



INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

NAVAL AIR STATION PATUXENT RIVER COMPLEX'S

NAVAL RECREATION CENTER SOLOMONS, MARYLAND



July 2024

FINAL



INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Air Station Patuxent River Complex's Naval Recreation Center Solomons, Maryland

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2024

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Naval Facilities Engineering Command - Washington Region

Document is Cleared for Public Release

**INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
Naval Air Station Patuxent River Complex
Naval Recreation Center Solomons, Maryland**

APPROVAL

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

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

For Plan Period: 2023-2028

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For Plan Period: 2023-2028

Concurring Agency – U.S. Fish and Wildlife Service

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Naval Air Station Patuxent River Complex
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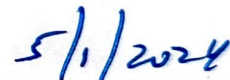
By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

For Plan Period: 2023-2028

Concurring Agency – Maryland Department of Natural Resources



Brian Eyler
Associate Director
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DEPARTMENT OF THE NAVY
NAVAL AIR STATION
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5090
Ser N4/309
28 Sep 22

From: Commanding Officer, Naval Air Station Patuxent River
To: Mr. James R. Swift, Planning and Conservation Branch Head, Environmental Division

Subj: APPOINTMENT AS INSTALLATION NATURAL RESOURCES MANAGER

Ref: (a) OPNAVINST 5090.1E – Environmental Readiness Program Manual
(b) Sikes Act, as amended through P.L. 111-84, 28 October 2009

1. Effective immediately, you are hereby designated authority and responsibilities as Installation Natural Resources Program Manager for the Naval Air Station (NAS) Patuxent River; Webster Field Annex (WFA), St Inigoes, Maryland; and Navy Recreation Center (NRC), Solomons, Maryland. For the purpose of this appointment, "NAS Complex" refers collectively to NAS Patuxent River, WFA, and NRC.
2. Per reference (a), your duties include ensuring that the Commanding Officer (CO) is informed of natural resources issues, conditions of objectives contained within the Integrated Natural Resources Management Plans (INRMPs) pertaining to the NAS Complex, and potential or actual conflicts between mission requirements and natural resources mandates.
3. In addition, you are responsible for the inherently governmental decisions made on behalf of the NAS Complex and CO with regards to compliance with reference (b) and INRMP implementation. This includes supervision of specific technical experts to manage and/or carry out natural resources programs/responsibilities such as:
 - a. Providing biological expertise to assist air operations and aviation safety officers in preparing and implementing bird/animal aircraft strike hazard (BASH) plans to reduce strikes and ensure consistency with the INRMPs.
 - b. Protecting listed species, species at risk and species of concern, and their habitats.
 - c. Managing installation lands to ensure, consistent with the military mission, wetlands protection, soil conservation, floodplain management, invasive species control, environmental and economically beneficial landscaping, and agricultural out leasing.
 - d. Managing installation forestlands by restoration, enhancement and improvement of forest resources and related ecosystems;
 - e. Protecting and managing fish and wildlife resources.

Subj: APPOINTMENT AS INSTALLATION NATURAL RESOURCES MANAGER

f. Providing and managing outdoor recreational opportunities (e.g., hunting and fishing) consistent with installation security, military mission, and sustainable natural resources management.

4. This appointment will remain in effect until your permanent transfer from this command, or it is rescinded in writing by the CO.

A handwritten signature in red ink, appearing to read "DKingsley", with a stylized flourish extending to the right.

D. W. KINGSLEY

EXECUTIVE SUMMARY

The Department of Defense (DoD) owns and manages approximately 8.8 million acres of land in the United States (CRS 2020). Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain and implement an Integrated Natural Resources Management Plan (INRMP). This INRMP was prepared for Naval Recreation Center (NRC) Solomons, Maryland, under the command of Naval Air Station (NAS) Patuxent River, Maryland, in accordance with DoD Instruction 4715.03 (Natural Resources Conservation Program); DoD Manual 4715.03 (INRMP Implementation Manual); Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1 (series) (Environmental and Natural Resources Program Manual); 16 U.S. Code (USC) §670 a-f (Sikes Act), as amended; and 32 Code of Federal Regulations (CFR) Part 190 (DoD Natural Resources Management Program). The NAS Patuxent River Complex, which includes the Naval Air Station, Webster Outlying Field, NRC Solomons, and Bloodsworth Island Range, is referred to as the Complex or the Station throughout this document.

