stump	AO, BB, BR, BSW, GB,	55
	Pad/Ice Pond Field,		HS, JK, PL, MR, OB	
	Recreation Center, and			
	Green Tree Area			
2020	No treatments	N/A	N/A	0
2019	Openings, fields, edges	Herbicide foliar, cut stump	AO, BB, OB, MR, JK	76
2019	Hemlock Stands	Tablet in soil	HWA	98
2018	Openings, fields, edges	Herbicide foliar, cut stump	AO, JK, BSW, OB, BB,	45
			СТ	
2018	Hemlock Stands	Tablet in soil	HWA	98
2017	Openings, fields, edges	Herbicide foliar, cut stump	AO, JK, BSW, OB, BB,	79
			СТ	
2017	Hemlock Stands	Tablet in soil	HWA	98
2016	Openings, fields, edges	Herbicide foliar, cut stump	AO, JK, BSW, OB, BB,	77
			СТ	
2016	Hemlock Stands	Tablet in soil	HWA	98

Table 7-6. Invasive species treatment at New Boston Space Force Station, 2016–2021

^a **Species codes:** AO= Autumn Olive, BB= Burning Bush, BR= Barberry, BSW= Black Swallowwort, CT= Canadian Thistle, GB= Glossy Buckthorn, HS= Honeysuckle, HWA= Hemlock Woolly Adelgid, JK= Japanese Knotweed, MR= Multiflora Rose, OB= Oriental Bittersweet, PL= Purple Loosestrife



Figure 7-7. Invasive vegetation and hemlock woolly adelgid (HWA) treatment areas at New Boston Space Force Station (NBSFS)

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to USAF installations that maintain a BASH program to prevent and reduce wildliferelated hazards to aircraft operations. This section is not applicable to this installation.

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to USAF installations that are located along coasts and/or within coastal management zones. This section is not applicable to this installation.

7.14 Cultural Resources Protection

Applicability Statement

This section applies to USAF installations that have cultural resources that may be impacted by natural resource management activities. This section is applicable to this installation.

Program Overview/Current Management Practices

On NBSFS, there are numerous cultural resources, including stone mill foundations and dams near streams and remnants of stone walls, barns and houses, old roads, and lanes in upland areas (HB&A 2004). Prehistoric resources include 2 sites near East Meadow Road and Wells Bog; both are the remnants of temporary campsites that were used by small groups of Native Americans. Archeological resources include approximately 70 sites. One such site is shown in Figure 7-8. Most of the sites are eligible for inclusion in the National Register of Historic Places and are managed as contributing elements to an archeological district. In addition, there are 6 Cold War-related properties (Buildings 100, 102, 108/109, 142/143, and the Boresight Tower) that are eligible for the National Register of Historic Places, possibly as a historic district (Tab 2—Integrated Cultural Resources Management Plan (ICRMP)). The USAF received formal concurrence from the NH Division of Historic Resources on the determination of eligibility of the district in 2006.

Protection and management of cultural resources at NBSFS are guided by the ICRMP (<u>Tab 2</u>—Integrated Cultural Resources Management Plan (ICRMP)). The ICRMP identifies measures that should be taken to protect cultural resources at the station. These measures apply to actions taken as part of this INRMP. Forest management activities and prescribed burns are designed by NBSFS Natural Resources staff to minimize or eliminate their impacts on cultural resources. The WFMP was specifically designed to recognize and minimize impacts to cultural resources sites during wildfire management activities.



Figure 7-8. Remnants of historic Joe English Pond Mill

7.15 Public Outreach

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Access to NBSFS is restricted to active-duty military, DoD civilians, active-duty military dependents and family members, military retirees, DoD civilian retirees, and employees of installation prime contractors. The general public does not have access to NBSFS. Natural Resources personnel conduct a number of outreach activities that target NBSFS visitors and employees. These activities include:

- Developing and distributing brochures that describe natural and cultural resources on NBSFS
- Developing and distributing identification cards for the Blanding's turtle to NBSFS employees to raise awareness of their presence at the station and in the Operations Area
- Promoting birding by visitors by publishing and distributing a checklist of the birds of NBSFS that includes information on seasonal occurrence
- Conducting periodic educational presentations to NBSFS employees regarding T&E and rare species likely to be encountered on NBSFS
- Posting interpretive signs in areas where timber harvest and other forest management activities have recently occurred to raise awareness of natural resource management issues at the station

Natural Resources personnel have been successful in raising awareness of natural resources issues at the station, particularly with regard to the presence and vulnerability of T&E and rare species on NBSFS. Consequently, Natural Resources personnel routinely get reports of sightings of these and other species on

the station. These sightings have been an important contribution to a developing understanding of population distributions and movements for several species at the station.

In addition to the above activities, NBSFS Natural Resources personnel notify adjacent property owners, both directly and through public notices, prior to conducting prescribed burns that are likely to have visible flames or smoke from off the station. These notices are intended to ensure that the public is aware that prescribed burning is taking place and reduce any concerns regarding smoke.

7.16 Climate Change Vulnerabilities

Applicability Statement

This section applies to USAF installations that have identified climate change risks, vulnerabilities, and adaptation strategies using authoritative region-specific climate science, climate projections, and existing tools. This section is applicable to this installation.

Program Overview/Current Management Practices

Climate change will have a variety of effects on the natural resources currently managed by NBSFS. Although the largely indoor, technology-driven operations at the core of the NBSFS mission are unlikely to be directly impacted, NBSFS will contend with impacts to local ecosystems and landscapes driven by a climate in continual flux, characterized in part by:

- Increased average, maximum, and minimum temperatures in all seasons (Section 2.2.1.1)
- Shorter, warmer winter seasons (Section 2.2.1.1)
- Continued regional declines in snowpack (<u>Section 2.2.1.1</u>)
- Earlier snowmelt and peak runoff in streams and earlier lake ice-out dates (Section 2.2.1.1)
- Longer growing seasons, with warmer spring and fall temperatures (<u>Section 2.2.1.1</u>)
- Hotter and potentially drier summer conditions (Section 2.2.1.1)
- Higher water temperatures in ponds, lakes, and streams, especially during summer (<u>Section 2.3.2.3</u>; <u>Section 2.3.3</u>)
- Alteration of forest species composition and overall resilience as a result of changing temperatures and hydrological cycling in landscapes (Section 2.3.2.3; Section 2.3.3)
- Increased risk of extreme heat exposure for outdoor workers, including an increase in days with dangerous heat index conditions due to high humidity and temperatures (Section 2.2.1.1)
- Increased intensity and frequency of extreme rainstorm events, along with increases in associated flooding (Section 2.2.1.1)
- Higher peak intensity and unpredictability of tropical storm and hurricane impacts in the broader region when they occur (Section 2.2.1.1)

These changes will lead to greater needs for ecological monitoring, land use planning, infrastructure maintenance, and natural resource management to support the maintenance of the base as a whole. Current operations depend upon a variety of regulating services provided by the forest and wetland systems (e.g., flash flood regulation, groundwater recharge, atmospheric cooling through shade, air quality improvement) that can be altered as different species respond in diverse ways to emerging climate conditions. Increased coordination on flood mitigation and infrastructure design will be needed to integrate these ecologically-driven local drainage and hydrological impacts into design considerations.

Threats to wildlife and plant species in the region prompted by or exacerbated by climate change may also result in changes in the conservation status of species found on the base. At the same time, special-status

species may also migrate from elsewhere into NBSFS lands. In this situation, new regulatory constraints to operations may result in areas being deemed as important habitat for these species.

Increases in temperature will have effects to the mission beyond their impacts on local ecosystems. These include increased cooling, energy, and maintenance costs for facilities, increased exposure to extreme heat, and thereby, a reduction in the overall efficacy of operations that require strenuous outdoor work. Drought conditions, when they emerge, may also occur more rapidly and intensely under warmer conditions, requiring more careful attention to the impacts of activities with the potential to cause damage to drought-affected landscapes.

Increased temperatures, both year-round and especially in the winter and fall, may also increase burdens associated with invasive species management, as many invasive vegetation species and pests are especially well suited to exploiting these emerging climate conditions. Similarly, vector-borne illnesses, such as Lyme disease (borne by ticks) and mosquito-borne illnesses could become more common as their host species take advantage of warmer seasonal conditions.

Potential increases in maximum storm intensity may have both direct and indirect impacts on the mission. Damage to infrastructure, roadways, and mission critical technology may occur as a direct result of extreme winds and debris, for example. More broadly, these storms may have impacts on local landscapes that prompt increased restoration, flood mitigation, or other natural resource management costs. Storm-driven impacts due to flooding, erosion, and sediment transport into water bodies may also hinder habitat function for special-status species in affected habitats, furthering potential mission restrictions in these areas.

Wildfire risk is likely to change on and around NBSFS. Although fire risk is generally projected to increase, changes to fire risk are nuanced and dynamic. Increased planning and care will be required to carry out important natural resource management operations (e.g., prescribed burns), or fire risk mitigation operations. As such, the mission may be impacted by changes to wildfire and wildland fire management.

The maintenance of ecological integrity and overall system resilience at NBSFS will be critical to ensuring that future operational demands can be met with the greatest degree of flexibility. Climate change may also result in indirect impacts to NBSFS operational needs, as DoD facilities around the globe are very likely to become more vulnerable with projected changes and require reorientation of assets and operations (e.g., coastal facilities facing loss of land due to sea level rise). Long-term operational readiness will require consideration of the vulnerabilities discussed in this section, and are thus included in the Goals and Objectives of the Natural Resources Management Office (Section 8.0).

7.17 Geographic Information Systems (GIS)

Applicability Statement

This section applies to all USAF installations that maintain an INRMP, as all geospatial information must be maintained within the USAF GeoBase system. The installation is required to implement this element.

Program Overview/Current Management Practices

A geographic information system (GIS) is used by Natural Resources staff to assist in natural resources inventories and management. GIS incorporates up-to-date geographic and attribute data for the station. GIS provides the ability to analyze and model pertinent natural resource information to ensure compatibility between the military mission and natural resource management. Applications are used to manage biodiversity and assist in the preparation of required operational requests to ensure regulatory compliance. This capability is critical to the success of an integrated natural resources management program because it

provides a methodology for baseline measurement, tracking progress, problem identification, and identification of solutions (Najjar 1998). Currently, NBSFS uses Environmental Systems Research Institute, Inc., ArcGIS software for all GIS applications. Environmental data sets are maintained by AFCEC (currently under contract with CEMML), with updates from the installation. Data are created and maintained in Spatial Data Standards for Facilities, Infrastructure, and Environment format.

8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long-term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long or medium range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year. Also, in cases where off-installation land uses may jeopardize USAF missions, this section may list specific goals and objectives aimed at eliminating, reducing, or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are displayed in the Installation Supplement section below in a format that facilitates an integrated approach to natural resource management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

Installation Supplement—Management Goals and Objectives

GOAL 1 MAINTAIN A NATURAL RESOURCES PROGRAM AT NEW BOSTON SPACE FORCE STATION (NBSFS) THAT PROTECTS ECOSYSTEM DIVERSITY AND SUPPORTS THE MILITARY MISSION.

- *Objective 1.1 Remain in compliance with federal, state, and local laws and regulations governing natural resources.*
 - Project 1.1.1 Review and update the INRMP annually in cooperation with the United States Fish and Wildlife Service (USFWS) and New Hampshire Fish and Game Department (NHFGD). Time frame: annual
- Objective 1.2 Ensure that the NBSFS Natural Resources Program staff has the appropriate training to accomplish program goals.
 - Project 1.2.1 Have each Natural Resources Program Office staff member attend at least one DoD-sponsored natural resources training workshop or USFWS National Conservation Training Center course each year. Time frame: annual
- *Objective 1.3 Minimize the extent of impacts and restore sites disturbed by remediation activities to pre-disturbance conditions and functions.*
 - Project 1.3.1 Work with USAF Restoration staff to include natural resources considerations during the remediation planning and contracting process, and complete consultation with USFWS, NHFGD, and New Hampshire Natural Heritage Bureau prior to the initiation of a remediation plan to ensure that remediation and restoration activities are consistent with the INRMP and Sikes Act requirements. Time frame: continuous

GOAL 2 MANAGE FOR SUSTAINABLE POPULATIONS OF THREATENED, ENDANGERED, AND RARE SPECIES USING AN ECOSYSTEM APPROACH WHILE SUPPORTING THE MILITARY MISSION.

Objective 2.1 Sustain existing populations of federally and state-listed bats, including those under review for Endangered Species Act (ESA) listing, on NBSFS.

- Project 2.1.1 Manage and protect small footed bat roost habitat on Joe English Hill in consultation with NHFGD.
- Project 2.1.2 Update Small-footed Bat Management Plan as necessary to ensure protection of roost habitat. Time frame: continuous
- Project 2.1.3 Collect bat acoustic monitoring data annually using in-house monitors with assistance from cooperators. Send data to cooperator for analysis.
- Project 2.1.4 Participate in the North American Bat Monitoring Program (NABat) in cooperation with USFWS and NHFGD. Time frame: continuous
- Project 2.1.5 Follow acoustic detections of northern long-eared bat or tricolored bat with surveys to confirm occurrence and determine breeding status. Time frame: annual

Objective 2.2 Implement management plan to support Blanding's turtle populations on NBSFS.

- Project 2.2.1 Continue monitoring Blanding's turtles (including trapping and radiotelemetry) to determine seasonal habitat use and movements. Time frame: continuous
- Project 2.2.2 Update installation Geographic Information Systems (GIS) with Blanding's turtle location data and provide annual reports to NHFGD. Time frame: annual
- Project 2.2.3 Create nesting habitat for Blanding's turtles to provide alternative to road shoulders or other high-risk nesting locations. Time frame: FY 2025-2029
- Project 2.2.4 Evaluate quality of Blanding's turtle habitat created in Project 2.2.3 by determining if turtles are nesting in the newly established habitat. Time frame: FY 2025-2029
- Project 2.2.5 Minimize installation of new roadside curbs and evaluate removal or modification of existing curbs and new culvert technology to minimize impacts on Blanding's turtle movements on NBSFS. Time frame: continuous.
- Project 2.2.6 Annually cull predators from known Blanding's turtle nesting areas. Time frame: annual

Objective 2.3 Support spotted, wood, and box turtle populations on the installation.

- Project 2.3.1 Conduct surveys for spotted, wood, and box turtles to determine abundance and distribution.
- Project 2.3.2 Manage habitat and protect individuals where spotted turtles and wood turtles are found in Project 2.3.1 using DoD Best Management Practices (BMPs) for spotted turtle and wood turtle and the Best Management Practices for Eastern Box Turtle Habitat in the Northeastern U.S. where box turtles are found when consistent with the mission.

Objective 2.4 Determine the habitat use and movements of eastern hognose snake on NBSFS.

Project 2.4.1 Continue monitoring eastern hognose snakes, gathering morphometric data and placing PIT tags on individuals in accordance with the management plan. Time frame: annual Project 2.4.2 Update installation GIS with geographic location data and provide NHFGD with annual report. Time frame: annual

Objective 2.5 Determine the status, distribution, and habitat associations of American bittern, Cooper's hawk, northern goshawk, and whip-poor-will on NBSFS.

- Project 2.5.1 Conduct annual surveys for American bittern, Cooper's hawk, northern goshawk, and whip-poor-wills during June and July to monitor status, distributions, and habitat associations. Time frame: annual
- Project 2.5.2 Conduct annual breeding bird surveys to monitor status, distributions, and habitat associations of neotropical migrants. Time frame: annual
- Project 2.5.3 Conduct annual presence absence and breeding status survey of Joe English Hill for peregrine falcon. Time frame: annual

Objective 2.6 Determine the status, distribution, and habitat associations of banded sunfish, native brook trout, American eel, and other native fish on NBSFS.

- Project 2.6.1 Conduct annual fisheries survey in NBSFS ponds and streams, with focus on native brook trout, American eel, and banded sunfish.
- Project 2.6.2 Produce annual report with species encountered, geographic data, water chemistry, and recommendations for habitat improvement and management. Time frame: annual

Objective 2.7 Determine the status, distribution, and habitat of wildlife on NBSFS.

- Project 2.7.1 Conduct phased survey of wildlife and insect populations. Time frame: phased, 4 years starting in FY 2025
- Objective 2.8 Determine the status, distribution, and habitat of small whorled pogonia (SWP) on NBSFS.
 - Project 2.8.1 Conduct annual monitoring of existing SWP populations, with additional followup surveys as necessary.
 - Project 2.8.2 Prevent disturbance within 100 yards of populations by integrating SWP protections into the Wildland Fire Management Plan and training staff that will be working in SWP habitat. Time frame: annual
 - Project 2.8.3 Develop management plan for SWP, incorporating results from monitoring surveys (Project 2.8.1). Plan should include habitat protection measures. Time frame: by 2028
 - Project 2.8.4 Incorporate results from SWP monitoring surveys into Wildland Fire Management Plan. Ensure any prescribed fires, forestry, or other activities at NBSFS avoid SWP populations. Time frame: continuous

Objective 2.9 Support pollinators, especially the ESA candidate monarch butterfly, on the installation

- Project 2.9.1 Conference with USFWS to discuss NBSFS plans for monitoring and managing for monarch butterfly in accordance with the USFWS management plan.
- Project 2.9.2 Conduct an annual survey for monarch butterflies on the installation and record habitat use. Time frame: annual
- Project 2.9.3 Update installation GIS with geographic location data recorded in Project 2.9.2. Time frame: annual
- Project 2.9.4 Provide input on the next update of the Integrated Pest Management Plan (IPMP) to ensure that considerations of Section 3 of the U.S. Air Force

Pollinator Reference Guide are implemented in the plan. Time frame: every 5 years

- Project 2.9.5 Review the Wildland Fire Management Plan to ensure patch size, frequency, timing, and intensity of burns are appropriate for protecting monarchs and other pollinators, as described in Section 2.B.4 of the U.S. Air Force Pollinator Reference Guide. Time frame: every 5 years
- Project 2.9.6 Enhance existing monarch habitat by supplementing populations of milkweed and other native nectar-producing flowers. Coordinate with NHFGD to determine whether a pre-migration arrival milkweed cut would be appropriate to increase habitat quality.

GOAL 3 MANAGE FORESTS, WETLANDS, AND NATURAL HABITATS TO ENHANCE SUSTAINABILITY, DIVERSITY, AND RESILIENCE TO CLIMATE CHANGE.

Objective 3.1 Update data on existing NBSFS forest types, distributions, and age structure.

- Project 3.1.1 Continue to perform base-wide forest inventories for Natural Resource Management units on an approximate 10-year rotation. Time frame: continuous
- Project 3.1.2 Update GIS to include forest attributes determined in Project 3.1.1. Time frame: continuous

Objective 3.2 Provide habitat for forest-dependent wildlife species on NBSFS.

- Project 3.2.1 Perform prescribed burns on 10- to 50-acre blocks as identified in Wildland Fire Management Plan. Time frame: continuous
- Project 3.2.2 Evaluate forest attribute data to determine current availability of early-succession habitat and potential locations of suitable sites for conversion.
 Implement 2 to 3 clearcuts that are 5 to 15 acres in size every 5 to 10 years (Note: clearcuts for this project count against overall totals identified for Project 3.3.1). Time frame: continuous

Objective 3.3 Manage timber resources for sustained yield.

Project 3.3.1	Regenerate 10 to 20 acres of forest areas periodically, primarily through shelterwood cutting with some of the overstory trees permanently reserved. Time frame: periodic (2 to 5 harvests every 10 years)
Project 3.3.2	Thin approximately 20 to 50 acres of forest periodically. Focus harvest on removal of hemlock that is declining from hemlock woolly adelgid (HWA). Time frame: periodic (2 to 5 harvests every 10 years)
Project 3.3.3	Develop and implement a passive tree disease monitoring protocol for use during other listed projects to identify emerging forest pathogens and pests. Timeframe: continuous
	tain and monitor NDCEC worthands

Objective 3.4 Maintain and monitor NBSFS wetlands.

- Project 3.4.1 Continue implementation of qualitative wetlands monitoring protocol. Time frame: annual
- Project 3.4.2 Collect water quality data in conjunction with fisheries survey project on NBSFS waters capable of supporting fish, and ensure data-gathering meets State of New Hampshire water quality monitoring standards. Time frame: annual

Objective 3.5 Prevent degradation of existing NBSFS wetlands through implementation of BMPs for forest roads.

- Project 3.5.1 Implement wetland restoration activities from NBSFS wetland study (ANL 2014). Time frame: as needed
- Project 3.5.2 Maintain all gravel forest roads (over 10 miles) in accordance with New Hampshire BMPs for Erosion Control on Timber Harvesting Operations (New Hampshire Division of Forests & Lands and University of New Hampshire Cooperative Extension 2016). Time frame: annual
- Project 3.5.3 Install gates on roads not intended for routine travel to prevent erosion. Install gates as needed.
- Project 3.5.4 Repair existing Gardner Pond Dam to prevent sediment release and fluctuations in water levels that may cause downstream impacts. Time frame: 2025-2029

Objective 3.6 Manage existing rare natural communities on NBSFS.

- Project 3.6.1 Avoid significant disturbance in NBSFS rare natural communities when possible. Time frame: continuous
- Project 3.6.2 Annually survey NBSFS rare natural communities to document status and monitor for invasive nonnative plant establishment and other disturbances. Time frame: annual
- Project 3.6.3 Conduct prescribed burns with low intensity fire in the Joe English Hill area to maintain oak forest. Time frame: as needed

GOAL 4 MANAGE INVASIVE PLANTS AND INSECTS USING SUSTAINABLE AND COST-EFFECTIVE METHODS.

Objective 4.1 Eliminate or control existing problem species on NBSFS.

Project 4.1.1	Implement a control plan for existing invasive nonnative plant species based on the recommendations presented in the Invasive Plant Species Control Plan (IPSCP, <u>Tab 4</u> —Invasive Plant Species Control Plan (IPSCP)) and monitor success of control efforts. Target 20 to 40 acres for treatment per year. Time frame: annual
Project 4.1.2	Update/revise the IPSCP for invasive plant species at NBSFS. Time frame: FY 2025
Project 4.1.3	Conduct a comprehensive survey and map invasive plant species occurrences on NBSFS in conjunction with the IPSCP update. Survey results should be included in the IPSCP. Time frame: FY 2025
Project 4.1.4	Implement HWA management plan, treat hemlock (20 to 40 acres), and release predatory beetles when available. Time frame: annual
Objective 4.2 Imp	lement the IPMP to manage pest species.
Project 4.2.1	Implement recommendations of the IPSCP to prevent the inadvertent introduction and spread of invasive nonnative plant species, eliminate the use of nonnative species in plantings, and use only plants of local origin when possible. Prevent spread of invasive species by washing equipment and using invasive-free landscaping materials in all contracts. Time frame: continuous
Project 4.2.2	Ensure invasive species BMPs are integrated throughout construction contract specifications, and that military activities have provisions to prevent invasive species introduction or transport. Time frame: continuous

GOAL 5 PROVIDE OUTDOOR RECREATION AND EDUCATIONAL OPPORTUNITIES FOR MILITARY PERSONNEL, DOD EMPLOYEES, AND VISITORS AT NBSFS.

Objective 5.1 Maintain interpretive outdoor recreation program and provide archery and other recreational opportunities for NBSFS users.

- Project 5.1.1 Maintain a self-guided nature trail originating at the closed Joe English Pond Campground. Time frame: annual
- Project 5.1.2 Maintain archery range at Green Tree Field. Time frame: continuous
- Project 5.1.3 Maintain hiking/recreation trail network on Joe English Hill, Hill 51, and in the southwest portion of the base. Provide maps to installation users, and mark trails with standard trail marking using tree paint. Time frame: annual

Objective 5.2 Provide high-quality hunting experiences on NBSFS.

Project 5.2.1 Continue to collect hunter harvest and usage data. Time frame: annual

Objective 5.3 Sustain or enhance game fish populations on NBSFS.

- Project 5.3.1 Stock Roby Pond, Ice Pond, Deer Pond, Joe English Pond, and Joe English Brook with trout. Time frame: annual
- Project 5.3.2 Perform periodic fish surveys for game and rare fish on NBSFS. Time frame: as needed

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

Implementation of the NBSFS INRMP is under the direction of the Natural Resources Planner (23 SOPS/CEA) at NBSFS. The NBSFS Natural Resources Planner oversees the development of the plans and programs described in the INRMP and ensures that those plans and programs are implemented in a timely manner. Data collection and studies to support the INRMP are conducted by the Natural Resources Planner, other Natural Resources personnel, and cooperators from other federal, state, and local agencies. The NBSFS Natural Resources Planner will maintain regular communications with the USFWS, NHFGD, and installation organizations regarding natural resource issues.

NBSFS has one funded GS-0401 position assigned to Natural Resources. The position is assigned natural resources, cultural resources, and NEPA duties. The position is augmented by interagency staff from the U.S. Forest Service and USFWS who work on specific projects funded through the USAF Conservation Program. Prior to FY 2022, standard USAF programming allowed the budgeting, funding, and ultimate staffing by interagency personnel. A manpower study in the 2000s determined that NBSFS should be authorized 4 additional positions.

Natural Resources personnel should attend professional meetings (e.g., National Military Fish and Wildlife Association, Society of American Foresters, The Wildlife Society, DoD PARC) to maintain contact with other natural resources professionals and keep abreast on the status of resources, management approaches, and survey protocols. Personnel should also maintain contact with regional professionals as INRMP projects are implemented to ensure consistency and acceptance in the broader scientific and resource management community. The current GS-0401 position is acquisition-coded and requires significant training and continuing education credits to maintain mandatory certification.

Natural Resources personnel at NBSFS are responsible for managing the installation's response to wildfire and other emergencies. All personnel must meet National Wildfire Coordinating Group standards for the positions in which they serve. The WFMP details the necessary training and experience required.

9.2 Monitoring INRMP Implementation

Implementation of the NBSFS INRMP will be monitored at the end of each fiscal year by determining the status of each project planned for that year, as identified in the work plans. Projects that are not completed in a given year will be carried over for completion in subsequent years.

9.3 Annual INRMP Review and Update Requirements

A review of INRMP-related activities will be conducted by Natural Resources staff with USFWS and NHFGD at the end of each fiscal year to document compliance with the INRMP. The Natural Resources Planner (as delegated by the Commander) will certify that the review has been completed.

The INRMP requires annual review, IAW DoDI 4715.03 and DAFMAN 32-7003, to ensure the achievement of mission goals, verify the implementation of projects, and establish any necessary new management requirements. This process involves installation natural resources personnel and external agencies working in coordination to review the INRMP. If the installation mission or any of its natural resources management issues change significantly after the creation of the original INRMP, a major revision to the INRMP is required. The need to accomplish a major revision is normally determined during the annual review with USFWS, the appropriate state, and NOAA (if required). The NRM/POC documents the findings of the annual review in an Annual INRMP Review Summary and obtains signatures from the

coordinating agencies on review findings. By signing the Annual INRMP Review Summary, the collaborating agency representatives assert concurrence with the findings. If any agency declines to participate in an on-site annual review, the NRM submits the INRMP for review along with the Annual INRMP Review Summary document to the agency via official correspondence and request return correspondence with comments/concurrence.

The USFWS, the state, NOAA (if applicable), and the NRM/POC conduct an Annual INRMP Review Meeting. This meeting takes place in person with respective representatives for each agency. Individuals may telephone or video call if they cannot attend in person. During this meeting, the NRM/POC updates the external stakeholders/parties with the end-of-the-year execution report and coordinates future work plans and any necessary changes to management methods, etc. All parties review the INRMP and begin preliminary collaborative work on updating the INRMP (new policies, procedures, impacts, mitigations, etc.) as applicable.

10.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans are included in this section. These projects are listed by fiscal year, including the current year and 4 succeeding years. For each project and activity, a specific timeframe for implementation is provided (as applicable), as well as the appropriate funding source and priority for implementation. The work plans provide all the necessary information for building a budget within the USAF framework. Priorities are defined as follows:

- High: The INRMP signatories assert that if the project is not funded, the INRMP is not being implemented and the USAF is non-compliant with the Sikes Act; or that the project is specifically tied to an INRMP goal and objective and is part of a "Benefit of the Species" determination necessary for ESA Section 4(a)(3)(B)(i) critical habitat exemption.
- Medium: Project supports a specific INRMP goal and objective and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112, Exotic and Invasive Species. However, the INRMP signatories would not contend that the INRMP is not being implemented if not accomplished within the programmed year due to other priorities.
- Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the Installation mission, and/or supports long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Resource Category Goal	Objective	Occur-	FV	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
HabitatOR 2ManagementTE 5SpeciesWE 1ManagementThreatenedandEndangered	OR 2.2 TE 5.1 WE 1.1	Annual	2024	23 SOPS/CEI	Cons	Med	INRP	MGT, HABITAT, AQUATIC	RNGFA 53246119	Implements approved New Boston Space Force Station INRMP Goal OR-2: Provide high-quality hunting and fishing experiences, Objective OR-2.2: Sustain or enhance game fish populations on NBSFS. Objective TE5.1, Determine the status, distribution, and habitat associations of banded sunfish, native brook trout, American eel and other native fish on NBSFS Project TE-5.1: Perform periodic fish surveys for game and rare fish on NBSFS.
HabitatTE 1ManagementTE 2SpeciesTE 3ManagementTE 4ThreatenedWE 1andFO 1EndangeredFO 2WetlandManagement	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 TE 4.2 WE 1.1 FO 1.1 FO 1.2 FO 2.1	Annual	2024	23 SOPS/CEI	Cons	High	INRP	MGT, HABITAT	RNGFA 53246119	Required to support installation Environmental Programs. Implements approved New Boston INRMP Section 8 goals and objectives. Several State-listed birds (bald eagle, pied-billed grebe, osprey, and northern harrier), several State-listed reptiles (eastern hognose snake, Blanding's turtle and spotted turtle), and a State-listed bat (small-footed bat) also have been observed on NBSFS. In addition, several animal species that are considered rare by the NHNHB have been observed on NBSFS. These include several moths and butterflies, wood turtle, American bittern, Tricolored bat, Northern long-eared bat, Red bat, Silver haired-bat, and the Hoary bat. More specifically: TE 2.1 Continue monitoring Blanding's Turtles (NH E), TE 2.2.1 Implement management plan for Blanding's turtles and their habitats (includes employee removing predators). TE 3.1, Determine habitat use by Eastern Hognose Snake (NH E), TE 4.1 annual survey for American Bittern, whip-poor wills, Project TE-1.1 Collect bat acoustic monitoring data annually using in-house monitors with assistance from cooperators. Send data to cooperator for analysis. Participate in larger efforts (i.e, NABat) in cooperation with USFWS and NH Fish and Game.WE-1.2: Implement wetland restoration activities, Project FO-1.1.1: Continue to perform base wide forest inventories, FO-2.1.1: Regenerate 10 to 20 ac of forest areas periodically, FO-2.1.2: Thin approximately 20 to 50 ac of forest periodically, IN-1.1: Implement a control plan for existing invasive nonnative plant species (includes mowing).

 Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat	TE 1	TE 1	Annual	2024	23 SOPS/CEI	Cons	Med	MMA	EQUIPMENT	RNGFA	NBSFS Natural Resources manages three snowmobiles, three
Management	TE 2	TE 2.1							MAINTAIN. CN	53246111	annual maintenance and unscheduled parts replacement to
Species	TE 3	TE 2.2									ensure safe operation. During FY 24 the slip-on fire pump is
Management	TE 4	TE 3.1									scheduled for replacement requiring a on-time budget increase.
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2						41-				
Wetland											
Management											
Habitat	TE 1	TE 1	Annual	2024	23 SOPS/CEI	Cons	Med	MMA	SUPPLIES, CN	RNGFA	Required to support Conservation activities.
Management	TE 2	TE 2.1								5324619	
Species	TE 3	TE 2.2									
Management	TE 4	TE 3.1									
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2	FO 1.1									
Wetland		FO 1.2									
Management		FO 2.1									
Threatened	TE1	TE1	Annual	2024	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-		Species management including detailed analysis of acoustic
and									T&E		monitoring data collect in-house or by other government personnel at NBSFS. Intent is to monitor presence of federally
Endangered											listed Northern long-eared bat and several other state listed
. .	73.74	DII I		2024			xx: 1	IN VID D	MCT INVASIVE	DUCEA	bats. Projects implements TE Goal and objective.
Invasive	IN1	IN1.1	Annual	2024	23 SOPS/CEI	Cons	Hıgh	INRP	SPECIES	RNGFA	invasive species areas that have been controlled in the current
										53247120	season and previous season and to determine if that control
											method was effective, if not then a new management scheme needs to be implemented. This project will man (25 acres)
											areas controlled using GIS and complete a field datasheet and
											photo-points (10 digital data) per control areas to determine
											effectiveness of treatments. Invasive species to be controlled this season is the autumn olive trees in 25 acres of TBD
					#						management areas.

 Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Threatened and Endangered	TE1	TE1	Annual	2024	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES- T&E		Species management, annual monitoring of Small Whorled Pogonia populations
Wetland Threatened and Endangered	WE 1	WE 1.2	Annual	2024	23 SOPS/CEI	Cons	Med	INRP	MGT, NUISANCE WILDLIFE	RNGFA 53256122	Nuisance wildlife control as required to implement New Boston SFS INRMP goals and objectives. WS staff will provide wildlife mitigations measures to New Boston Air Force Station to address human health and safety concerns, protection of threatened and endangered turtles, eggs and their offspring and provide flooding mitigation through the lethal removal of woodchuck, beaver and porcupine. Implements Sikes Act compliant NBSFS INRMP goal WE-1 and NC-1 objective WE-1.2, Prevent degradation of existing NBAFS wetlands and Objective NC-1.1: Manage existing rare natural communities on NBAFS.
Habitat Management Species Management Threatened and Endangered	OR 2 TE 5 WE 1	OR 2.2 TE 5.1 WE 1.1	Annual	2025	23 SOPS/CEI	Cons	Med	INRP	MGT, HABITAT, AQUATIC	RNGFA 53256119	Implements approved New Boston Space Force Station INRMP Goal OR-2: Provide high-quality hunting and fishing experiences, Objective OR-2.2: Sustain or enhance game fish populations on NBSFS. Objective TE5.1, Determine the status, distribution, and habitat associations of banded sunfish, native brook trout, American eel and other native fish on NBSFS Project TE-5.1: Perform periodic fish surveys for game and rare fish on NBSFS.

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat Management Species Management Threatened and Endangered Wetland Management	TE 1 TE 2 TE 3 TE 4 WE 1 FO 1 FO 2	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 TE 4.2 WE 1.1 FO 1.1 FO 1.2 FO 2.1	Annual	2025	23 SOPS/CEI	Cons	High	INRP	MGT, HABITAT	RNGFA 53256119	Required to support installation Environmental Programs. Implements approved New Boston INRMP Section 8 goals and objectives. Several State-listed birds (bald eagle, pied-billed grebe, osprey, and northern harrier), several State-listed reptiles (eastern hognose snake, Blanding's turtle and spotted turtle), and a State-listed bat (small-footed bat) also have been observed on NBSFS. In addition, several animal species that are considered rare by the NHNHB have been observed on NBSFS. These include several moths and butterflies, wood turtle, American bittern, Tricolored bat, Northern long-eared bat, Red bat, Silver haired-bat, and the Hoary bat. More specifically: TE 2.1 Continue monitoring Blanding's Turtles (NH E), TE 2.2.1 Implement management plan for Blanding's turtles and their habitats (includes employee removing predators). TE 3.1, Determine habitat use by Eastern Hognose Snake (NH E), TE 4.1 annual survey for American Bittern, whip-poor wills, Project TE-1.1 Collect bat acoustic monitoring data annually using in-house monitors with assistance from cooperators. Send data to cooperator for analysis. Participate in larger efforts (i.e, NABat) in cooperation with USFWS and NH Fish and Game.WE-1.2: Implement wetland restoration activities, Project FO-1.1.1: Continue to perform base wide forest inventories, FO-2.1.1: Regenerate 10 to 20 ac of forest areas periodically, FO-2.1.2: Thin approximately 20 to 50 ac of forest periodically, IN-1.1: Implement a control plan for existing invasive nonnative plant species (includes mowing).
Habitat Management Species Management Threatened and Endangered Wetland Management	TE 1 TE 2 TE 3 TE 4 WE 1 FO 1 FO 2	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 WE 1.1	Annual	2025	23 SOPS/CEI	Cons	Med	MMA	EQUIPMENT PURCHASE / MAINTAIN, CN	RNGFA 53256111	NBSFS Natural Resources manages three snowmobiles, three ATVs, one Mark 3 pump and a BB 3 slip-on pump. All require annual maintenance and unscheduled parts replacement to ensure safe operation. During FY 24 the slip-on fire pump is scheduled for replacement requiring a on-time budget increase.