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

In accordance with the Sikes Act, this INRMP was prepared in cooperation with the Secretary of the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service (USFWS), and the head of the Maryland Department of Natural Resources (MDNR). Because of this coordination effort, the INRMP reflects the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources. Future involvement of the state and federal wildlife agencies will ensure continued mutual agreement and cooperation in managing the natural resources at NRC Solomons.

Each year, this INRMP and the projects contained within will be reviewed and rated against established Navy metrics by the installation natural resources staff and state and federal wildlife agencies. In addition, the INRMP will be updated as needed (at least annually) to provide ongoing management direction based on scientific data and a higher level of knowledge of the NRC Solomons ecosystems and their interrelationships. The long-term goal of the INRMP is to bring together and integrate all management activities (e.g., land, wildlife, and rare species) in a way that sustains, promotes, and restores the health and integrity of NRC Solomons ecosystems. Integrated ecosystem management is sound stewardship and will, over the long term, ensure the maximum return of biological diversity and habitat quality.

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

- Management of Rare, Threatened, and Endangered Species and Species of Concern
- Wetlands Management
- Fish and Wildlife Management
- Migratory Bird Management
- Forest Management
- Vegetative Management
- Invasive Species Management
- Land Management
- Outdoor Recreation
- Wildland Fire Management
- Conservation Law Enforcement
- Coastal Zone Management
- Floodplains Management
- Cultural Resources Management

Standard INRMP program elements that are not applicable to NRC Solomons (such as critical habitat management, Bird/Animal Aircraft Strike Hazard [BASH] reduction, agricultural outleasing, and training of natural resources personnel) have not been included herein.

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

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ACRONYMS AND ABBREVIATIONS

ATMO	Atlantic Targets Marine Operations
ATR	Atlantic Test Range
BASH	Bird/Animal Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CAA	Clean Air Act
CAP	Climate Action Plan
CBP	Chesapeake Bay Program
CFR	Code of Federal Regulations
CN	Environmental Planning and Conservation
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRMA	Commander, Navy Region Mid-Atlantic
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoN	Department of the Navy
EAP	Encroachment Action Plan
EFH	essential fish habitat
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
EPRWeb	Environmental Readiness Program Requirements Web
ERL	Environmental Readiness Level
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FEA	Final Environmental Assessment
FEC	Facilities Engineering Command

FEMA	Federal Emergency Management Agency
FICMNEW	Federal Interagency Committee for the Management of Noxious and Exotic Weeds
FR	Federal Register
FY	fiscal year
GCN	greatest conservation need
GHG	greenhouse gas
GIS	Geographic Information System
GPS	Global Positioning System
GRX	GeoReadiness Explorer
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
INST	Instruction
IPM	integrated pest management
ISA	International Society of Arboriculture
JLUS	Joint Land Use Study
LNG	liquefied natural gas
MBTA	Migratory Bird Treaty Act
MDA	Maryland Department of Agriculture
MDE	Maryland Department of Environment
MDNR	Maryland Department of Natural Resources
MDSPGP	Maryland State Programmatic General Permit
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer Systems
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MWR	Morale, Welfare and Recreation
NAB	Naval Amphibious Base
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command

NDW	Naval District Washington
NEPA	National Environment Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOLTF	Naval Ordnance Laboratory Test Facility
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NR	Natural Resources (Program)
NRC	Navy Recreation Center
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Operating Instruction
ppt	parts per thousand
REC	Regional Environmental Coordinators
RPM	Remedial Project Manager
RSC	Regulatory Services Coordination Office
RT&E	rare, threatened, and endangered
RV	recreational vehicle
SAV	submerged aquatic vegetation
SCA	Student Conservation Association, Inc.
SECNAV	Secretary of the Navy
SHPO	State Historic Preservation Office
STWG	Scientific and Technical Working Group
SWAP	State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code

USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance
VIMS	Virginia Institute of Marine Science

1. OVERVIEW

A. Purpose

In accordance with Department of Defense (DoD) Instruction (DoDI) 4715.03 (Natural Resources Conservation Program), Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1 (series) (Environmental and Natural Resources Program Manual), Naval Facilities Procedural Manual 73 (NAVFAC P-73), and 16 U.S. Code (USC) §670a-f (Sikes Act), the Department of the Navy (DoN) is required to develop and implement an Integrated Natural Resources Management Plan (INRMP) that ensures a balanced and integrated program for the management of natural resources. This INRMP was prepared to facilitate no net loss in the capability of Naval Recreation Center (NRC) Solomons lands to support the military mission of the Naval Air Station (NAS) Patuxent River Complex, while protecting and enhancing installation natural resources for multiple use, sustainable yield and biological integrity. The purpose of this INRMP is to ensure consistency with the use of NRC Solomons to support military preparedness, while providing for the conservation and rehabilitation of natural resources on military installations and the sustainable multipurpose use of the resources including hunting, fishing, trapping, and non-consumptive uses (Sikes Act). This INRMP must also ensure that natural resources management practices comply with all pertinent laws and regulations and are in accordance with Navy policy which, as summarized from OPNAVINST 5090.1 (series), is to incorporate ecosystem management as the basis for planning and management.

B. Scope

This INRMP addresses natural resources management on those lands and near-shore areas at NRC Solomons that are:

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

The INRMP primarily addresses natural resources management of the undeveloped, natural areas at NRC Solomons, but also applies to natural resources issues in developed areas such as support and administrative facilities and recreational areas.

Other properties under the command of NAS Patuxent River include Webster Outlying Field, Bloodsworth Island Range, Point Lookout Tracking Station, and other associated properties. Combined, these properties form the NAS Patuxent River Complex (also referred to as the Complex or the Station throughout this document). Natural resources management at the other NAS Patuxent River properties is addressed under separate INRMPs.

As funding becomes available for environmental projects or as mitigation is needed for future activities, this INRMP will serve as a priority list to better enable the Natural Resources Program to practice effective ecosystem management. This Plan is not meant as a definitive list of projects

that will be automatically funded upon enactment. It provides guidance to the resource managers on strategies to employ for the next five years. The Navy will implement recommendations and projects in the INRMP within the framework of regulatory compliance, national Navy mission obligations, anti-terrorism/force-protection limitations, and funding constraints. Any requirement for the obligation of funds for projects in this INRMP shall be subject to the availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable federal law, including the Anti-Deficiency Act, 31 U.S.C. § 341, et seq.

C. Goals and Objectives

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

- Responsible parties and stakeholders concerned with natural resources management at NRC Solomons are identified.
- Current and future military mission and requirements, and resulting constraints on natural resources, are described.
- Policies, management philosophy and objectives of natural resources management at NRC Solomons are clearly stated.
- Information regarding the existing biological and physical conditions and desired future conditions of the installation and the surrounding area is provided.
- Key natural resources management issues and concerns at the installation and in the surrounding area are identified.
- Projects and management actions required to meet the objectives of natural resources management and ensure no net loss in the capability of installation lands to support the military mission are identified and described.
- Scheduling priorities and funding opportunities for the implementation of natural resources projects and management actions are identified.

In an effort to meet these goals, objectives are established throughout this INRMP, specific to individual resources and/or programs. Subsequent management recommendations and projects are then linked to the objectives.

D. Responsibilities

Once they are designed and written, plans must then be implemented if goals and objectives are to be transferred from paper to the resources to which they apply. The first step in executing the NRC Solomons INRMP is to submit project summaries and cost estimates through the Environmental Readiness Program Requirements Web (EPRWeb) environmental budgeting program. This is done three to four years in advance of the fiscal year for which funding is being requested. The next step is to prepare an execution plan for each upcoming fiscal year, which is also completed in EPRWeb. DoD Instruction 4715.03, Enclosure 4, provides detailed guidance on natural

resources management and project prioritization (DoD 2018a). Additional information is contained in the Implementation section of this INRMP.