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat	TE 1	TE 1	Annual	2025	23 SOPS/CEI	Cons	Med	MMA	SUPPLIES, CN	RNGFA	Required to support Conservation activities.
Management	TE 2	TE 2.1								5325619	
Species	TE 3	TE 2.2									
Management	TE 4	TE 3.1									
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2	FO 1.1									
Wetland		FO 1.2									
Management		FO 2.1									
Threatened	TE1	TE1	Annual	2025	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-		Species management including detailed analysis of acoustic
and									IAL		personnel at NBSFS. Intent is to monitor presence of federally
Endangered											listed Northern long-eared bat and several other state listed
Investue	IN1	INT 1	<u> </u>	2025	22 SODS/CEI	Cons	High	INDD	MGT INVASIVE	DNCEA	bats. Projects implements TE Goal and objective.
Invasive	11111	1111.1	Annual	2023	23 SOFS/CEI	Colls	nigii	INKF	SPECIES	53257120	invasive species areas that have been controlled in the current
										55257120	season and previous season and to determine if that control
											needs to be implemented. This project will map (25 acres)
											areas controlled using GIS and complete a field datasheet and
											photo-points (10 digital data) per control areas to determine effectiveness of treatments. Invasive species to be controlled
											this season is the autumn olive trees in 25 acres of TBD
	TTT 1			2025				T 0 F	MCT SDECIES		management areas.
Threatened	TEI	TEI	Annual	2025	23 SOPS/CEI	Cons	Med	T&E	T&E		Pogonia populations
and							<i>y</i>				
Endangered	D11	D11.1		2025		G		NIDD		DNGEA	Conduct investive encodes survey and undets 2004 investive
Invasive	INI	IN1.1	One	2025	23 SOPS/CEI	Cons	Med	INRP	OTHER	KNGFA	species control plan for NBSFS.
Species			time							53257120	
Management			survey								

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Wetland Threatened and Endangered	WE 1	WE 1.2	Annual	2025	23 SOPS/CEI	Cons	Med	INRP	MGT, NUISANCE WILDLIFE	RNGFA 53256122	Nuisance wildlife control as required to implement New Boston SFS INRMP goals and objectives. WS staff will provide wildlife mitigations measures to New Boston Air Force Station to address human health and safety concerns, protection of threatened and endangered turtles, eggs and their offspring and provide flooding mitigation through the lethal removal of woodchuck, beaver and porcupine. Implements Sikes Act compliant NBSFS INRMP goal WE-1 and NC-1 objective WE-1.2, Prevent degradation of existing NBAFS wetlands and Objective NC-1.1: Manage existing rare natural communities on NBAFS.
Species Management	TE 7	TE 7.1	One time survey	2025	23 SOPS/CEI	Cons	Med	INRMP	MGT, SPECIES	RNGFA 53256120	Conduct updated baseline, basewide survey of plant and fungi species on NBSFS and mapping of vegetative communities present. Anticipated phase one of four year effort to update inventory of natural resources on NBSFS. This phased project is to conduct a full ecological survey of all flora, fauna, and fungal species present, including federal and state rare, threatened, and endangered species, invasive and nuisance species located on NBSFS effort includes survey to locate, identify, log and map flora/fauna species, reptile, invertebrate, vegetative communities and wildlife communities Implements approved NBSFS INRMP Goal FO-1: Provide sustainable forest management and high-quality habitat for forest- dependent species on NBAFS, Objective FO-1.1: Update data on existing NBAFS forest types, distributions, and age structure, Goal NC-1: Maintain existing rare natural communities on NBAFS. Goal WE-1: Maintain existing wetland communities on NBAFS. Includes cost for USFWS personnel support. Project is not ranked in the INRMP work plan.
Habitat Management	OR 2 TE 5	OR 2.2 TE 5.1	Annual	2026	23 SOPS/CEI	Cons	Med	INRP	MGT, HABITAT, AQUATIC	RNGFA 53266119	Implements approved New Boston Space Force Station INRMP Goal OR-2: Provide high-quality hunting and fishing
Species	WE 1	WE 1.1								20200117	experiences, Objective OR-2.2: Sustain or enhance game fish populations on NBSFS. Objective TE5.1, Determine the
Management Threatened and											status, distribution, and habitat associations of banded sunfish, native brook trout, American eel and other native fish on NBSFS Project TE-5.1: Perform periodic fish surveys for game and rare fish on NBSFS.
Endangered					47						

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat Management Species Management Threatened and Endangered Wetland Management	TE 1 TE 2 TE 3 TE 4 WE 1 FO 1 FO 2	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 TE 4.2 WE 1.1 FO 1.1 FO 1.2 FO 2.1	Annual	2026	23 SOPS/CEI	Cons	High	INRP	MGT, HABITAT	RNGFA 53266119	Required to support installation Environmental Programs. Implements approved New Boston INRMP Section 8 goals and objectives. Several State-listed birds (bald eagle, pied-billed grebe, osprey, and northern harrier), several State-listed reptiles (eastern hognose snake, Blanding's turtle and spotted turtle), and a State-listed bat (small-footed bat) also have been observed on NBSFS. In addition, several animal species that are considered rare by the NHNHB have been observed on NBSFS. These include several moths and butterflies, wood turtle, American bittern, Tricolored bat, Northern long-eared bat, Red bat, Silver haired-bat, and the Hoary bat. More specifically: TE 2.1 Continue monitoring Blanding's Turtles (NH E), TE 2.2.1 Implement management plan for Blanding's turtles and their habitats (includes employee removing predators). TE 3.1, Determine habitat use by Eastern Hognose Snake (NH E), TE 4.1 annual survey for American Bittern, whip-poor wills, Project TE-1.1 Collect bat acoustic monitoring data annually using in-house monitors with assistance from cooperators. Send data to cooperator for analysis. Participate in larger efforts (i.e, NABat) in cooperation with USFWS and NH Fish and Game.WE-1.2: Implement wetland restoration activities, Project FO-1.1.1: Continue to perform base wide forest inventories, FO-2.1.1: Regenerate 10 to 20 ac of forest areas periodically, FO-2.1.2: Thin approximately 20 to 50 ac of forest periodically, IN-1.1: Implement a control plan for existing invasive nonnative plant species (includes mowing).
Habitat Management Species Management Threatened and Endangered Wetland Management	TE 1 TE 2 TE 3 TE 4 WE 1 FO 1 FO 2	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 WE 1.1	Annual	2026	23 SOPS/CEI	Cons	Med	MMA	EQUIPMENT PURCHASE / MAINTAIN, CN	RNGFA 53266111	NBSFS Natural Resources manages three snowmobiles, three ATVs, one Mark 3 pump and a BB 3 slip-on pump. All require annual maintenance and unscheduled parts replacement to ensure safe operation. During FY 24 the slip-on fire pump is scheduled for replacement requiring a on-time budget increase.

Table 10-1. Annual work plans (current year to 4 years out)
Resource	Coal	Objective	Occur-	FV	Office of Primary Responsibility	Funding	Priority L ovel	PB28 Code*	Standard Title*	Project Number	Description
				F 1		Source				DNGEA	Description Pageired to support Concentration activities
Habitat	TEI	TEI	Annual	2026	23 SOPS/CEI	Cons	Med	MMA	SUPPLIES, CIN	RNGFA	Required to support Conservation activities.
Management	TE 2	TE 2.1								5325619	
Species	TE 3	TE 2.2									
Management	TE 4	TE 3.1									
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2	FO 1.1									
Wetland		FO 1.2									
Management		FO 2.1									
Threatened	TE1	TE1	Annual	2026	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-	RNGFA	Species management including detailed analysis of acoustic
and									T&E	53267119	monitoring data collect in-house or by other government personnel at NBSES. Intent is to monitor presence of federally
Endangered											listed Northern long-eared bat and several other state listed
									The second se		bats. Projects implements TE Goal and objective.
Invasive	IN1	IN1.1	Annual	2026	23 SOPS/CEI	Cons	High	INRP	MGT, INVASIVE	RNGFA	Sound adaptive management requires annual monitoring of
									SPECIES	53266121	season and previous season and to determine if that control
											method was effective, if not then a new management scheme
											needs to be implemented. This project will map (25 acres)
											areas controlled using GIS and complete a field datasheet and
											effectiveness of treatments. Invasive species to be controlled
											this season is the autumn olive trees in 25 acres of TBD
											management areas.
Threatened	TE1	TE1	Annual	2026	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-		Species management, annual monitoring of Small Whorled
and									ICE		
Endangered											

 Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Wetland Threatened and Endangered	WE 1	WE 1.2	Annual	2026	23 SOPS/CEI	Cons	Med	INRP	MGT, NUISANCE WILDLIFE	RNGFA 53266122	Nuisance wildlife control as required to implement New Boston SFS INRMP goals and objectives. WS staff will provide wildlife mitigations measures to New Boston Air Force Station to address human health and safety concerns, protection of threatened and endangered turtles, eggs and their offspring and provide flooding mitigation through the lethal removal of woodchuck, beaver and porcupine. Implements Sikes Act compliant NBSFS INRMP goal WE-1 and NC-1 objective WE-1.2, Prevent degradation of existing NBAFS wetlands and Objective NC-1.1: Manage existing rare natural communities on NBAFS.
Threatened and Endangered	TE1	TE1	One- time Survey	2026	23 SOPS/CEI	Cons	High	T&E	MGT, SPECIES- T&E	RNGFA 53267119	Species management including survey of Joe English Hill for potential bat hibernaculum.
Species Management	TE 7	TE 7.1	One time survey	2026	23 SOPS/CEI	Cons	Med	INRMP	MGT, SPECIES	RNGFA 53256120	Conduct updated baseline, basewide survey of plant and fungi species on NBSFS and mapping of vegetative communities present. Anticipated phase one of four year effort to update inventory of natural resources on NBSFS. This phased project is to conduct a full ecological survey of all flora, fauna, and fungal species present, including federal and state rare, threatened, and endangered species, invasive and nuisance species located on NBSFS effort includes survey to locate, identify, log and map flora/fauna species, reptile, invertebrate, vegetative communities and wildlife communities Implements approved NBSFS INRMP Goal FO-1: Provide sustainable forest management and high-quality habitat for forest- dependent species on NBAFS, Objective FO-1.1: Update data on existing NBAFS forest types, distributions, and age structure, Goal NC-1: Maintain existing rare natural communities on NBAFS. Includes cost for USFWS personnel support. Project is not ranked in the INRMP work plan.

Table 10-1. Annual work plans (current year to 4 years out)

Resource			Occur-		Office of Primary	Funding	Priority	PB28	Standard	Project	
Category	Goal	Objective	rence	FY	Responsibility	Source	Level	Code*	Title*	Number	Description
Habitat Management Species Management Threatened and Endangered	OR 2 TE 5 WE 1	OR 2.2 TE 5.1 WE 1.1	Annual	2027	23 SOPS/CEI	Cons	Med	INRP	MGT, HABITAT, AQUATIC	RNGFA 53276119	Implements approved New Boston Space Force Station INRMP Goal OR-2: Provide high-quality hunting and fishing experiences, Objective OR-2.2: Sustain or enhance game fish populations on NBSFS. Objective TE5.1, Determine the status, distribution, and habitat associations of banded sunfish, native brook trout, American eel and other native fish on NBSFS Project TE-5.1: Perform periodic fish surveys for game and rare fish on NBSFS.
Habitat Management Species Management Threatened and Endangered Wetland Management	TE 1 TE 2 TE 3 TE 4 WE 1 FO 1 FO 2	TE 1 TE 2.1 TE 2.2 TE 3.1 TE 4.1 TE 4.2 WE 1.1 FO 1.1 FO 1.2 FO 2.1	Annual	2027	23 SOPS/CEI	Cons	High	INRP	MGT, HABITAT	RNGFA 53276119	Required to support installation Environmental Programs. Implements approved New Boston INRMP Section 8 goals and objectives. Several State-listed birds (bald eagle, pied-billed grebe, osprey, and northern harrier), several State-listed reptiles (eastern hognose snake, Blanding's turtle and spotted turtle), and a State-listed bat (small-footed bat) also have been observed on NBSFS. In addition, several animal species that are considered rare by the NHNHB have been observed on NBSFS. These include several moths and butterflies, wood turtle, American bittern, Tricolored bat, Northern long-eared bat, Red bat, Silver haired-bat, and the Hoary bat. More specifically: TE 2.1 Continue monitoring Blanding's Turtles (NH E), TE 2.2.1 Implement management plan for Blanding's turtles and their habitats (includes employee removing predators). TE 3.1, Determine habitat use by Eastern Hognose Snake (NH E), TE 4.1 annual survey for American Bittern, whip-poor wills, Project TE-1.1 Collect bat acoustic monitoring data annually using in-house monitors with assistance from cooperators. Send data to cooperator for analysis. Participate in larger efforts (i.e, NABat) in cooperation with USFWS and NH Fish and Game.WE-1.2: Implement wetland restoration activities, Project FO-1.1.1: Continue to perform base wide forest inventories, FO-2.1.2: Thin approximately 20 to 50 ac of forest periodically, IN-1.1: Implement a control plan for existing invasive nonnative plant species (includes mowing).

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat	TE 1	TE 1	Annual	2027	23 SOPS/CEI	Cons	Med	MMA	EQUIPMENT	RNGFA	NBSFS Natural Resources manages three snowmobiles, three ATVs one Mark 3 nump and a BB 3 slip on nump. All require
Management	TE 2	TE 2.1							MAINTAIN, CN	53276111	annual maintenance and unscheduled parts replacement to
Species	TE 3	TE 2.2									ensure safe operation. During FY 24 the slip-on fire pump is
Management	TE 4	TE 3.1									scheduled for replacement requiring a on-time budget increase.
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2						44				
Wetland											
Management											
Habitat	TE 1	TE 1	Annual	2027	23 SOPS/CEI	Cons	Med	MMA	SUPPLIES, CN	RNGFA	Required to support Conservation activities.
Management	TE 2	TE 2.1								5327619	
Species	TE 3	TE 2.2									
Management	TE 4	TE 3.1									
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2	FO 1.1									
Wetland		FO 1.2									
Management		FO 2.1									
Threatened	TE1	TE1	Annual	2027	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-	RNGFA	Species management including detailed analysis of acoustic
and									T&E	53297119	personnel at NBSES. Intent is to monitor presence of federally
Endangered											listed Northern long-eared bat and several other state listed
T	INT1	INTI 1	A	2027		C	II. 1		MGT INVASIVE	DNCEA	bats. Projects implements TE Goal and objective.
Invasive	INI	11N 1.1	Annual	2027	23 SOPS/CEI	Cons	High	INKP	SPECIES	KNGFA 52076101	invasive species areas that have been controlled in the current
										552/0121	season and previous season and to determine if that control
											needs to be implemented. This project will map (25 acres)
											areas controlled using GIS and complete a field datasheet and
											photo-points (10 digital data) per control areas to determine
											this season is the autumn olive trees in 25 acres of TBD
					Ŧ						management areas.

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Threatened and Endangered	TE1	TE1	Annual	2027	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES- T&E		Species management, annual monitoring of Small Whorled Pogonia populations
Wetland Threatened and Endangered	WE 1	WE 1.2	Annual	2027	23 SOPS/CEI	Cons	Med	INRP	MGT, NUISANCE WILDLIFE	RNGFA 53276122	Nuisance wildlife control as required to implement New Boston SFS INRMP goals and objectives. WS staff will provide wildlife mitigations measures to New Boston Air Force Station to address human health and safety concerns, protection of threatened and endangered turtles, eggs and their offspring and provide flooding mitigation through the lethal removal of woodchuck, beaver and porcupine. Implements Sikes Act compliant NBSFS INRMP goal WE-1 and NC-1 objective WE-1.2, Prevent degradation of existing NBAFS wetlands and Objective NC-1.1: Manage existing rare natural communities on NBAFS.
Species Management	TE 7	TE 7.1	One time survey	2027	23 SOPS/CEI	Cons	Med	INRMP	MGT, SPECIES		Conduct updated baseline, basewide survey of plant and fungi species on NBSFS and mapping of vegetative communities present. Anticipated phase one of four year effort to update inventory of natural resources on NBSFS. This phased project is to conduct a full ecological survey of all flora, fauna, and fungal species present, including federal and state rare, threatened, and endangered species, invasive and nuisance species located on NBSFS effort includes survey to locate, identify, log and map flora/fauna species, reptile, invertebrate, vegetative communities and wildlife communities. Implements approved NBSFS INRMP Goal FO-1: Provide sustainable forest management and high-quality habitat for forest- dependent species on NBAFS, Objective FO-1.1: Update data on existing NBAFS forest types, distributions, and age structure, Goal NC-1: Maintain existing rare natural communities on NBAFS. Includes cost for USFWS personnel support. Project is not ranked in the INRMP work plan.

Table 10-1. Annual work plans (current year to 4 years out)

Resource	Coal	Objective	Occur-	FV	Office of Primary Responsibility	Funding	Priority Lovel	PB28 Code*	Standard Title*	Project Number	Description
Category	Guai	Objective	Tence	гі	Responsibility	Source	Level	Coue	The .	INUILIDEI	Description
Habitat	OR 2	OR 2.2	Annual	2028	23 SOPS/CEI	Cons	Med	INRP	AQUATIC	RNGFA	Implements approved New Boston Space Force Station INRMP Goal OR-2: Provide high-quality hunting and fishing
Management	TE 5	TE 5.1								53286119	experiences, Objective OR-2.2: Sustain or enhance game fish
Species	WE 1	WE 1.1									populations on NBSFS. Objective TE5.1, Determine the
Management											status, distribution, and habitat associations of banded sunfish,
Threatened											NBSFS Project TE-5.1: Perform periodic fish surveys for game
and											and rare fish on NBSFS.
Endangered											
Habitat	TE 1	TE 1	Annual	2028	23 SOPS/CEI	Cons	High	INRP	MGT, HABITAT	RNGFA	Required to support installation Environmental Programs.
Management	TE 2	TE 2.1					8			53286119	Implements approved New Boston INRMP Section 8 goals and
Species	TE 3	TE 2.1								00200117	objectives. Several State-listed birds (bald eagle, pied-billed grebe osprey and northern harrier) several State-listed reptiles
Management	TE 4	TE 2.2									(eastern hognose snake, Blanding's turtle and spotted turtle),
Threatened	WE 1	TE 3.1									and a State-listed bat (small-footed bat) also have been
and		1124.1									observed on NBSFS. In addition, several animal species that
		1E4.2									NBSFS. These include several moths and butterflies, wood
Endangered	FO 2	WE 1.1									turtle, American bittern, Tricolored bat, Northern long-eared
Wetland		FO 1.1									bat, Red bat, Silver haired-bat, and the Hoary bat. More
Management		FO 1.2									specifically: TE 2.1 Continue monitoring Blanding's Turtles (NH F) TE 2.2.1 Implement management plan for Blanding's
		FO 2.1									turtles and their habitats (includes employee removing
											predators). TE 3.1, Determine habitat use by Eastern Hognose
											Snake (NH E), TE 4.1 annual survey for American Bittern,
											whip-poor wills, Project TE-1.1 Collect bat acoustic monitoring data appually using in-house monitors with
											assistance from cooperators. Send data to cooperator for
							In the second se				analysis. Participate in larger efforts (i.e., NABat) in
			-								cooperation with USFWS and NH Fish and Game.WE-1.2:
											Implement wetland restoration activities, Project FO-1.1.1:
											Regenerate 10 to 20 ac of forest areas periodically FO-2.1.1
											Thin approximately 20 to 50 ac of forest periodically, IN-1.1:
											Implement a control plan for existing invasive nonnative plant
											species (includes mowing).

Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Habitat	TE 1	TE 1	Annual	2028	23 SOPS/CEI	Cons	Med	MMA	EQUIPMENT	RNGFA	NBSFS Natural Resources manages three snowmobiles, three
Management	TE 2	TE 2.1							MAINTAIN. CN	53286111	annual maintenance and unscheduled parts replacement to
Species	TE 3	TE 2.2									ensure safe operation. During FY 24 the slip-on fire pump is
Management	TE 4	TE 3.1									scheduled for replacement requiring a on-time budget increase.
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2						44				
Wetland											
Management											
Habitat	TE 1	TE 1	Annual	2028	23 SOPS/CEI	Cons	Med	MMA	SUPPLIES, CN	RNGFA	Required to support Conservation activities.
Management	TE 2	TE 2.1								5328619	
Species	TE 3	TE 2.2									
Management	TE 4	TE 3.1									
Threatened	WE 1	TE 4.1									
and	FO 1	WE 1.1									
Endangered	FO 2	FO 1.1									
Wetland		FO 1.2									
Management		FO 2.1									
Threatened	TE1	TE1	Annual	2028	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES-	RNGFA	Species management including detailed analysis of acoustic
and									IXE	53287119	personnel at NBSFS. Intent is to monitor presence of federally
Endangered											listed Northern long-eared bat and several other state listed
Invasive	IN1	IN1 1	Annual	2028	23 SOPS/CEI	Cons	High	INPP	MGT, INVASIVE	RNGEA	Sound adaptive management requires annual monitoring of
mvasive	1111	1111.1	Annuar	2020	25 501 5/CEI	Cons	Ingn		SPECIES	53286121	invasive species areas that have been controlled in the current
										55200121	season and previous season and to determine if that control
											needs to be implemented. This project will map (25 acres)
											areas controlled using GIS and complete a field datasheet and
											photo-points (10 digital data) per control areas to determine effectiveness of treatments. Invasive species to be controlled
											this season is the autumn olive trees in 25 acres of TBD
					Ψ						management areas.

 Table 10-1. Annual work plans (current year to 4 years out)

Resource Category	Goal	Objective	Occur- rence	FY	Office of Primary Responsibility	Funding Source	Priority Level	PB28 Code*	Standard Title*	Project Number	Description
Threatened and Endangered	TE1	TE1	Annual	2028	23 SOPS/CEI	Cons	Med	T&E	MGT, SPECIES- T&E		Species management, annual monitoring of Small Whorled Pogonia populations
Wetland Threatened and Endangered	WE 1	WE 1.2	Annual	2028	23 SOPS/CEI	Cons	Med	INRP	MGT, NUISANCE WILDLIFE	RNGFA 53286122	Nuisance wildlife control as required to implement New Boston SFS INRMP goals and objectives. WS staff will provide wildlife mitigations measures to New Boston Air Force Station to address human health and safety concerns, protection of threatened and endangered turtles, eggs and their offspring and provide flooding mitigation through the lethal removal of woodchuck, beaver and porcupine. Implements Sikes Act compliant NBSFS INRMP goal WE-1 and NC-1 objective WE-1.2, Prevent degradation of existing NBAFS wetlands and Objective NC-1.1: Manage existing rare natural communities on NBAFS.
Species Management	TE 7	TE 7.1	One time survey	2028	23 SOPS/CEI	Cons	Med	INRMP	MGT, SPECIES		Conduct updated baseline, basewide survey of plant and fungi species on NBSFS and mapping of vegetative communities present. Anticipated phase one of four year effort to update inventory of natural resources on NBSFS. This phased project is to conduct a full ecological survey of all flora, fauna, and fungal species present, including federal and state rare, threatened, and endangered species, invasive and nuisance species located on NBSFS effort includes survey to locate, identify, log and map flora/fauna species, reptile, invertebrate, vegetative communities and wildlife communities Implements approved NBSFS INRMP Goal FO-1: Provide sustainable forest management and high-quality habitat for forest- dependent species on NBAFS, Objective FO-1.1: Update data on existing NBAFS forest types, distributions, and age structure, Goal NC-1: Maintain existing rare natural communities on NBAFS. Includes cost for USFWS personnel support. Project is not ranked in the INRMP work plan.

Table 10-1. Annual work plans (current year to 4 years out)

*Natural Resources standard titles by PB28 code (excluding CZT/CZC titles); see table below.

INRP MMA T&E MNRA WTLD P&F, CN Management, Species Management, Habitat Compliance Public Management, Wetlands/ Ploodplains Management, Wetlands/ Ploodplains Management, Wetlands/ Ploodplains Interagency/Intraagency, Government, Sikes Act Interagency/Intraagency, Government, Sikes Act, Conservation Management, Invasive Species Recordkeeping, Other Interagency/Intraagency, Government, Sikes Act, Conservation Interagency/Intraagency, Government, Sikes Act, Conservation Interagency/Intraagency, Government, Sikes Act, Conservation Interagency/Intraagency, Government, Sikes Act, Conservation Interagency/Intraagency, Government, Sikes Act Outsourced Environmental Services, CN Supplies, CN Supplies, CN, CLEO Interagency/Intraagency, Government, Sikes Act, CLEO Outsourced Environmental Services, CN Services, CN - Supplies, CN, CLEO Vehicle Leasing, CN Interagency/Intraagency, Government, Sikes Act, CLEO - - Feujpment Purchase/ Maintain, CN - Supplies, CN, CLEO - - Vehicle Leasing, CN - Supplies, CN, CLEO - - Management, WildInd Fire - Supplies, CN, CLEO - -					
P&F, CN Management, Species Management, Habitat Compliance Public Notification Management, Wetlands/ Floodplains Interagency/Intraagency, Government, Sikes Act Interagency/Intraagency, Government, Sikes Act Management, Species Plan Update, Other Monitor Wetlands Interagency/Intraagency, Government, Sikes Act, Conservation Outsourced Environmental Services, CN Management, Invasive Species RecordReeping, Other Interagency/Intraagency, Government, Sikes Act, Conservation Interagency/Intraagency, Government, Sikes Act, Conservation Outsourced Environmental Services, CN RecordReeping, Other Outsourced Environmental Services, CN Supplies, CN Supplies, CN, CLEO Interagency/Intraagency, Government, Sikes Act, CLEO Outsourced Environmental Services, CN — — Equipment Purchase/Maintain, CN — — Supplies, CN, CLEO — — Vehicle Leasing, CN — Supplies, CN, CLEO — — — Vehicle Leasing, CN — Supplies, CN, CLEO — — — Vehicle Leasing, CN — Supplies, CN, CLEO — — — Vehicle Leasing, CN — Supplies, CN, CLEO — — — Plan Update, INRMP — Supplies, CN, CLEO — — — Plan Update, Other — </th <th>INRP</th> <th>MMA</th> <th>T&E</th> <th>MNRA</th> <th>WTLD</th>	INRP	MMA	T&E	MNRA	WTLD
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Table 10-2. Natural Resources standard	itles by PB28 code	(excluding CZT/CZC titles)
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<u>11.0</u> <u>REFERENCES</u>

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- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook
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<u>12.0</u> <u>ACRONYMS</u>

12.1 Standard Acronyms (Applicable to all USAF installations)

- <u>eDASH Acronym Library</u>
- <u>Natural Resources Playbook—Acronym Section</u>
- <u>U.S. EPA Terms & Acronyms</u>

12.2 Installation Acronyms

AFCEC	Air Force Civil Engineer Center
CFR	Code of Federal Regulations
EAB	Emerald ash borer
HWA	Hemlock woolly adelgid
IPSCP	Invasive Plant Species Control Plan
NBSFS	New Boston Air Force Station
NHNHB	New Hampshire Natural Heritage Bureau
NHWAP	New Hampshire Wildlife Action Plan
NLEB	Northern long-eared bat
SLF	Spotted lanternfly
SWP	Small whorled pogonia
Т&Е	Threatened and Endangered (species)
USAF	U.S. Air Force
U.S. EPA	U.S. Environmental Protection Agency

<u>13.0</u> DEFINITIONS

- 13.1 Standard Definitions (Applicable to all USAF installations)
 - Natural Resources Playbook—Definitions Section
- 13.2 Installation Definitions

N/A

14.0 APPENDICES

14.1 Standard Appendices

14.1.1 Appendix A

Table 14-1. Annotated summary of key l	egislation related to design and implementation of the					
Integrated Natural Resources Management Plan (INRMP)						

Legislation	Description	
Federal Public Laws (P.L.s) and Executive Orders (EOs)		
National Defense Authorization Act of	Amends 2 Acts and establishes volunteer and partnership	
1989, P.L. 101-189; Volunteer	programs for natural and cultural resources management on	
Partnership Cost-Share Program	DoD lands.	
Defense Appropriations Act of 1991,	Establishes the "Legacy Resource Management Program" for	
P.L. 101-511; Legacy Resource	natural and cultural resources. Program emphasis is on	
Management Program	inventory and stewardship responsibilities of biological,	
	geophysical, cultural, and historic resources on DoD lands,	
	including restoration of degraded or altered habitats.	
EO 11514, Protection and	Federal agencies shall initiate measures needed to direct their	
Enhancement of Environmental	policies, plans, and programs to meet national environmental	
Quality	goals. They shall monitor, evaluate, and control agency	
	activities to protect and enhance the quality of the	
	environment.	
EO 11593, Protection and	All federal agencies are required to locate, identify, and record	
Enhancement of the Cultural	all cultural resources. Cultural resources include sites of	
Environment	archaeological, historical, or architectural significance.	
EO 11988, Floodplain Management	Provides direction regarding actions of federal agencies in	
	floodplains, and requires permits from state, territory, and	
	federal review agencies for any construction within a 100-	
	year floodplain and to restore and preserve the natural and	
	beneficial values served by floodplains in carrying out its	
	responsibilities for acquiring, managing, and disposing of	
	federal lands and facilities.	
EO 11989, Off-Road Vehicles on	Installations permitting off-road vehicles to designate and	
Public Lands	mark specific areas/trails to minimize damage and conflicts,	
	publish information including maps, and monitor the effects	
	of their use. Installations may close areas if adverse effects on	
	natural, cultural, or historic resources are observed.	

Legislation	Description	
EO 11990, Protection of Wetlands	Requires federal agencies to avoid undertaking or providing	
	assistance for new construction in wetlands unless there is no	
	practicable alternative, and all practicable measures to	
	minimize harm to wetlands have been implemented and to	
	preserve and enhance the natural and beneficial values of	
	wetlands in carrying out the agency's responsibilities for (1)	
	acquiring, managing, and disposing of federal lands and	
	facilities; (2) providing federally undertaken, financed, or	
	assisted construction and improvements; and (3) conducting	
	federal activities and programs affecting land use, including	
	but not limited to water and related land resources planning,	
	regulating, and licensing activities.	
EO 12088, Federal Compliance with	This EO delegates responsibility to the head of each executive	
Pollution Control Standards	agency for ensuring all necessary actions are taken for the	
	prevention, control, and abatement of environmental	
	pollution. This order gives the U.S. Environmental Protection	
	Agency (U.S. EPA) authority to conduct reviews and	
	inspections to monitor federal facility compliance with	
	pollution control standards.	
EO 12898, Environmental Justice	This EO requires certain federal agencies, including the DoD,	
	to the greatest extent practicable permitted by law, to make	
	environmental justice part of their missions by identifying	
	and addressing disproportionately high and adverse health or	
	environmental effects on minority and low-income	
	populations.	
EO 13112, Invasive Species	Prevents the introduction of invasive species and provide for	
	their control and to minimize the economic, ecological, and	
	numan health impacts that invasive species cause.	
EO 13186, Responsibilities of Federal	The U.S. Fish and Wildlife Service (USFWS) has the	
Agencies to Protect Migratory Birds	responsibility to administer, oversee, and enforce the	
	conservation provisions of the Migratory Bird Treaty Act,	
	which includes responsibility for population management	
	(e.g., monitoring), nabital protection (e.g., acquisition,	
	enhancement, and mounication), international coordination,	
EQ 14009 Trabling the Olimeter Origin	This EQ requires the DeD to prioritize action on elimete	
EO 14008, Tacking the Climate Crisis	This EO requires the DoD to phontize action on climate	
ai nome ana Abroaa	and procurement, and in angegement with state local tribal	
	and territorial governments	
EO 14072 Strongthaning the Nation's	This EQ establishes policy to maintain restore, and conserve	
EO 14072, Strengthening the Nation's	the nation's forests to include old growth and mature forests	
Foresis, Communities, and Local Feonomies	to limit international deforestation and to combat climate	
	change and enhance resilience	
Im	ited States Code (U.S.C.)	

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description		
Animal Damage Control Act (7 U.S.C.	Provides authority to the Secretary of Agriculture for		
§ 426-426b, 47 Stat. 1468)	investigation and control of mammalian predators, rodents,		
	and birds. DoD installations may enter into cooperative		
	agreements to conduct animal control projects.		
Bald and Golden Eagle Protection Act	This law provides for the protection of the bald eagle (the		
of 1940, as amended; 16 U.S.C. § 668-	national emblem) and the golden eagle by prohibiting, except		
668c	under certain specified conditions, the taking, possession and		
	commerce of such birds. The 1972 amendments increased		
	penalties for violating provisions of the Act or regulations		
	issued pursuant thereto and strengthened other enforcement		
	measures. Rewards are provided for information leading to		
	arrest and conviction for violation of the Act.		
Clean Air Act (42 U.S.C. § /401–	This Act, as amended, is known as the Clean Air Act of 1970.		
/6/1q, 14 July 1955, as amended)	The amendments made in 1970 established the core of the		
	clean air program. The primary objective is to establish		
	rederal standards for air pollutants. It is designed to improve		
	air quality in areas of the country which do not meet rederal		
	standards and to prevent significant deterioration in areas		
Comprehensive Environmental	Authorizes and administers a program to assess damage		
Response Compensation and	respond to releases of hazardous substances fund cleanup		
Liability Act (CERCLA) of 1980	establish cleanup standards assign liability and other efforts		
(Superfund) (26 U S C 8 4611–4682	to address environmental contaminants. Installation		
P L 96-510 94 Stat 2797) as	Restoration Program guides cleanups at DoD installations		
amended	restoration respense garace creatures at 2 of instantations.		
Endangered Species Act (ESA) of	Protects threatened, endangered, and candidate species of fish,		
1973, as amended; P.L. 93-205, 16	wildlife, and plants and their designated critical habitats.		
U.S.C. § 1531 et seq.	Under this law, no federal action is allowed to jeopardize the		
	continued existence of an endangered or threatened species.		
	The ESA requires consultation with the USFWS and National		
	Oceanic and Atmospheric Administration (NOAA) Fisheries		
	(National Marine Fisheries Service) and the preparation of a		
	biological evaluation or a biological assessment may be		
	required when such species are present in an area affected by		
	government activities.		
Federal Aid in Wildlife Restoration	Provides federal aid to states and territories for management		
Act of 1937 (16 U.S.C. § 669–669i; 50	and restoration of wildlife. Fund derives from sports tax on		
Stat. 917) (Pittman-Robertson Act)	arms and ammunition. Projects include acquisition of wildlife		
	habitat, wildlife research surveys, development of access		
	facilities, and hunter education.		
Federal Environmental Pesticide Act	Requires installations to ensure pesticides are used only in		
of 1972	accordance with their label registrations and restricted-use		
	pesticides are applied only by certified applicators.		

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description	
Federal Land Use Policy and	Requires management of Bureau of Land Management lands to	
Management Act, 43 U.S.C. § 1701–	protect the quality of scientific, scenic, historical, ecological,	
1782	environmental, and archaeological resources and values; as	
	well as to preserve and protect certain lands in their natural	
	condition for fish and wildlife habitat. This Act also requires	
	consideration of commodity production such as timbering.	
Federal Noxious Weed Act of 1974, 7	The Act provides for the control and management of non-	
U.S.C. § 2801–2814	indigenous weeds that injure or have the potential to injure	
	the interests of agriculture and commerce, wildlife resources,	
	or the public health.	
Federal Water Pollution Control Act	The CWA is a comprehensive statute aimed at restoring and	
(Clean Water Act [CWA]), 33 U.S.C.	maintaining the chemical, physical, and biological integrity of	
§1251–1387	the nation's waters. Primary authority for the implementation	
	and enforcement rests with the U.S. EPA.	
Fish and Wildlife Conservation Act	Installations encouraged to use their authority to conserve and	
(16 U.S.C. § 2901–2911; 94 Stat.	promote conservation of nongame fish and wildlife in their	
1322, P.L. 96-366)	habitats.	
Fish and Wildlife Coordination Act	Directs installations to consult with the USFWS or state or	
(16 U.S.C. § 661 et seq.)	territorial agencies to ascertain means to protect fish and	
	wildlife resources related to actions resulting in the control or	
	structural modification of any natural stream or body of water.	
	Includes provisions for mitigation and reporting.	
Lacey Act of 1900 (16 U.S.C. § 701,	Prohibits the importation of wild animals or birds or parts	
702, 32 Stat. 187, 32 Stat. 285)	thereof, taken, possessed, or exported in violation of the laws	
	of the country or territory of origin. Provides enforcement	
	and penalties for violation of wildlife related Acts or	
	regulations.	
Leases: Non-excess Property of	Authorizes DoD to lease to commercial enterprises federal	
Military Departments, 10 U.S.C. §	land not currently needed for public use. Covers agricultural	
2667, as amended	outleasing program.	
Migratory Bird Treaty Act 16 U.S.C. §	The Act implements various treaties for the protection of	
703–712	migratory birds. Under the Act, taking, killing, or possessing	
	migratory birds is unlawful without a valid permit.	

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description
National Environmental Policy Act of	Requires federal agencies to utilize a systematic approach
1969 (NEPA), as amended; P.L. 91-	when assessing environmental impacts of government
190, 42 U.S.C. § 4321 et seq.	activities. Establishes the use of environmental impact
	statements. NEPA proposes an interdisciplinary approach in a
	decision-making process designed to identify unacceptable or
	unnecessary impacts on the environment. The Council of
	Environmental Quality (CEQ) created Regulations for
	Implementing the National Environmental Policy Act [40
	Code of Federal Regulations (CFR) Parts 1500–1508], which
	provide regulations applicable to and binding on all federal
	agencies for implementing the procedural provisions of
	NEPA, as amended.
National Historic Preservation Act, 16	Requires federal agencies to take account of the effect of any
U.S.C. § 470 et seq.	federally assisted undertaking or licensing on any district,
	site, building, structure, or object included in or eligible for
	inclusion in the National Register of Historic Places (NRHP).
	Provides for the nomination, identification (through listing on
	the NRHP), and protection of historical and cultural
	properties of significance.
National Trails Systems Act (16	Provides for the establishment of recreation and scenic trails.
U.S.C. § 1241–1249)	
National Wildlife Refuge Acts	Provides for establishment of National Wildlife Refuges
	through purchase, land transfer, donation, cooperative
	agreements, and other means.
National Wildlife Refuge System	Provides guidelines and instructions for the administration of
Administration Act of 1966 (16 U.S.C.	Wildlife Refuges and other conservation areas.
§ 668dd–668ee)	
Native American Graves Protection	Established requirements for the treatment of Native American
and Repatriation Act of 1990 (25	human remains and sacred or cultural objects found on federal
U.S.C. § 3001–13; 104 Stat. 3042), as	lands. Includes requirements on inventory, and notification.
amended	
Rivers and Harbors Act of 1899 (33	Makes it unlawful for the U.S. Air Force (USAF) to conduct
U.S.C. § 401 et seq.)	any work or activity in navigable waters of the United States
	without a federal permit. Installations should coordinate with
	the U.S. Army Corps of Engineers (USACE) to obtain
	permits for the discharge of refuse affecting navigable waters
	under National Pollutant Discharge Elimination System
	(NPDES) and should coordinate with the USFWS to review
	effects on fish and wildlife of work and activities to be
	undertaken as permitted by the USACE.
Sale of certain interests in land, 10	Authorizes sale of forest products and reimbursement of the
U.S.C. § 2665	costs of management of forest resources.