The responsibility for the development, revision, and implementation of INRMPs is shared by several command elements. The roles and responsibilities for Navy natural resources management are described in OPNAVINST 5090.1 (series) and in the DoD guidance for INRMP development and implementation (DoD 2018b). A summary of responsibilities for natural resources management at the NAS Patuxent River Complex follows.

Chief of Naval Operations (CNO) is the Echelon I command and serves as the principle leader to provide policy, guidance and resources for the development, revision and implementation of INRMPs. CNO also represents the Navy on issues and resolves high-level conflicts regarding development and implementation of INRMPs.

Commander, Navy Installations Command (CNIC) is the Echelon II command under CNO, responsible for Navy-wide shore installation management. CNIC has overall shore installation management responsibility and authority as the budget submitting office for installation support and is the Navy point of contact for installation policy and program execution oversight (CNIC 2022). CNIC must ensure the programming of resources necessary to maintain and implement INRMPs; participate in the development and revision of INRMPs; and provide oversight for all natural resources program elements.

The DoD Regional Environmental Coordinators (REC) support the DoD/DoN mission through coordination, communication and facilitation of environmental issues and activities when these activities affect two or more DoD installations within an Environmental Protection Agency (EPA) region. Commander, Navy Region Mid-Atlantic (CNRMA) is the DoD/Navy REC for military installations within Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington, D.C. (CNRMA 2022).

Naval Facilities Engineering Systems Command Washington (NAVFAC Washington) is the regional facilities command and supports the mission of CNRMA and CNIC with technical authority, project management, and contracts management as requested. NAVFAC Washington also facilitates agency review of and cooperative agreements supporting INRMPs, and reviews and signs INRMPs to ensure technical sufficiency.

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

The NAS Patuxent River Environmental and Conservation Planning (CN) Branch Manager, who is part of NAVFAC Washington, is primarily responsible for implementing this INRMP and coordinating with other personnel on the installation. Implementation responsibilities include identifying personnel, internal or external to the installation, with expertise to perform the work

identified; creating EPRWeb project exhibits and identifying the appropriate funding source to accomplish the projects; and ensuring installation personnel are familiar with the contents of this INRMP. The CN Branch Manager is also responsible for ensuring this plan is reviewed in coordination with the U.S. Fish and Wildlife Service (USFWS) and the Maryland Department of Natural Resources (MDNR).

E. Staff Resources

The Station's Natural Resources (NR) Program, which is part of the CN Branch, has a full-time staff of five people. The professional staff, which includes one natural resources manager, two natural resources specialists, and two natural resources technicians, is an interdisciplinary team with education, experience and training in fisheries, wildlife management, forestry, zoology, ecology, wetlands, and outdoor recreation. The responsibilities of the NR Program cover all properties of the Complex, including NRC Solomons.

The permanent staff is supplemented by part-time and temporary staff when activity requirements of the NR Program periodically increase. This is accomplished predominantly through the use of seasonal employees, high school cooperative study students, and volunteers. The seasonal employees have been brought in through the Student Conservation Association (SCA), Inc., which has been a Complex partner since 1995. These volunteers/resources assistants are selected to complete specific projects but are involved in nearly all aspects of the NR Program. Most recently, SCA volunteers conducted field surveys at Complex properties, including NRC Solomons, to aid in updating the Maryland Amphibian and Reptile Atlas and Breeding Bird Atlas.

F. Authority

The Sikes Act, DoDI 4715.03, OPNAVINST 5090.1 (series), NAVFAC P-73, and 32 Code of Federal Regulations Part 190 (32 CFR 190) (DoD Natural Resources Management) are the main authorities for the development and implementation of this INRMP.

G. Stewardship and Compliance

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

Natural resources stewardship is the management of natural resources with the goal of maintaining or increasing the resource's value indefinitely into the future. This INRMP identifies both stewardship and compliance projects that help meet natural resources management goals. However, funding priority will be given to projects that are required to meet compliance criteria.

Stewardship efforts that rely on volunteer labor and have the support of the military community or have available alternate funding sources are also likely to be implemented.

H. Review and Revision Process

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

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

This evaluation is facilitated by the web-based Metrics Builder tool on the Natural Resources Data Call Station website. The Metrics Builder provides the means to evaluate performance in seven focus areas:

- Natural Resources Management (Ecosystem Integrity)
- Listed Species Critical Habitat (Threatened and Endangered Species; Proposed and Candidate Species; State, Local, and Other Species; Unoccupied Critical Habitat)
- Recreational Use and Access and Conservation Law Enforcement
- Sikes Act Cooperation
- Team Adequacy
- INRMP Implementation
- Support of the Installation Mission

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

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

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

Additionally, the INRMP must be reviewed, and (if necessary) updated or revised at intervals of not more than five years. If necessary changes are minor (e.g., capturing regulatory updates, incorporating survey information), an update would be appropriate; however, significant changes to the installation's mission requirements or natural resources would warrant an INRMP revision.

I. Geographic Information Systems Management, Data Integration, Access and Reporting

Geographic data and information are an integral part of natural resources and environmental protection and planning at NAS Patuxent River and NRC Solomons. All natural resources geographic information system (GIS) information for NRC Solomons is collected and maintained in coordination with the Natural Resources (NR) Program office at NAS Patuxent River.

Maps have been incorporated into the INRMP as a means of physically depicting information associated with the various management programs. These maps are a static display of spatial data contained in the Station's ever-changing GIS, called the GeoReadiness Explorer (GRX); as such, they are accurate only at the time the images were captured from GRX and a degree of error is inherent. These maps are distributed "AS-IS" without warranties of any kind, expressed or implied, including (but not limited to) warranties of suitability to a particular purpose or use. No attempt has been made in either the design or production of the maps to define the limits or jurisdiction of any federal, state, or local government. The maps are intended for use only at the published scale; as such, detailed on-the-ground surveys and historical analyses of sites may differ from the maps. Individuals requiring geographic information for decision-making purposes should access GRX directly in order to view the desired data in its most up-to-date form.

J. Commitment of the United States Fish and Wildlife Service and Maryland Department of Natural Resources

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

Per Sikes Act requirements, the USFWS, MDNR and (where applicable) NOAA Fisheries agree to cooperate in the development and review of this INRMP as to operation and effect at least once every five years. In addition to the formal five-year review, Navy policy requires annual reviews be conducted in coordination with the Sikes Act partners to ensure that the INRMP continues to meet Sikes Act requirements and contributes to the conservation of natural resources in the applicable military properties.

K. Management Strategy

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

Employing ecosystem management helps to maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems, while supporting sustainable economies, human use, and the environment required for realistic military training operations (DoD 2018a). The basic principles and guidelines of ecosystem management are to:

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

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

In accordance with the Sikes Act, the major components of this INRMP include managing natural resources for multiple use and sustainable yield, and to support the military mission; identifying natural resources inventory and monitoring needs; protecting, enhancing and restoring fish and wildlife habitat, including wetlands; and enforcing natural resources laws and regulations. Each of these components is essential to the success of an ecosystem management plan that aims to achieve sustainable use and promote biodiversity.

Resource-specific natural resources management areas have been developed to address relevant issues at NRC Solomons. The program structure has been developed based on the installation-specific management situation and is designed to facilitate issue identification and prioritization, as well as project funding, implementation and tracking. Due to the inherent interaction of natural resources, significant overlap exists among programs. Therefore, all programs are integrated with each other, as well as the overall land use and mission-planning processes at NAS Patuxent River.