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description		
Soil and Water Conservation Act (16	Installations shall coordinate with the Secretary of Agriculture		
U.S.C. § 2001, P.L. 95-193)	to appraise, on a continual basis, soil/water-related resources.		
	Installations will develop and update a program for furthering		
	the conservation, protection, and enhancement of these		
	resources consistent with other federal and local programs.		
Sikes Act (16 U.S.C. § 670a–670l, 74	Provides for the cooperation of DoD, the Department of the		
Stat. 1052), as amended	Interior (USFWS), and the State Fish and Game Department		
	in planning, developing, and maintaining fish and wildlife		
	resources on a military installation. Requires development of		
	an INRMP and public access to natural resources and allows		
	collection of nominal hunting and fishing fees.		
	NOTE: DAFMAN 32-7003 Sec 3.11, INRMP		
	Implementation. As defined in DoDI 4/15.03, use		
	professionally trained natural resources management		
	personnel with a degree in the natural sciences to develop and		
	Implement the installation in KMP. Per Sec. 5.11.1,		
	the Silves Act, 16 U.S.C. & 670 et seg, the Office of		
	Management and Budget Circular No. A 76 Parformance of		
	Commercial Activities 04 August 1983 (Revised 29 May		
	2003) does not apply to the development implementation		
	and enforcement of INRMPs. Activities that require the		
	exercise of discretion in making decisions regarding the		
	management and disposition of government owned natural		
	resources are inherently governmental. When it is not		
	practicable to utilize DoD personnel to perform inherently		
	governmental natural resources management duties, obtain		
	these services from federal agencies having responsibilities		
	for the conservation and management of natural resources.		
DoD Policies, Directives, and Instructions			
DoD Instruction (DoDI) 4150.07,	Implements policy, assigns responsibilities, and prescribes		
DoD Pest Management Program,	procedures for the DoD Integrated Pest Management		
dated 29 May 2008	Program.		
DoDI 4715.1, Environmental Security	Establishes policy for protecting, preserving, and (when		
	required) restoring and enhancing the quality of the		
	environment. This instruction also ensures environmental		
	factors are integrated into DoD decision-making processes		
	that could impact the environment and are given appropriate		
	consideration along with other relevant factors.		
DoDI 4715.03, Natural Resources	Implements policy, assigns responsibility, and prescribes		
Conservation Program	procedures under DoDI 4/15.1 for the integrated		
	management of natural and cultural resources on property		
	under DoD control.		

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description	
Office of Secretary of Defense (OSD)	Provides supplemental guidance for implementing the	
Policy Memorandum, 17 May 2005—	requirements of the Sikes Act in a consistent manner	
Implementation of Sikes Act	throughout DoD. The guidance covers lands occupied by	
Improvement Amendments:	tenants or lessees or being used by others pursuant to a	
Supplemental Guidance Concerning	permit, license, right of way, or any other form of permission.	
Leased Lands	INRMPs must address the resource management on all lands	
	for which the subject installation has real property	
	accountability, including leased lands. Installation	
	commanders may require tenants to accept responsibility for	
	performing appropriate natural resource management actions	
	as a condition of their occupancy or use, but this does not	
	preclude the requirement to address the natural resource	
	management needs of these lands in the installation INRMP.	
OSD Policy Memorandum, 01	Emphasizes implementing and improving the overall INRMP	
November 2004—Implementation of	coordination process. Provides policy on scope of INRMP	
Sikes Act Improvement Act	review, and public comment on INRMP review.	
Amendments: Supplemental Guidance		
Concerning INRMP Reviews		
OSD Policy Memorandum, 10	Provides guidance for implementing the requirements of the	
October 2002—Implementation of	Sikes Act in a consistent manner throughout DoD and	
Sikes Act Improvement Act: Updated	replaces the 21 September 1998 guidance Implementation of	
Guidance	the Sikes Act Improvement Amendments. Emphasizes	
	implementing and improving the overall INRMP coordination	
	process and focuses on coordinating with stakeholders,	
	reporting requirements and metrics, budgeting for INRMP	
	projects, using the INRMP as a substitute for critical habitat	
	designation, supporting military training and testing needs,	
	and facilitating the INRMP review process.	
USAF	Instructions and Directives	
AFI 32-1015, Integrated Installation	This publication establishes a comprehensive and integrated	
<i>Planning</i> , and 32 CFR Part 898, as	planning framework for development/redevelopment of Air	
amended	Force installations. Provides guidance and responsibilities in	
	the Environmental Impact Analysis Process for implementing	
	INRMPs. Implementation of an INRMP constitutes a major	
	federal action and therefore is subject to evaluation through	
	an Environmental Assessment or an Environmental Impact	
	Statement.	

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

Legislation	Description		
DAFMAN 32-7003, Environmental	Implements Air Force Policy Directive (AFPD) 32-70,		
Conservation	Environmental Quality; DoDI 4715.03, Natural Resources		
	Conservation Program; and DoDI 7310.5, Accounting for		
	Sale of Forest Products. It explains how to manage natural		
	resources on USAF property in compliance with federal,		
	state, territorial, and local standards. This Manual also		
	implements DoDI 4710.1, Archaeological and Historic		
	Resources Management. It explains how to manage cultural		
	resources on USAF property in compliance with federal,		
	state, territorial, and local standards.		
AFI 32-10112 Installation Geospatial	This instruction implements Department of Defense		
Information and Services (IGI&S)	Instruction (DoDI) 8130.01, Installation Geospatial		
	Information and Services (IGI&S) by identifying the		
	requirements to implement and maintain an Air Force		
	Installation Geospatial Information and Services program and		
	Air Force Policy Directive (AFPD) 32-10 Installations and		
	Facilities.		
AFPD 32-70, Environmental Quality	Outlines the USAF mission to achieve and maintain		
	environmental quality on all USAF lands by cleaning up		
	environmental damage resulting from past activities, meeting		
	all environmental standards applicable to present operations,		
	planning its future activities to minimize environmental		
	impacts, managing responsibly the irreplaceable natural and		
	cultural resources it holds in public trust and eliminating		
	pollution from its activities wherever possible. AFPD 32-70		
	also establishes policies to carry out these objectives.		
Policy Memo for Implementation of	Outlines the USAF interpretation and explanation of the Sikes		
Sikes Act Improvement Amendments,	Act and Improvement Act of 1997.		
HQ USAF Environmental Office			
(USAF/ILEV) on 29 January 1999			

Table 14-1. Annotated summary of key legislation related to design and implementation of the Integrated Natural Resources Management Plan (INRMP)

14.2 Installation Appendices

14.2.1 Appendix B—Plant Species at New Boston Space Force Station

Scientific Name	Common Name	State Status and Rank
Amauropelta noveboracensis	New York fern	
Anchistea virginica	Virginia chain-fern	
Athyrium filix-femina	Common lady fern	—
Aureolaria pedicularia var. intercedens	Fernleaf yellow false foxglove	—
Bartonia virginica	Yellow screwstem	
Bazzania sp.	Leafy liverwort	—
Berberis thunbergii	Japanese barberry	
Betula alleghaniensis	Yellow birch	
Betula lenta	Black (Sweet) birch	_
Betula papyrifera	Paper birch	—
Betula populifolia	Gray birch	—
Bidens cernua	Bur-marigold, Nodding beggartick	—
Bidens connata	Purplestem beggarticks	—
Bidens frondosa	Devil's beggartick	—
Boehmeria cylindrica	Smallspike false nettle	—
Botrychium dissectum	Lace-frond grape-fern, Cutleaf	—
	grapefern	
Botrychium simplex	Little grape-fern	—
Brachyelytrum erectum	Bearded shorthusk	—
Brachyelytrum erectum var. septentrionale	Northern shorthusk	
Calamagrostis canadensis var. canadensis	Blue-joint	
Calla palustris	Water arum	
Cardamine pensylvanica	Pennsylvania bittercress	
Carex albicans	Whitetinge sedge	—
Carex arctata	Sedge species	—
Carex canescens	Sedge species	
Carex communis	Sedge species	
Carex crinita	Sedge species	
Carex debilis	Sedge species	
Carex folliculata	Sedge species	
Carex gracillima	Sedge species	—
Carex intumescens	Sedge species	
Carex laxiflora	Sedge species	
Carex leptalea	Sedge species	
Carex lupulina var. lupulina	Sedge species	—
Carex lurida	Sedge species	

Scientific Name	Common Name	State Status and Rank
Carex pedunculata	Sedge species	
Carex pensylvanica	Sedge species	
Carex pseudocyperus	Sedge species	
Carex rostrata	Beaked sedge	Endangered, S1
Carex rugosperma	Sedge species	—
Carex swanii	Sedge species	—
Carex trisperma	Three-seeded sedge	—
Carex utriculata	Sedge species	—
Castanea dentata	American chestnut	—
Ceanothus americanus	New Jersey tea	—
Celastrus scandens	American bittersweet	
Cephalanthus occidentalis	Buttonbush	<u> </u>
Cerastium vulgatum	Mouse-ear chickweed	
Chamaedaphne calyculata	Leatherleaf	—
Chelidonium majus	Celandine	—
Chelone glabra	White turtle-head	—
Chenopodium album	Lambsquarters	—
Chenopodium gigantospermum	Mapleleaf goosefoot	—
Chimaphila maculata	Spotted wintergreen, Striped prince's	
	pine	
Chimaphila umbellata	Pipsissewa	
Chrysosplenium americanum	Water-mat, American golden saxifrage	
Cicuta bulbifera	Bulbiferous water hemlock	
Circaea lutetiana	Common (Broadleaf) enchanter's nightshade	
Clematis virginiana	Virgin's bower, Devil's darning needles	—
Clinopodium vulgare	Wild basil	
Clintonia borealis	Clintonia lily, Bluebead	—
Coleataenia longifolia ssp. rigidula	Panic-grass	—
Comandra umbellata	Bastard toadflax	—
Comptonia peregrina	Sweet fern	—
Convolvulus arvensis	Field bindweed	—
Conyza canadensis	Canadian horseweed	—
Coptis trifolia	Goldthread, Threeleaf goldthread	—
Cornus alternifolia	Alternate-leaf dogwood	<u> </u>
Cornus amomum	Knob-styled dogwood, Silky dogwood	—
Cornus obliqua	Narrowleaf dogwood, Silky dogwood	—
Cornus rugosa	Round-leaf dogwood	
Corydalis sempervirens	Pale corydalis, Rock harlequin	
Corylus cornuta	Beaked hazelnut	<u> </u>

Table 14-2. Plant species observed on New Boston Space Force Station (LaGory et al. 1997, Seres	-
Arcadis Joint Venture 2023)	

Scientific Name	Common Name	State Status and Rank
Corvphonteris simulata	Bog fern	
Crataegus sp.	Hawthorn	a
Cuscuta gronovii	Common dodder. Scaldweed	
Cyperus strigosus	False nutsedge. Strawcolored flatsedge	
Cyprinedium acaule	Pink lady's slipper. Moccasin flower	
Cystopteris fragilis	Fragile fern, Brittle bladderfern	
Danthonia compressa	Woodland oat-grass, Flattened oatgrass	
Danthonia spicata	Poverty oat-grass	_
Daucus carota	Queen Anne's lace	
Decodon verticillatus	Water-willow, Swamp loosestrife	
Dendrolycopodium obscurum	Ground pine	_
Dennstaedtia punctilobula	Eastern hay-scented fern	
Deschampsia cespitosa	Tufted hair-grass	<u> </u>
Deschampsia flexuosa	Wavy hair-grass	_
Desmodium canadense	Canadian tick-trefoil	
Desmodium glabellum	Tick-trefoil	
Dianthus armeria	Deptford pink	
Dianthus deltoides	Maiden pink	
Diervilla lonicera	Bush honeysuckle	
Digitaria sp. ^a	Crab grass	a
Diphasiastrum complanatum	Ground-cedar	—
Diphasiastrum digitatum	Southern ground-cedar	—
Diphasiastrum tristachyum	Wiry ground-cedar	—
Diphasiastrum x zeilleri	Hybrid ground-cedar	—
Doellingeria umbellata	Tall flat-topped white aster, Parasol	—
	whitetop	
Drosera intermedia	Spatulate-leaved sundew	
Drosera rotundifolia	Round-leaved sundew	—
Dryopteris carthusiana	Spinulose wood-fern	
Dryopteris clintoniana	Clinton's wood-fern	
Dryopteris cristata	Crested wood-fern	<u> </u>
Dryopteris intermedia	Glandular wood-fern	
Dryopteris marginalis	Marginal wood-fern	<u> </u>
Dryopteris x boottii	Boott's wood-fern	<u> </u>
Dulichium arundinaceum	Three-way sedge	<u> </u>
Elaeagnus umbellata ²	Autumn olive	<u> </u>
Eleocharis acicularis	Needle spike-rush	
Eleocharis palustris	Spike-rush	<u> </u>
Epifagus virginiana	Beech-drops	<u> </u>
Epigaea repens	Trailing arbutus	
Epilobium coloratum	Eastern willow-herb	—

Scientific Name	Common Name	State Status and Rank
Epipactis helleborine	Helleborine	
Equisetum hyemale	Common scouring-rush	_
Equisetum sylvaticum	Woodland horsetail	
Erechtites hieracifolius	American burnweed	
Erigeron strigosus	Rough (prairie) fleabane	
Eriocaulon aquaticum	Sevenangle pipewort	
Eriophorum tenellum	Conifer (fewnerved) cotton-grass	
Eupatorium dubium	Three-nerved (coastal plain) joe pye	
1	weed	
Eupatorium maculatum	Spotted joe pye weed	—
Eupatorium perfoliatum	Common boneset	—
Eupatorium rugosum	White snakeroot	_
Euphorbia maculata	Milk purslane	-
Euthamia graminifolia	Common flat-topped goldenrod	
Fagus grandifolia	American beech	
Fallopia cilinodis	Fringed black bindweed	—
Fallopia convolvulus	Black bindweed	
Fallopia japonica var. japonica	Japanese knotweed	
Fallopia scandens	False buckwheat	
Festuca rubra var. rubra f. rubra	Red fescue	
Fimbristylis autumnalis	Sedge	
Fragaria virginiana	Thick-leaved wild strawberry	
Fraxinus americana	White ash	
Galium asprellum	Rough bedstraw	
Galium palustre	Marsh bedstraw	
Gaultheria hispidula	Creeping snowberry	
Gaultheria procumbens	Wintergreen, Eastern teaberry	—
Gaylussacia baccata	Black huckleberry	
Gaylussacia frondosa	Dangleberry, Blue huckleberry	
Gentiana linearis	Narrowleaf gentian	
Geranium robertianum	Herb-Robert, Robert geranium	—
Glyceria borealis	Northern float-grass	
Glyceria canadensis	Rattlesnake manna-grass	
Glyceria melicaria	Slender manna-grass	
Glyceria septentrionalis	Floating manna-grass	—
Glyceria striata	Fowl manna-grass	—
Gnaphalium uliginosum	Low cudweed	
Hamamelis virginiana	American witchhazel	
Hedyotis caerulea	Bluets	
Helianthemum canadense	Longbranch Frostweed	

Scientific Name	Common Name	State Status and Rank
Hieracium aurantiacum	Orange-red king devil. Orange	
	hawkweed	
Hieracium caespitosum	Yellow king devil, Meadow hawkweed	_
Hieracium paniculatum	Panicled hawkweed	_
Humulus lupulus	Hops	
Hydrocotyle americana	Marsh pennywort	
Hypericum canadense	Lesser Canadian St. John's-wort	
Hypericum ellipticum	Pale St. John's-wort	
Hypericum gentianoides	Orange-grass	
Hypericum mutilum	Dwarf St. John's-wort	
Hypericum perforatum	Common St. John's-wort	_
Hypericum punctatum	Spotted St. John's-wort	_
Hypericum virginicum	Marsh St. John's-wort	7
Hypopitys monotropa	Pinesap	_
Ilex verticillata	Swamp (common) winterberry	
Impatiens capensis	Orange touch-me-not, Jewelweed	
Iris versicolor	Larger blue flag	
Isoetes tenella	Spiny-spored quillwort	
Isotria medeoloides	Small whorled pogonia	Threatened, S2
Juglans cinerea	Butternut	—
Juncus canadensis	Canadian rush	—
Juncus marginatus	Grassleaf rush	—
Juncus tenuis	Path rush	—
Juniperus communis	Common juniper	—
Juniperus virginiana	Eastern red cedar	—
Kalmia angustifolia	Sheep laurel	—
Kalmia latiflolia	Mountain laurel	—
Lactuca canadensis	Canada lettuce	—
Lechea intermedia	Largepod pinweed	—
Leersia oryzoides	Rice cut-grass	—
Lemna minor	Lesser duckweed	—
Lepidium virginicum	Poorman pepperweed	—
Lespedeza capitata	Bush clover	—
Lespedeza hirta	Hairy lespedeza	—
Lespedeza intermedia	Wand lespedeza	—
Leucanthemum vulgare	Ox-eye daisy	—
Lilium philadelphicum	Wood lily	<u> </u>
Lindera benzoin	Spicebush	
Lindernia dubia	False pimpernel	
Lobelia cardinalis	Cardinal flower	
Lobelia inflata	Indian tobacco	—

Table 14-2. Plant species observed on New Boston Space Force Station (LaGory et al. 1997, Seres	-
Arcadis Joint Venture 2023)	