Natural resources issues and concerns, which are discussed in detail for each management program element in Section 4, are defined as any action, process, activity, program, etc., that might present constraints to NAS Patuxent River operations and mission activities, readiness, and future planning at NRC Solomons. The NAS Patuxent River CN Branch manager is responsible for identifying issues and concerns by assessing current programs and evaluating the status and trends of natural resources.

2. CURRENT CONDITIONS AND USE

A. Installation Information

1. General Description

NRC Solomons encompasses approximately 296 acres of land on the eastern shore of the Patuxent River, in the southern portion of Calvert County, Maryland (Figure 2-1); of this, approximately 277 acres are managed for the purposes of this INRMP. NRC Solomons is located near the convergence of the Patuxent River and the Chesapeake Bay, approximately 60 miles southeast of Washington D.C. The Patuxent River forms the installation's southern and western borders, Maryland Route 2/4 forms the eastern border and private property (a retirement community) lies along the northern border. The town of Solomons, Maryland lies to the south of the installation. NAS Patuxent River is across the Patuxent River, approximately 3 miles south of NRC Solomons.

As NRC Solomons includes approximately 3.3 miles of shoreline and two coves totaling almost 11 acres, it is important to define the extent of Navy control over the nearshore environment. The State of Maryland owns the bottoms of all tidal water bodies on or adjacent to the islands from the mean high tide line; however, NAS has security control on some of the submerged land. NRC Solomons has a coastal security zone that includes the coves and extends 75 yards from the shoreline.

2. Military Mission

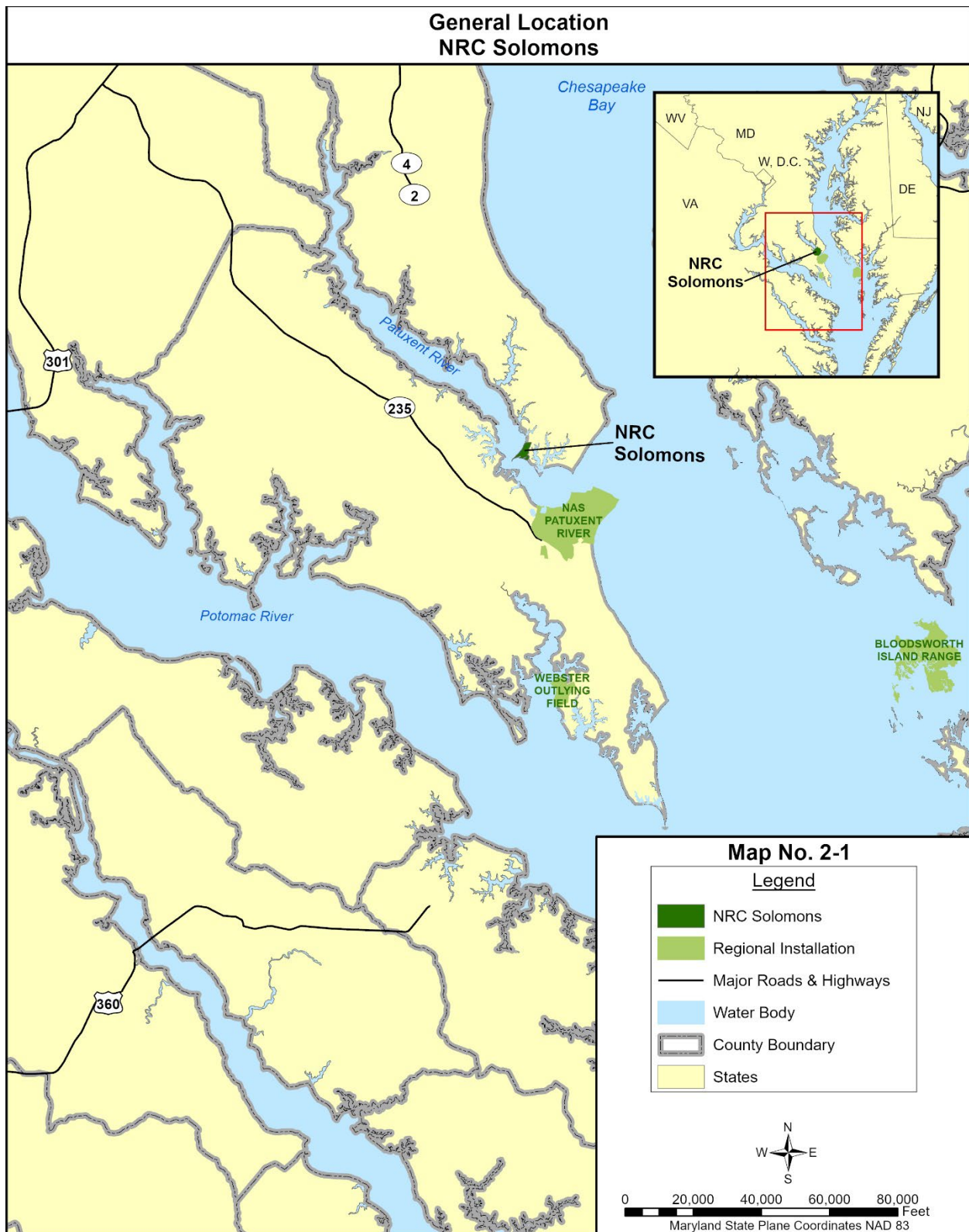
Two distinct military missions are supported at the NRC Solomons site. Approximately 85 percent of the installation serves as a DoD recreational facility, whereas the remaining 15 percent supports Naval warehouse facilities and an industrial tenant (Figure 2-2).