Scientific Name	Common Name	State Status and Rank
Lobelia spicata	Spiked lobelia	
Lolium perenne	Perennial ryegrass	
Lolium temulentum	Darnel	
Lonicera canadensis	Fly honeysuckle	
Ludwigia palustris	Marsh seedbox, Marsh primrose-	
	willow	
Luzula multiflora	Common wood-rush	—
Lycopodiella inundatum	Bog clubmoss	—
Lycopodium annotinum	Stiff clubmoss	—
Lycopodium clavatum	Common clubmoss	—
Lycopodium lagopus	One-cone clubmoss	-
Lycopus americanus	Cut-leaf water-horehound	_
Lycopus uniflorus	Northern water-horehound	-
Lyonia ligustrina	Maleberry	
Lysimachia quadrifolia	Whorled loosestrife	—
Lysimachia terrestris	Bog, Yellow loosestrife	—
Lythrum salicaria	Purple loosestrife	—
Maianthemum canadense	Canada mayflower	—
Maianthemum racemosum ssp. racemosum	False Solomon's-seal	—
Medeola virginiana	Indian cucumber-root	—
Melampyrum lineare	Narrowleaf cow-wheat	—
Mentha arvensis	Field mint	—
Micranthes virginiensis	Virginia (Early) saxifrage	—
Mimulus ringens	Allegheny monkey flower	—
Mitchella repens	Partridge-berry	—
Mollugo verticillata	Carpetweed	—
Monotropa uniflora	Indian pipe	—
Muhlenbergia uniflora	Fall drop-seed	—
Myrica gale	Sweet gale	—
Najas flexilis	Nodding water nymph	—
Nasturtium officinale	Watercress	—
Nemopanthus mucronatus	Common mountain holly	
Nuphar variegata	Varigated yellow pond-lily	
Nuttallanthus canadensis	Canada (Oldfield) toadflax	—
Nymphaea odorata	American waterlily	—
Nymphoides cordata	Little floating heart	
Nyssa sylvatica	Black gum	—
Oenothera biennis	Common evening-primrose	
Oenothera parviflora	Northern evening-primrose	
Onoclea sensibilis	Sensitive fern	
Oryzopsis asperifolia	Rough mountain-rice	—

Scientific Name	Common Name	State Status and Rank
Osmunda cinnamomea	Cinnamon fern	
Osmunda claytoniana	Interrupted fern	
Osmunda regalis	Royal fern	_
Ostrya virginiana	Eastern hop-hornbeam	
Oxalis stricta	Common yellow wood-sorrel	_
Packera aurea	Golden ragwort	
Panax trifolius	Dwarf ginseng	—
Panicum capillare	Panic grass, Annualwitch grass	
Panicum clandestinum	Deertongue witchgrass	—
Panicum virgatum	Old switch panic-grass	
Parthenocissus quinquefolia	Virginia creeper	_
Parthenocissus vitacea	Grape woodbine	
Persicaria arifolia	Halberd-leaf tear thumb	7
Persicaria careyi	Carey's smartweed	_
Persicaria lapathifolium	Dock-leaf smartweed	
Persicaria maculosa	Lady's thumb	
Persicaria pensylvanica	Pennsylvania smartweed	
Persicaria posumbu	Oriental lady's thumb	—
Persicaria punctata	Dotted smartweed	—
Persicaria sagittata	Arrow-leaf tear thumb	—
Phegopteris polypodioides	Beech fern	—
Phleum pratense	Timothy grass	—
Phlox paniculata	Fall phlox	—
Picea mariana	Black spruce	—
Pinus resinosa	Red pine	—
Pinus rigida	Pitch pine	—
Pinus strobus	Eastern white pine	—
Plantago major	Common plantain	—
Poa pratensis	Kentucky bluegrass	—
Pogonia ophioglossoides	Snakemouth orchid	—
Polygala paucifolia	Flowering wintergreen	—
Polygala polygama	Bitter milkwort	
Polygala sanguinea	Blood milkwort	
Polygonatum biflorum	Solomon's-seal	—
Polygonatum pubescens	Hairy Solomon's-seal	—
Polygonella articulata	Coastal jointweed	
Polygonum aviculare ssp. depressum	Common knotweed	
Polygonum aviculare	Yard knotweed	<u> </u>
Polypodium virginianum	Common polypody	<u> </u>
Polystichum acrostichoides	Christmas fern	
Pontederia cordata	Pickerel weed	—

Table 14-2. Plant species observed on New Boston Space Force Station (LaGory et al. 1997, Seres	-
Arcadis Joint Venture 2023)	

Scientific Name	Common Name	State Status and Rank
Populus tremuloides	Ouaking aspen	
Portulaca oleracea	Common purslane	_
Potamogeton epihydrus	Ribbonleaf pondweed	_
Potamogeton oakesianus	Oakes' pondweed	_
Potentilla argentea	Silver cinquefoil	_
Potentilla canadensis	Dwarf cinquefoil	
Potentilla recta	Roughfruit cinquefoil	—
Potentilla simplex	Old-field cinquefoil	
Prenanthes trifoliolata	Gall-of-the-earth	
Proserpinaca palustris	Marsh mermaid-weed	
Prunella vulgaris	Common self-heal	_
Prunus pensylvanica	Pin cherry	_
Prunus serotina	Wild black cherry	7
Prunus virginiana	Chokecherry	_
Pteridium aquilinum	Bracken fern	
Pyrola elliptica	Waxflower shinleaf	
Quercus alba	White oak	
Quercus coccinea	Scarlet oak	—
Quercus ilicifolia	Bear oak	—
Quercus rubra	Red oak	—
Quercus velutina	Black oak	—
Ranunculus bulbosus	Bulbous buttercup	—
Ranunculus hispidus	Bristly buttercup	—
Raphanus raphanistrum	Wild radish	—
Rhexia virginica	Meadow-beauty	—
Rhododendron canadense	Rhodora	—
Rhododendron prinophyllum	Roseshell azalea	—
Rhus copallina	Shining sumac	—
Rhus glabra	Smooth sumac	—
Rhus typhina	Staghorn sumac	—
Rhynchospora sp. ^a	Beakrush	a
Ribes glandulosum	Skunk currant	—
Ribes triste	Swamp red currant	—
Robinia pseudoacacia	Black locust	—
Rosa multiflora	Multiflora rose	—
Rosa nitida	Northeastern (Shining) rose	
Rosa palustris	Swamp rose	—
Rosa virginiana	Virginia rose	<u> </u>
Rubus allegheniensis	Allegheny blackberry	<u> </u>
Rubus hispidus	Bristly dewberry	
Rubus idaeus	Red raspberry	<u> </u>

Table 14-2. Plant species observed on New Boston Space Force Station (LaGory et al. 1997, Seres-	
Arcadis Joint Venture 2023)	

Scientifie Name	Common Nama	State Status
Pubus agaidentalis	Plack reaphormy	
Rubus occudentatis	Durple flowering reenhorry	<u> </u>
Rubus satosus	Satosa blackbarry	
Rubus selosus Budhaalig hinta	Plack and Sugar	—
Ruabeckia hiria	Diack-eyed Susaii	—
Rumex acelosella	A aid water errowhead	—
Sagittaria latifolia	Acid-water arrowhead	—
Salin on a	Willow	a
Sambucus nigra spp. canadensis	A marican alderbarry	
Sambucus nigra spp. canadensis	Furencen red elderberry	
Samaconia pumpunca	Bitcher plant	
Sanafras albidum	Saggefreg	
Schodonorus pratensis	Sassanas Meadow fescue	
Scheuchzeria palustris	Rennock rush	
Scheenenlastus americanus	Olney bulruch	
Schoenopiecius americanas	Green bulruch	
Scirpus autovirens	Wool grass	
Scleranthus annuus	Annual knawel	
Scieraninas annuas	Hooded (Marsh) skulleen	
Scutellaria lateriflora	Blue skullcap	
Selaginella rupestris	Ledge (Rock) spikemoss	
Sisvrinchium atlanticum	Eastern blue-eved grass	
Sium sugue	Water_parspip	
Smilax herbacea	Herbaceous greenbrier	
Smilax rotundifolia	Common greenbrier	
Solanum dulcamara	Bittersweet nightshade	
Solidago canadensis	Canada goldenrod	
Solidago juncea	Early goldenrod	
Solidago nemoralis	Gray goldenrod	
Solidago puberula	Downy goldenrod	
Solidago sauarrosa	Stout goldenrod	
Sorbus americana	American mountain-ash	
Sparganium americanum	American bur-reed	
Sparganium emersum	European bur-reed	
Spergularia rubra	Sand-spurrey	
Sphagnum magellanicum	Magellan's sphagnum	
Spiraea alba	White meadowsweet	<u> </u>
Spiraea alba var. latifolia	Smooth meadowsweet	<u> </u>
Spiraea tomentosa	Steeplebush	
Spiranthes cernua	Nodding ladies'-tresses	—

Scientific Name	Common Name	State Status and Rank
Symphyotrichum cordifolium yar.	Arrow-leaved aster. Common blue	
sagittifolius	wood aster	
Symphyotrichum undulatum	Clasping heart-leaved aster. Wayyleaf	
	aster	
Taxus canadensis	Canada yew	
Thalictrum pubescens	Tall meadow-rue	
Thelypteris palustris	Marsh fern	
Tiarella cordifolia	Heartleaf foamflower	
Tilia americana	American basswood	
Toxicodendron radicans	Poison ivy	
Toxicodendron vernix	Poison sumac	_
Trichostema dichotomum	Bluecurls	
Trientalis borealis	Starflower	-
Trifolium arvense	Rabbit-foot clover	
Trifolium aureum	Golden clover	—
Trifolium hybridum	Alsike clover	—
Trifolium pratense	Red clover	—
Trifolium repens	White clover	—
Trillium undulatum	Painted trillium	—
Tsuga canadensis	Eastern hemlock	—
Typha latifolia	Common cattail	—
Utricularia geminiscapa	Hiddenfruit bladderwort	—
Utricularia intermedia	Flatleaf (Mountain) bladderwort	—
Utricularia vulgaris	Common bladderwort	—
Uvularia sessilifolia	Sessile-leaf bellwort	—
Vaccinium angustifolium	Lowbush-blueberry	—
Vaccinium corymbosum	Highbush-blueberry	—
Vaccinium macrocarpon	Large cranberry	—
Vaccinium pallidum	Hillside-blueberry	
Veratrum viride	Green false hellebore	
Verbena hastata	Swamp verbena, Blue vervain	
Verbena urticifolia	White verbena	—
Veronica officinalis	Common gypsyweed	—
Veronica scutellata	Marsh speedwell	—
Viburnum acerfolium	Maple-leaf viburnum	
Viburnum lantanoides	Hobblebush	—
Viburnum nudum var. cassinoides	Withe-rod	
Viburnum dentatum	Arrow-wood	
Viburnum recognitum	Northern arrow-wood	<u> </u>
Vicia cracca	Cow vetch	<u> </u>
Vicia tetrasperma	Lentil vetch	—
Table 14-2. Plant species observed on New Boston Space Force Station (LaGory et al. 1997, Seres-Arcadis Joint Venture 2023)

Scientific Name	Common Name	State Status and Rank
Viola blanda	Sweet white violet	—
Viola lanceolata	Bog white violet	—
Viola sagittata	Arrowleaf violet	—
Viola sororia	Common blue violet	—
Vitis labrusca	Fox grape	—
Vitis riparia	Riverbank grape	—
Vitis x novae-angliae	Pilgrim grape	—
Wisteria floribunda	Japanese wisteria	
Woodsia ilvensis	Rusty cliff-fern	_

Notes: Table adapted in 2024 with species status updates. Updated with NHNHB (2022) and New Hampshire Code of Administrative Rules 300.

State Rank Codes: S1= Critically imperiled because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction; S2= Imperiled because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.

^a A species within the genus listed is protected in New Hampshire.

14.2.2 Appendix C—Moth Species at New Boston Space Force Station

Scientific Name Common Name State						
	Geometridae					
Anacamptodes ephyraria	Pale-winged gray					
Anacamptodes vellivolata	Large purplish gray	_				
Anavitrinella pampinaria	Common gray					
Besma quercivoraria	Oak besma	_				
Campaea perlata	Pale beauty					
Caripeta angustiorata	Brown pine looper moth	_				
Caripeta piniata	Northern pine looper moth					
Cyclophora packardi	Packard's wave	_				
Cyclophora pendulinaria	Sweetfern geometer					
Dysstroma citrata	No common name	-				
Ecliptopera silaceata albolineata	No common name	_ /				
Epirrhoe alternata	White-banded toothed carpet					
Euchlaena irraria	Least-marked euchlaena					
Euchlaena serrata	The saw-wing	_				
Euchlaena tigrinaria	Mottled euchlaena					
Eugonobapta nivosaria	Snowy geometer					
Eulithis explanata	White eulithis					
Euphyia unangulata intermediata	Sharp-angled carpet					
Eupithecia ssp.	No common name					
Eutrapela clemataria	Curve-toothed geometer					
Horisme intestinata	Brown bark carpet					
Hypagyrtis esther	Esther moth					
Hypagyrtis unipunctata	One-spotted variant					
Iridopsis larvaria	Bent-line gray					
Itame loricaria julia	No common name					
Itame pustularia	Lesser maple spanworm moth					
Lambdina fiscellaria	Hemlock looper moth					
Lomographa semiclarata	Bluish spring moth					
Lomographa vestaliata	White spring moth					
Lytrosis unitaria	Common lytrosis	—				
Melanolophia canadaria	Canadian melanolophia	—				
Metanema inatomaria	Pale metanema					
Metarranthis duaria	Ruddy metarranthis					
Metarranthis obfirmaria	Yellow-washed metarranthis					
Orthonama obstipata	The gem					
Oxydia vesulia transponens	No common name					
Petrophora divisata	Common petrophora					
Plagodis alcoolaria	Hollow-spotted plagodis					
Plagodis serinaria	Lemon plagodis	_				

Table 14-3. Moth species observed on New Boston Space Force Station (LaGory et al. 1997)

Scientific Name	Common Name	State Rank	
Probole amicaria	Friendly probole	—	
Prochoerodes transversata	Large maple spanworm moth		
Protoboarmia porcelaria	Porcelain gray	_	
Scopula limboundata	Large lace-border		
Semiothisa bisignata	Red-headed inchworm moth	—	
Semiothisa minorata	Minor angle	—	
Semiothisa pinistrobata	White pine angle		
Semiothisa signaria dispuncta	Pale-marked angle	_	
Tetracis cachexiata	White slant-line	—	
Tetracis crocallata	Yellow slant-line	-	
Xanthorhoe ferrugata	Red twin-spot	_	
L	asiocampidae		
Malacosoma americanum	East tent caterpillar moth	—	
Malacosoma disstria	Forest tent caterpillar moth	-	
Phyllodesma americana	Lappet moth	_ /	
Tolype laricis	No common name	_	
	Saturniidae	•	
Dryocampa rubicunda	Rosy maple moth		
	Sphingidae		
Ceratomia undulosa	Waved sphinx	SGCN	
Hemaris thysbe	Hummingbird clearwing	—	
Lapara bombycoides	Northern pine sphinx	—	
Paonias excaecatus	Blinded sphinx		
Sphinx poecila	No common name	—	
Xylophanes tersa	Tersa sphinx	—	
	Arctiidae	1	
Cisseps fulvicollis	Yellow-collared scape moth		
Grammia virgo	Virgin tiger moth		
Halysidota tessellaris	Banded tussock moth	<u> </u>	
Haploa clymene	Clymene moth	—	
Holomelina ferruginosa	Rusty holomelina	—	
Holomelina laeta treatii	Joyful holomelina	—	
Holomelina opella	Tawny holomelina	—	
Hypoprepia fucosa	Painted lichen moth	—	
Phragmatobia assimilans	Large ruby tiger moth	—	
Spilosoma virginica	Virginian tiger moth	—	
	Noctuidae		
Abagrotis alternata	Greater red dart		
Acronicta haesitata	Hesitant dagger moth	—	
Acronicta hasta	Speared dagger moth		
Acronicta increta	No common name		
Acronicta lobeliae	Lobelia dagger moth		
Acronicta ovata	Ovate dagger moth		

Table 14-3. Moth species observed on New Boston Space Force Station (LaGory et al. 1997)

Scientific Name	Common Name	State Rank
Allotria elonympha	False underwing	—
Amphipyra pyramidoides	Copper underwing	—
Anomogyna badicollis	Northern variable dart	—
Apharetra purpurea	Blueberry sallow	
Autographa precationis	Common looper moth	
Balsa labecula	White-blotched balsa	_
Bellura gortynoides	White-tailed diver	
Bleptina caradrinalis	Bent-winged owlet	_
Bomolocha baltimoralis	Baltimore bomolocha	
Caenurgina crassiuscula	Clover looper moth	-
Callopistria cordata	Silver-spotted fern moth	_
Catocala andromedae tristis	Andromeda underwing	_
Catocala connubialis	Connubial underwing	-
Catocala ilia	Ilia underwing	-
Catocala praeclara	Praeclara underwing	_ /
Catocala relicta	White underwing	
Catocala sordida	Sordid underwing	
Catocala ultronia	Ultronia underwing	
Cerma cerintha	Tufted bird-dropping moth	_
Chaetaglaea sericea	Silky sallow	
Chrysanympha formosa	Formosa looper moth	
Chytonix palliatricula	Cloaked marvel	
Colocasia propinquilinea	Closebanded yellowhorn	
Cosmia calami	American dun-bar	—
Diarsia jucunda	Smaller pinkish dart	—
Drasteria grandirena	No common name	
Elaphria festivoides	Festive midget	
Enargia decolor	No common name	—
Epiglaea apiata	No common name	—
Euagrotis illapsa	Snowy dart	
Eucirroedia pampina	Scalloped sallow	
Feltia jaculifera	Dingy cutworm moth	
Graphiphora haruspica	No common name	
Herptagrotis phyllophora	No common name	
Homorthodes furfurata	No common name	
Hypersstrotia secta	Black-patched graylet	
Hyppa xylinoides	Common hyppa	—
Idia aemula	Common idia	—
Idia americalis	American idia	
Idia diminuendis	Orange-spotted idia	
Idia lubricalis	Glossy black idia	—
Idia rotundalis	No common name	
Idia scobialis	Smoky idia	_

Table 14-3. Moth species observed on New Boston Space Force Station (LaGory et al. 1997)

Scientific Name	Common Name	State Rank
Iodopepla u-album	No common name	—
Lacinipolia implicata	Implicit arches	
Leucania pseudargyria	False wainscot	
Leuconycta diphteroides	Green leuconycta	—
Noctua pronuba	No common name	
Nola cilcoides eurypennis	Blurry-patched nola	—
Nola pustulata	No common name	-
Orthodes crenulata	Rustic quaker	_
Oruza albocostaliata	The white-edge	—
Pangrapta decoralis	Decorated owlet	—
Panthea furcilla	Eastern panthea	—
Papaipema eupatori	No common name	_
Parallelia bistriaris	Maple looper moth	-
Phlogophora periculosa	No common name	-
Platyperigea multifera	Speckled rustic	_ /
Polia detracta neoterica	Disparaged arches	—
Polia purpurissta	Purple arches	
Polygrammate hebraeicum	Hebrew moth	—
Protolampra brunneicollis	Brown-collared dart	—
Raphia frater	The brother	
Renia flavipunctalis	No common name	
Sunira ralla	No common name	
Tricholita signata semitropicae	Signate quaker	—
Trichosilia geniculata	No common name	
Ulolonche modesta	No common name	—
Xestia bicarnea	Pink-spotted dart	—
Xestia dolosa	Greater black-letter dart	—
Xestia normaniana	Norman's dart	—
Xestia smithii	Smith's dart	—
Zanclognatha jacchusalis	No common name	
Zanclognatha laevigata	Variable zanclognatha	
Zanclognatha ochreipennis	Wavy-lined zanclognatha	

Table 14-3. Moth species observed on New Boston Space Force Station (LaGory et al. 1997)

Notes: Table adapted in 2024 with species status updates, including NHFDG (2024f).

Definition: SGCN= Species of Greatest Conservation Need

14.2.3 Appendix D—Butterfly and Skipper Species at New Boston Space Force Station

Table 14-4. Butterfly and skipper species observed on New Boston Space Force Station (LaGory et al. 1997; S. Najjar, NBSFS, personal communication, 2024)

Scientific Name	Common Name	Federal and State Rank
	Papilionidae	
Papilio canadensis	Canadian swallowtail	
Papilio glaucus	Tiger swallowtail	
Papilio polyxenes	Black swallowtail	_
Papilio troilus	Spicebush swallowtail	-
	Pieridae	
Colias philodice	Clouded sulphur	
Pieris rapae	Cabbage butterfly	—
	Lycaenidae	
Celastrina ladon	Spring azure	-
Everes comytas	Eastern tailed blue	
Lycaena phlaeas	American copper	
Satyrium calanus	Banded hairstreak	
	Nymphalidae	
Cercyonis pegala	Common wood nymph	-
Coenonympha tullia	Common ringlet	
Danaus plexippus	Monarch	C, S5, SC, SGCN
Enodia anthedon	Northern pearly eye	
Limenitis antipoda astyanax	Red-spotted purple	—
Limenitis archippus	Viceroy	
Limenitis arthemis arthemis	White admiral	
Megisto cymela	Little wood satyr	—
Nymphalis antipoda	Mourning cloak	
Nymphalis vau-album	Compton's tortoiseshell	
Phyciodes selenis	Pearl crescent	
Satyrodes appalachia	Appalachian brown	
Satyrodes eurydice	Meadow-eyed brown	—
Speryeria atlantis	Atlantis fritillary	—
Speyeria aphrodite	Aphrodite fritillary	—
Speyeria cybele	Great spangled fritillary	—
	Hesperiidae	·
Ancyloxpha numitor	Least skipper	
Atrytone logan	Delaware skipper	
Epargyreus clarus	Silver-spotted skipper	
Erynnis icelus	Dreamy duskywing	—
Erynnis juvenalis	Juvenal's duskywing	
Euphyes vestris	Dun skipper	—
Pholisora catullus	Common sootywing	—
Poanes massasoit	Mulberry wing	

Table 14-4. Butterfly and skipper species observed on New Boston Space Force Station (LaGory et al. 1997; S. Najjar, NBSFS, personal communication, 2024)

Scientific Name	Common Name	Federal and State Rank
Polites mystic	Long dash	
Pompeius verna	Little glassywing	
Wallengrenia egeremot	Northern broken dash	

Notes: Table adapted in 2024 with species status updates, including NHNHB (2024) and NHFDG (2024*f*). **Definitions:** C= Federal candidate species for listing under Endangered Species Act; SC= New Hampshire Species of Special Concern; SGCN= New Hampshire Species of Greatest Conservation Need; S5= Demonstrably widespread and secure, although the species may be quite rare in parts of its range, particularly at the periphery.

14.2.4 Appendix E—Bird Species at New Boston Space Force Station

		Federal	State	State	Neotropical
Scientific Name	Common Name	Status	Status	Rank	Migrant
Accipiter cooperi	Cooper's hawk		—		NIM
Accipiter gentilis	Northern goshawk		_	83	NTM
Accipiter striatus	Sharp-shinned	—	-	-	NTM
	hawk				
Actitis macularia	Spotted sandpiper		SGCN		NTM
Agelaius phoeniceus	Red-winged		-	-	NTM
	blackbird				
Aix sponsa	Wood duck	_	_		—
Anas carolinensis	Green-winged teal				NTM
Anas discors	Blue-winged teal	_	-	—	NTM
Anas platyrhynchos	Mallard	_			NTM
Anas rubripes	American black	-	SGCN	_	
	duck				
Anthus rubescens	American pipit		SGCN,	S2B	NTM
			SC		
Antrostomus vociferus	Eastern whip-		SGCN,	S3	NTM
	poor-will		SC		
Archilochus colubris	Ruby-throated	_	_	_	NTM
	hummingbird				
Ardea herodias	Great blue heron		—	_	
Aythya collaris	Ring-necked duck		—	_	NTM
Bombycilla cedrorum	Cedar waxwing	_	—	[NTM
Bonasa umbellus	Ruffed grouse	_	SGCN	—	
Botaurus lentiginosus	American bittern	—		S3B	NTM
Branta canadensis	Canada goose	—			
Buteo jamaicensis	Red-tailed hawk				NTM
Buteo lineatus	Red-shouldered		_		NTM
	hawk				
Buteo platypterus	Broad-winged		_		NTM
	hawk				
Butorides virescens	Green heron		_		
Cardinalis cardinalis	Northern cardinal		_		
Acanthis flammea	Common redpoll				
Spinus pinus	Pine siskin				NTM
Spinus pinus Spinus tristis	American	 			NTM
Spirius 11 15115	goldfinch				11111
Haemorhous mexicanus	House finch				
Haemorhous nurpureus	Purple finch				NTM
Cathartas aura	Turkov vulturo			<u> </u>	NTM
Camaries aura	Turkey vulture				

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

Scientific Name	Common Nama	Federal	State Status	State Bank	Neotropical Migrant
Catharus fuscescens	Veerv				NTM
Catharus guttatus	Hermit thrush				NTM
Catharus ustulatus	Swainson's thrush				NTM
Certhia americana	Brown creeper				NTM
Cervle alcoon	Belted kingfisher				NTM
Chaetura pelagica	Chimney swift		SGCN	_	NTM
Charadrius vooifarous	Killdoor		SGCN		NTM
Circus hudsonius	Northern harrier		E		NTM
		_	E, SGCN	SID	
Coccyzus americanus	Yellow-billed	-		-	NTM
	cuckoo				
Coccyzus erythropthalmus	Black-billed	_	SGCN	—	NTM
	cuckoo				
Colaptes auratus	Northern flicker		SGCN	—	NTM
Contopus virens	Eastern wood	-	_		NTM
	pewee				
Corvus brachyrhynchos	American crow				—
Corvus corax	Common raven	-			—
Cyanocitta cristata	Blue jay	_	—		
Setophaga caerulescens	Black-throated	-	-	—	NTM
	blue warbler				
Setophaga castanea	Bay-breasted	_	SGCN		NTM
	warbler				
Setophaga coronata	Yellow-rumped	_	—	—	NTM
	warbler				
Setophaga discolor	Prairie warbler	—	SGCN		NTM
Setophaga fusca	Blackburnian		—		NTM
	warbler				
Setophaga magnolia	Magnolia warbler		—		NTM
Setophaga palmarum	Palm warbler		—		NTM
Setophaga pensylvanica	Chestnut-sided		—	—	NTM
	warbler				
Setophaga petechia	Yellow warbler		—		NTM
Setophaga pinus	Pine warbler		—		NTM
Setophaga striata	Blackpoll warbler		_	—	NTM
Setophaga tigrina	Cape May warbler	—	SGCN		NTM
Setophaga virens	Black-throated		_	·	NTM
	green warbler				
Dolichonyx oryzivorus	Bobolink		SGCN		NTM
Dryocopus pileatus	Pileated				—
	woodpecker				
Dumetella carolinensis	Gray catbird				NTM

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

		Federal	State	State	Neotropical
Scientific Name	Common Name	Status	Status	Rank	Migrant
Empidonax alnorum	Alder flycatcher				NIM
Empidonax flaviventris	Y ellow-bellied		—		NTM
	flycatcher		COON		
Empidonax minimus	Least flycatcher		SGCN		NTM
Empidonax traillii	Willow flycatcher	—	_		NTM
Euphagus carolinus	Rusty blackbird		SGCN, SC	S3B	
Falco peregrinus	Peregrine falcon	-	T, SGCN	S2	
Falco sparverius	American kestrel	-	SC, SGCN	S3B	NTM
Gallinago gallinago	Common snipe	-		- \	NTM
Geothylpis trichas	Common yellowthroat			-	NTM
Haliaeetus leucocephalus	Bald eagle	-	SC	S2	—
Hesperiphona vespertina	Evening grosbeak	_	SGCN		
Hirundo rustica	Barn swallow		_		NTM
Hylocichla mustelina	Wood thrush	_	SGCN	_	NTM
Icterus galbula	Northern oriole,	_	—	—	NTM
_	Baltimore oriole				
Junco hyemalis	Dark-eyed junco	_	_		NTM
Lanius excubitor	Northern shrike	_			
Larus argentatus	Herring gull	—			
Lophodytes cucullatus	Hooded merganser		_		NTM
Meleagris gallopavo	Wild turkey	_	—		
Melospiza georgiana	Swamp sparrow		—	—	NTM
Melospiza lincolnii	Lincoln's sparrow				NTM
Melospiza melodia	Song sparrow		—		NTM
Mergus merganser	Common merganser	_	—	—	
Mimus polyglottos	Northern mockingbird	—		—	NTM
Mniotilta varia	Black-and-white warbler	_		—	NTM
Molothrus ater	Brown-headed cowbird				NTM
Myiarchus crinitus	Great-crested flycatcher	—	—	—	NTM
N/A	Brewster's warbler (hybrid)	—	—	—	NTM

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

		Federal	State	State	Neotropical
Scientific Name	Common Name	Status	Status	Rank	Migrant
N/A	Black		—		
	duck/Mallard				
	hybrid				
Pandion haliaetus	Osprey		—	—	
Setophaga americana	Northern parula		—	—	NTM
Poecile atricapillus	Black-capped	—	-		
	chickadee				
Baeolophus bicolor	Tufted titmouse				
Passer domesticus	House sparrow	—	(-	_	—
Passerculus sandwichensis	Savannah sparrow	—	-		NTM
Passerina cyanea	Indigo bunting	—	_	_	NTM
Petrochelidon pyrrhonota	Cliff swallow	-	T, SGCN	S3B	NTM
Phalacrocorax auritus	Double-crested	_		—	NTM
	cormorant				
Pheucticus ludovicianus	Rose-breasted	_	_	—	NTM
	grosbeak				
Picoides pubescens	Downy	_		—	
-	woodpecker				
Picoides villosus	Hairy woodpecker		-	—	
Pipilo erythrophtalmus	Rufous-sided	_	_	—	NTM
	towhee				
Piranga olivacea	Scarlet tanager	_	SGCN		NTM
Podilymbus podiceps	Pied-billed grebe		Τ,	S2B	—
			SGCN		
Quiscalus quiscula	Common grackle		SGCN		—
Rallus limicola	Virginia rail		_	·	NTM
Corthylio calendula	Ruby-crowned				NTM
	kinglet				
Regulus satrapa	Golden-crowned				—
	kinglet				
Riparia riparia	Bank swallow		SGCN,	S3B	NTM
			SC		
Sayornis phoebe	Eastern phoebe				NTM
Scolopax minor	American		SGCN		—
	woodcock				
Seiurus aurocapillus	Ovenbird		_		NTM
Parkesia motacilla	Louisiana	—	—	—	NTM
	waterthrush				
Parkesia noveboracensis	Northern	—		—	NTM
	waterthrush				
Setophaga ruticilla	American redstart	_			NTM

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

		Federal	State	State	Neotropical
Scientific Name	Common Name	Status	Status	Rank	Migrant
Sialia sialis	Eastern bluebird		—	—	NTM
Sitta canadensis	Red-breasted	—	—	—	—
	nuthatch				
Sitta carolinensis	White-breasted	—	—	—	
	nuthatch				
Sphyrapicus varius	Yellow-bellied	—	-	-	NTM
	sapsucker				
Spizella arborea	American tree			—	—
	sparrow				
Spizella passerina	Chipping sparrow	—	-		NTM
Spizella pusilla	Field sparrow	-	SGCN	-	
Stelgidopteryx serripennis	Northern rough-	-	_	-	NTM
	winged swallow				
Strix varia	Barred owl	_		—	
Sturnella magna	Eastern	—	Τ,	S3B	NTM
	meadowlark		SGCN		
Sturnus vulgaris	European starling	—	_		
Tachycineta bicolor	Tree swallow		SGCN	_	NTM
Tringa melanoleuca	Greater yellowlegs	_	—		NTM
Tringa solitaria	Solitary sandpiper				NTM
Troglodytes aedon	House wren	_	_	_	NTM
Troglodytes troglodytes	Winter wren	_	_	—	
Turdus migratorius	American robin	—	_		NTM
Tyrannus tyrannus	Eastern kingbird		SGCN	_	NTM
Leiothlypis celata	Orange-crowned	_	—	—	NTM
	warbler				
Leiothlypis peregrina	Tennessee warbler	_	SGCN		NTM
Setophaga pinus	Blue-winged	—	SGCN	—	NTM
	warbler				
Leiothlypis ruficapilla	Nashville warbler	—	SGCN	—	NTM
Vireo flavifrons	Yellow-throated	—	—	—	NTM
	vireo				
Vireo gilvus	Warbling vireo	—	—	—	NTM
Vireo olivaceus	Red-eyed vireo	—	—		NTM
Vireo philadelphicus	Philadelphia vireo	_	—	—	NTM
Vireo solitarius	Solitary vireo	—	—	—	NTM
Cardellina canadensis	Canada warbler	—	SGCN	—	NTM
Cardellina pusilla	Wilson's warbler				NTM
Zenaida macroura	Mourning dove				NTM
Zonotrichia albicollis	White-throated		SGCN		NTM
	sparrow				

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

Scientific Name	Common Name	Federal Status	State Status	State Rank	Neotropical Migrant
Zonotrichia leucophrys	White-crowned	—		—	NTM
	sparrow				

Table 14-5. Bird species observed on New Boston Space Force Station (LaGory et al. 1997)

Notes: Table adapted in 2024 with species status updates, including NHNHB (2024) and NHFDG (2024*f*). State ranks do not confer any official or legal status to a species. These ranks are assigned by the New Hampshire Natural Heritage Bureau (NHNHB 2024) to provide information on the population status of species within the state.

Definitions: SGCN= Species of Greatest Conservation Need; E= Endangered; T= Threatened; SC= Species of Concern; NTM= species is a neotropical migrant; —= Species is not a neotropical migrant.

State Rank Codes: S1= Critically imperiled because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. S2= Imperiled because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. S3= Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors (in the range of 21 to 100 occurrences).

State Rank Modifiers: B= Breeding status for a migratory species; N= Non-breeding status for a migratory species; ?= Rank is uncertain due to insufficient information at the state or global level.

14.2.5 Appendix F—Faunal Species at New Boston Space Force Station

		Federal	State	State
Scientific Name	Species	Status ¹	Status	Rank
	Fishes			
Ameiurus nebulosus	Brown bullhead	—		
Anguilla rostrata	American eel		SGCN, SC	S3
Catostomus commersoni	White sucker			
Enneacanthus obesus	Banded sunfish	—	SGCN, SC	S3
Erimyzon oblongus	Creek chubsucker	—		
Esox niger	Chain pickerel			
Lepomis gibbosus	Pumpkinseed			
Lepomis macrochirus	Bluegill	—	—	
Luxilus cornutus	Common shiner	—		
Micropterus salmoides	Largemouth bass	—	—	
Notemigonus crysoleucas	Golden shiner	—	—	
Noturus insignis	Margined madtom	—	—	
Oncorhynchus mykiss	Rainbow trout	—	—	—
Perca flavescens	Yellow perch			
Salvelinus fontinalis	Brook trout	—	SGCN, SC	
	Amphibians			
Ambystoma maculatum	Spotted salamander	—		
Bufo americanus	American toad			
Eurycea bislineata	Two-lined salamander			
Pseudacris crucifera	Spring peeper			
Dryophytes versicolor	Gray treefrog			

Table 14-6. Fish, amphibian, reptile, and mammal species observed on New Boston Space ForceStation (PES 1995; LaGory et al. 1997, 2002)

	g ;	Federal	State	State
Scientific Name	Species	Status	Status	Rank
Notophthalmus viridescens	Red-spotted newt			
Plethodon cinereus	Red-backed			
	salamander			
Lithobates catesbiana	Bullfrog			
Lithobates clamitans	Green frog	—		
Lithobates palustris	Pickerel frog		—	
Lithobates sylvatica	Wood frog		<u> </u>	
	Reptiles		1	
Chelydra serpentina	Snapping turtle	—		
Chrysemys picta	Painted turtle			
Clemmys guttata	Spotted turtle	UR	T, SGCN	S2
Emydoidea blandingii	Blanding's turtle	UR	E, SGCN	S1
Glyptemys insculpta	Wood turtle	UR	SC, SGCN	S 3
Heterodon platirhinos	Eastern hognose snake		E, SGCN	S1
Nerodia sipedon	Northern water snake			
Opheodrys vernalis	Smooth green snake		SGCN, SC	S3
Sternotherus odoratus	Musk turtle			
Storeria occipitomaculata	Redbelly snake			
Thamnophis sauritus	Ribbon snake		SGCN	
Thamnophis sirtalis	Garter snake			
·	Mammals		•	
Alces alces	Moose		SGCN	
Blarina brevicauda	Short-tailed shrew			
Canis latrans	Coyote			
Castor canadensis	Beaver			
Clethrionomys gapperi	Red-backed vole			
Eptesicus fuscus	Big brown bat		SGCN	
Erethizon dorsatum	Porcupine			
Felis rufus	Bobcat			
Lasionycteris noctivagans	Silver-haired bat		SGCN, SC	S3B
Lasiurus borealis	Red bat		SGCN, SC	S3?B
Lasiurus cinereus	Hoary bat	URFY28	SGCN, SC	S3B
Lepus americanus	Snowshoe hare		SGCN	
Lontra canadensis	River otter			
Marmota monax	Woodchuck			
Mephitis mephitis	Striped skunk		1	I
Microtis pennsylvanicus	Meadow vole		1	
Mustela frenata	Long-tailed weasel		<u> </u>	
Mustela vison	Mink		—	_
Myotis leibii	Eastern small-footed		E, SGCN	S1
	bat			

Table 14-6. Fish, amphibian, reptile, and mammal species observed on New Boston Space Force Station (PES 1995; LaGory et al. 1997, 2002)

		Federal	State	State
Scientific Name	Species	Status	Status	Rank
Myotis lucifugus	Little brown bat	UR	E, SGCN	S1
Myotis septentrionalis	Northern long-eared	Е	E, SGCN	S1
	bat			
Odocoileus virginianus	White-tailed deer	—	—	—
Ondatra zibethicus	Muskrat	—	—	
Pekania pennanti	Fisher	—	SGCN	
Perimyotis subflavus	Tricolored bat	PE	E, SGCN	S1
Peromyscus leucopus	White-footed mouse			
Procyon lotor	Raccoon	—	—	
Tamias striatus	Eastern chipmunk	—	—	
Tamiasciurus hudsonicus	Red squirrel	—	—	—
Ursus americanus	Black bear			
Vulpes vulpes	Red fox	—		

Table 14-6. Fish, amphibian, reptile, and mammal species observed on New Boston Space Force Station (PES 1995; LaGory et al. 1997, 2002)

Notes: Table adapted in 2024 with species status updates, including NHNHB (2024), NHFDG (2024*f*), and USFWS (2024*a*). State ranks do not confer any official or legal status to a species. These ranks are assigned by the New Hampshire Natural Heritage Bureau (NHNHB 2024) to provide information on the population status of species within the state.