NRC Solomons, which is the largest outdoor recreation facility in the Navy, provides outdoor recreational opportunities such as lodging, camping, fishing, boating, swimming, athletic pursuits, hiking, and special holiday programs/events. Recreational programs and facilities are operated by Morale, Welfare, and Recreation (MWR) and are available to active duty, retired, and reserve military personnel, as well as DoD civilians and sponsored guests (Rose 2014).

The industrial tenant provides mechanical manufacturing support for the fleet and rehabilitates equipment for NAS Patuxent River. Atlantic Targets Marine Operations (ATMO) occupies six buildings within the industrial section of NRC Solomons. The primary mission of the ATMO Solomons Detachment is the development, fabrication, and deployment of various military-related targets and decoys for deployment at installations worldwide. ATMO's Solomons facility is also currently home to the Targets Engineering Support Branch which supports ATMO with the engineering and development phases of various projects (Bowles 2014).

The NAS Patuxent River Admiral's Quarters are also located in an historic district at NRC Solomons.

Figure 2-1. Regional Location of NRC Solomons



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Figure 2-2. NRC Solomons Facilities



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3. Constraints

Current and future land uses at NRC Solomons have several constraining factors. Natural resources related constraints include wetlands, adjacent Maryland coastal zone, shoreline protection buffers and habitat for protected species. Other restrictions on mission and land use may be due to operational, environmental, and safety constraints. The Maryland Department of the Environment (MDE) identified four locations at NRC Solomons as having potential environmental concerns (MDE 2007); however all of these sites have undergone remediation (Smith 2014). Natural resources may restrict land use on approximately 208 acres at NRC Solomons (Figure 2-3). On-base constraints include natural resources such as wetlands (7 acres) and a shoreline protection area (207 acres), as well as cultural resources (8 acres). Federally listed species also have the potential to occur in the waters surrounding NRC Solomons. Any future land development should attempt to avoid impacts to these resources and, if avoidance is not possible, all impacts will be mitigated as required. Recreational development and water-dependent facilities are compatible with goals of the Maryland Coastal Zone Management Program.