Definitions: E= Endangered; T= Threatened; SGCN= Species of Greatest Conservation Need; SC= Species of Concern; UR= Under review for federal listing.

State Rank Codes: S1= Critically imperiled because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. S2= Imperiled because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. S3= Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors (in the range of 21 to 100 occurrences).

State Rank Modifiers: B= Breeding status for a migratory species; ?= Rank is uncertain due to insufficient information at the state or global level.

14.2.6 Appendix G—Blanding's Turtle Management Plan

New Boston Space Force Station NH Blanding's Turtle Management Plan

March 8, 2012

INTRODUCTION

Blanding's turtles are a state listed endangered turtle found on New Boston Space Force Station (NBSFS). The Blanding's habitat use, nesting areas and seasonal movement have been document by use of telemetry beginning in 2004 (see figure below). Approximately 30 adult Blanding's have been documented; with many individuals followed through multiple seasons. There is concern that Blanding's turtle populations in New Hampshire may exist in very low densities and that the species is declining due to a variety of factors including habitat loss and fragmentation, and increased road building and consequent increases in road kill (Innis et al. 2008). Congdon et al. (2000) published data that have implicated predation by raccoons, fox, coyotes, opossums and skunks as a major causal factor in nesting failure.

THREATS SPECIFIC TO NBSFS

Predation

Predation appears to be the main impediment to successful reproduction at NBSFS; incidental observations point to skunks being a major cause of turtle nest destruction near known Blanding's turtle nesting sites.

Road-kill

Mortality caused by road-kill has been well documented at NBSFS. Two adults have been found road killed on Bedford/Chestnut Hill Road adjacent to the installation, one juvenile on Bedford Road west of Klondike Corner, and several hatchlings were documented road-killed on base since 2004.



Blanding's Locations 2004-2011





NATURAL RESOURCES ACTIVITIES

Several of the natural resources management activities have some potential to result in Blanding's mortality including logging and prescribed fire. In the Massachusetts Forestry Conservation Management Practices for Blanding's Turtles (draft) publication maintaining forested habitat in association with vernal pools and wetlands is considered essential for the conservation of Blanding's Turtles. The impacts of timber harvesting are recognized as having significantly fewer lasting effects as compared to other permanent changes in land use, such as residential and commercial development. The publication indicates, "Certain precautions should be taken during timber harvesting in order to maintain the long-term viability of Blanding's Turtle populations within forested areas. The greatest concern during forestry operations are turtles being run over and crushed by motorized logging equipment. This could occur when turtles are moving between wetland types, nesting, estivating, or hatchlings are emerging and moving to wetlands. Direct mortality could also occur when wetlands are being harvested. Habitat modification surrounding vernal pools is also a concern."

Currently NBSFS does not harvest in wetlands and typically and typically avoids wetland impacts when developing timber harvests. Harvesting near vernal pools and other wetlands has been limited through the use of buffers of limited percentage of basal area harvested. Logging is not seasonally restricted at NBSFS and turtles could be unintentionally run over by harvesting equipment or log trucks. The area of highest use by Blanding's at NBSFS has not been harvested since at least 1960; the area was clearcut around 1959 for a line of sight.

The use of prescribed fire could result in unintentional take of Blanding's. The burn units closest to the areas of highest Blanding's activity were burned in November, which is outside the peak period of terrestrial movement. Other burn units near the Green Tree and Maddening Ponds area closest to known Blanding's habitat are typically burned in early spring; the units have no document use by Blanding's but the possibility exists of unintentionally burning a turtle.

GROUNDS MAINTENANCE ACTIVITIES

NBSFS Roads and Grounds maintain mowed lawns in improved areas on base. The restricted area has a documented nesting site north of Building 100. During terrestrial nesting movement in early June adult Blanding's are subject to lawn-mowing equipment. After emergence in September and October hatchlings are subject to lawn-mowing equipment. Other potential road maintenance that could impact Blanding's include road grading in nesting areas and removal of beaver debris from culverts or disturbing beaver dams during hibernation.

Management goals

- Reduce nest predation
- Eliminate further road-kill of adults and hatchlings
- Reduce risk of harm from Natural Resources activities
- Reduce risk of harm from grounds maintenance activities
- Continue documentation of Blanding's through tagging and telemetry

Implementation

Goal: Reduce nest predation

Reduction of nest predation will be accomplished through predator removal and nest screening. Skunks, raccoons, fox, opossum and coyotes will be removed from known nesting areas in the Northeast portion of

NBSFS through shooting and trapping. An annual depredation permit from NH Fish and Game will be required to implement predator reduction activities. Possibly enlist help from USDA Wildlife Services for predator removal activities.

Goal: Reduce further road-kill

Road-kill of adults has been documented on state and town roads adjacent to NBSFS. NBSFS will advocate through NH Fish and Game for placement of signs during peak movement times in areas which Blanding's are present. Additionally, NBSFS is beginning to implement the recommendations in Options to Reduce Road Mortality of Blanding's Turtles at New Boston Space Force Station, New Hampshire. Where possible vertical curbing has been eliminated as pavement modification projects take place and new curbing is being limited to Cape Cod style curbing.

New projects proposed at NBSFS which would increase traffic or create new roads should be analyzed carefully for impacts to Blanding's. No additional traffic should be routed through the area between Building 103 and Green Tree Reservoir because of high Blanding's use.

Goal: Reduce risk of harm from Natural Resources activities

Timber harvesting on NBSFS occurs sporadically usually on 2-3 year intervals. Stand entrance is typically no more frequent that 10-15 years and silvicultural practices typically include thinning in even aged stands, single tree selection in mixed forest and small clearcuts. Timber harvest design in recent years has included recognizing significant vernal pools and protecting them by providing a no harvest buffer around them or by removing a limited amount of the basal area. Skid trails are developed to avoid wetland crossing thereby negating the possibility of crushing hibernating turtles. No timber harvest is planned in the core Blanding's area in the Northeast portion of the installation due to the poor timber quality.

Prescribed burns implemented by NBSFS do have limited potential to take Blanding's turtles. Burns typically are conducted outside the core habitat in the Northeast portion of the base. If the units in the northeast portion of the installation are burned again they will be conducted in early spring (April) or late fall (November) to reduce the possibility of burning Blanding's. Additionally, the burn crew will be briefed to look out for turtles in the burn area.

Goal: Reduce risk of harm from grounds maintenance activities

Some of the risk to Blanding's from grounds maintenance activities can be controlled by scheduling road maintenance activities outside the nesting season. Road grading in know nesting areas should be limited to avoid June-Oct when eggs in the nest are present. Removal of beaver debris must be limited to ice off conditions when turtles are normally active (April-October).

Lawn mowing in known Blanding's nesting areas and travel routes should be minimized during the nesting season (June 1-20) to prevent adult being hit by a mower. Alternately, Natural Resources staff can periodically check the area for presence of Blanding's.

Goal: Continue documentation of Blanding's through tagging and telemetry

The continuation of long-term monitoring of Blanding's at NBSFS should provide information of the relative success of management activities. Monitoring from 2004-2010 has documented a relative scarcity of juvenile age Blanding's on the installation and problems with nesting success. Through the use of PIT tags and telemetry on subset of the population we should be able to establish increases in reproduction and continue to identify threats.

REFERENCES

- Congdon J.J., Nagel, R.D., Kinney, O.M., Oentoski, M., Avery, H.W., Van Loben Sels, R.C., and Tinkle, D.W., 2000, Nesting Ecology and Embryo Mortality: Implications for Hatchling Success and Demography of Blanding's Turtles (*Emydoidea blandingii*), Chelonian Conservation and Biology, 3(4): 569-579.
- Innis, R.J., Babbit, K.L., and Kanter, J.J., 2008, Home Range and Movement of Blanding's Turtles (*Emydoidea blandingii*) in New Hampshire, Northeastern Naturalist, 15(3):431-444
- Natural Heritage and Endangered Species Program. 2007. Massachusetts Forestry Conservation Management Practices for Blanding's Turtles. Draft (August 2007). Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts, USA.
- Walston, J. L., and K. E. LaGory. 2010. Options to Reduce Blanding's Turtle Mortality at New Boston Air Force Station New Hampshire, Environmental Science Division, Argonne National Laboratory, Argonne IL.

14.2.7 Appendix H—Eastern Hognose Snake Management Plan

New Boston Space Force Station NH Eastern Hognose Snake Management Plan

July 3, 2013

INTRODUCTION

Eastern hognose snakes were identified on NBSFS during the late 1990s by Natural Resources staff. A multi-year telemetry study was implemented starting in 2004 through 2007. A report was developed by Argonne National Labs detailing hognose movements during 2006 and 2007 (LaGory et al. 2008). During the period from 2004-2008 hognose utilized much of NBSFS, both mortality and reproduction was also documented.

THREATS SPECIFIC TO NBSFS

Recreation

Eastern Hognose are subject to being road-killed and killed by people with snake phobias.

Military Training

Military training activities may result in road-kills.

NATURAL RESOURCES ACTIVITIES

Prescribed burning and timber harvesting activities could result in hognose mortality. Long-term benefits from habitat management probably outweigh the short-term risk associated with these activities.

Management goals

- Protect overall habitat
- Document and mark individuals

Implementation

Goal: Protect overall habitat

Limit recreational development in areas with higher hognose usage as document in LaGory et al. 2008. Educate recreational users about snakes and limit unnecessary road use by recreational visitors through the placement of new gates on roads.

Goal: Document and mark individuals

Natural Resource personnel will document all hognose incidentally encountered at NBSFS. Adult and subadult hognose will be implanted with PIT tags if possible. Locations will be collected for inclusion in the installation GIS.

REFERENCES

LaGory, K.E., L.J. Walston, C. Goulet, C. Andrews, R.A. Van Lonkhuyzen, and M. Nesta. 2008. Movement and Habitat use of Eastern Hognose Snakes at New Boston Air Force Station, New Hampshire, New Hampshire. Argonne National Laboratory, Environmental Assessment Division, Argonne, Ill., Jan. 14.2.8 Appendix I—Small-footed Bat Management Plan

New Boston Space Force Station NH Small-footed Bat Management Plan

July 3, 2013

INTRODUCTION

Eastern Small-footed bat are a state listed endangered bat found on New Boston Space Force Station (NBSFS). The bats were first identified in a 2002 installation wide bat survey (LaGory et al. 2002). Subsequently bats were captured and followed in a radio telemetry study ending in 2007 (LaGory et al. 2008). During the study Joe English Hill was identified as the primary roost site on NBSFS. A post white-nose study in 2013 resulted in several bats being captured and two fitted with transmitters (one male and one female). The female roost site was identified in the Joe English Hill cliff face by Natural Resources personnel.

THREATS SPECIFIC TO NBSFS

Recreation

Joe English Hill was a popular rock climbing site for southern New Hampshire. NBSFS prior to 2001 allowed organized groups to climb the face with USAF permission. Additionally, some level of illegal climbing occurred and potentially continues. Currently all recreational rock climbing on Joe English has been prohibited by a Commander's policy letter.

Military Training

Joe English Hill has been used by military units to practice assault climbing and repelling. Training activity has been minimal due to UXO remediation activities. Eventually military training activities on the cliff may increase leading to possible disturbance of the bats.

NATURAL RESOURCES ACTIVITIES

Prescribed burning on Joe English Hill has occurred to the north of the cliff faces used by the Eastern Smallfooted bat. A prescribed burn was planned for the area surrounding the cliff face to maintain oak and other fire dependent species. After informal consultation with NH Fish and Game the burn was deferred due to concerns about direct and indirect impacts to the bat.

Management goals

- Protect roost site
- Periodically study population

Implementation

Goal: Protect roost site

Limit recreational access to Joe English Hill for rock climbing; continue to allow low levels of military climbing. Consult with NH Fish and Game to develop additional protection measures.

Limit prescribed burns to areas away from roost sites and avoid indirect impacts from smoke.

Goal: Periodically study population

Sponsor surveys and academic studies on Eastern Small-footed bats at NBSFS. Conduct survey on 10 year or less interval to document presence of bats and document any changes in health status (presence of scarring related to white nose, etc.).

REFERENCES

- LaGory, K.E., L.J. Walston, D.S. Reynolds, and C. Andrews. 2008. Radiotelemetry Study of Eastern Small-Footed Bats and a Hoary Bat at New Boston Air Force Station, New Hampshire, New Hampshire. Argonne National Laboratory, Environmental Assessment Division, Argonne, Ill., Sep.
- LaGory, K.E., D.S. Reynolds, and J.A. Kuiper. 2002. A Survey of the Bats of New Boston Air Force Station, New Hampshire. Argonne National Laboratory, Environmental Assessment Division, Argonne, Ill., Dec.

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14.2.9 Appendix J—New Hampshire National Guard Request to Construct a Small Arms Range at New Boston Space Force Station Memo and New Hampshire National Guard New Boston Range Proposal



DEPARTMENT OF THE AIR FORCE UNITED STATES SPACE FORCE HEADQUARTERS SPACE OPERATIONS COMMAND

12 September 2024

MEMORANDUM FOR SF/COO

FROM: SpOC/CC 150 Vandenberg Street, Suite 1105 Peterson SFB CO 80914-4020

SUBJECT: New Hampshire National Guard Request to Construct a Small Arms Range at New Boston Space Force Station

1. The New Hampshire National Guard (NHNG) requested permission to obtain a license to construct a small arms range complex at New Boston Space Force Station (NBSFS). Recognizing the potential value of such a complex, Space Operations Command (SpOC) does not oppose the funding and execution of a detailed planning charrette by NHNG and the National Guard Bureau (NGB) to determine the feasibility of a small arms range. The planning charrette is required to refine the proposed range location and determine the full impact to existing installation facilities and Space Force expansion plans. Upon completion of the study, SpOC and the appropriate Department of the Air Force agencies will review the results to assess potential issues and challenges.

2. The following areas must be addressed by the planning charrette to determine if the proposed project can move forward.

a. Operational Impact: Due to NBSFS's 24/7 support to Space Force operations and the Joint Force, it is critical the proposed range complex does not interfere with the current operations areas, radio tower, boresight, or Roby Hill as depicted on the attached memo. Any impact to these critical operational zones or future expansion sites will introduce unacceptable risk.

b. Unexploded Ordnance (UXO): Given the historical use of NBSFS for bombing and strafing training, there is a high likelihood of significant UXOs in the proposed development area. A comprehensive UXO survey is required to ensure personal safety and the feasibility of construction in the proposed area.

c. Geography/Topography: The geographical and topographical characteristics of the proposed site must be thoroughly evaluated to assess the impact on current operations and to determine if a small arms range complex can be integrated without disruption to future Space Force missions or impacts on the local community.

d. Environmental and Other Assessments; NHNG and NGB are required to provide the resources necessary to complete all environmental and other assessments in accordance with applicable laws, regulations, and policy. This includes compliance with the National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA).

VIA VINCIMUS

3. SpOC is strongly committed to continuing the partnership with NHNG and NGB as they work to determine the feasibility of conducting small arms training on NBSFS. My POC is Dr. Brian Kehl, HQ SpOC/DCG-S, DSN 692-3352 or brian.kehl.1@spaceforce.mil.

DAVID N. MILLER, JR. Lieutenant General, USSF Commander

Attachment: SF/S3/6 Operational Areas on NBSFS Memo, 24 Jun 20

cc: USSF/S8PX HQ SpOC/DCG-S HQ SpOC/CCX (LA) HQ SpOC S3/6C SBD 1/CC DEL 6/CC 23 SOPS/CC



NHNG New Boston Range Proposal

16JUL2024

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- ~28 acres for all ranges and support structures combined.
- ~700 acres of combined PSDZ.
- Range located on a southwestern ridge.
- Range area contains a
 - 32 Lane 25m
 M4/M16 Zero
 - 15 Lane 31m M17 CPQC range (not shown as it exists within shown PSDZ)

M4 / M16 Zero & M17 Qual. Ranges PSDZ



ARF = Automated Record Fire [Range] PSDZ = Probabilistic Surface Danger Zone CPQC = Combat Pistol Qualification Course OP1 = Option 1

*PSDZ Imagery Generated by US Army Combined Arms Center



- ~28 acres for all ranges and support structures combined.
- ~700 acres of combined PSDZ.
- Range located on a southwestern ridge.
- Range area contains a
 - 16 Lane 300m
 M4/M16 ARF

ARF = Automated Record Fire [Range]

Automated Record Fire Range PSDZ



OP1 = Option 1

PSDZ = Probabilistic Surface Danger Zone

*PSDZ Imagery Generated by US Army Combined Arms Center

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3



Probabilistic Surface Danger Zone (PSDZ) Development Notes

- Initial analysis of proposed ranges at New Boston Space Force Station, NH
- Projectile 5.56 M855A1 Ball
- Firing Site Offset: 1/1.5m
- Target Height Offset: 1m
- Analysis will change after terrain is altered

OP1 = Option 1



NHARNG Current Weapon Statistics

 NHARNG remains delinquent on qualifications due to lack of in State capabilities and lack of ranges

NHARNG Weapons Density vs Qualification Data (Past Year) a/o 20240711

	Rifle Requirements		
System	Required On-Hand/Assi	gned Qualified %	
M4/M4A1	1222	1582 459 38%	
M16A2	208	37 10 5%	
M16A4	12	12 12 100%	
Total	1442	1631 481	
	Pistol Requirements		
System	Required On-Hand/Assi	gned Qualified %	
M17	312	285 207 66%	
M9	84	103 11 13%	
Total	396	388 218	



TPO Ranges PSDZ Team

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TPO = TRADOC Proponent Office

PSDZ = Probabilistic Surface Danger Zone

GIS = Geographic Information System

15.0 ASSOCIATED PLANS

- 15.1 Tab 1—Wildland Fire Management Plan
- 15.2 Tab 2—Integrated Cultural Resources Management Plan (ICRMP)
- 15.3 Tab 3—Integrated Pest Management Plan (IPMP)
- 15.4 Tab 4—Invasive Plant Species Control Plan (IPSCP)
- 15.5 Tab 5—Hemlock Woolly Adelgid Management Plan (HWA)