There are currently 11 licenses, easements and/or leases in place for NRC Solomons, encumbering approximately 46 acres of land. The grantees, areas and outgrant purposes are as follows:

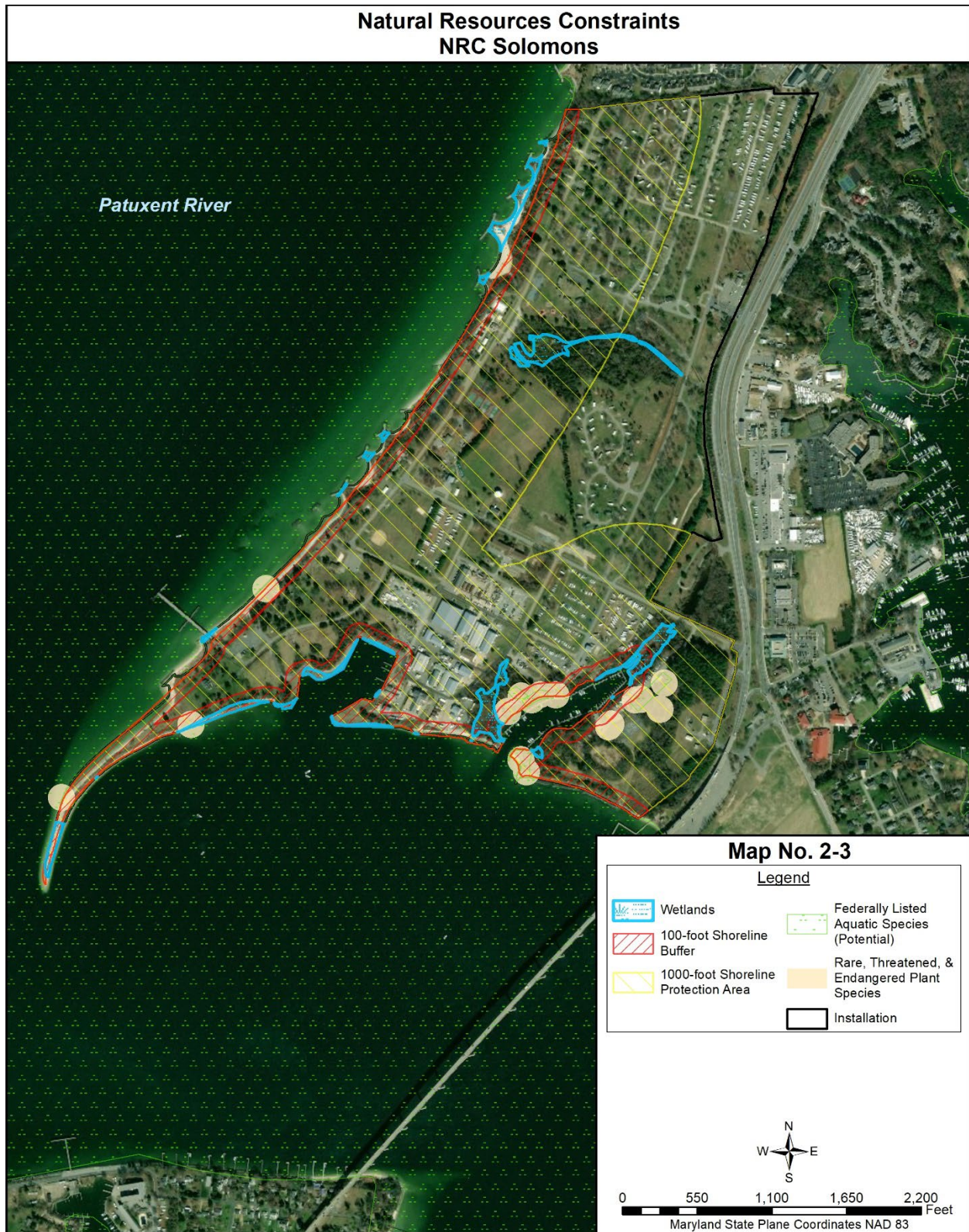
- Cedar Point Credit Union (112 square feet) – Automated Teller Machine
- State of Maryland (9.5 acres) – highway, road and bridge access (3 easements)
- Liberty Military Housing (3 acres) – housing management
- Southern Maryland Electrical Cooperative (11.5 acres) – transmission line and substation (2 easements)
- C & P Telephone (0.095 acres) – utility right-of-way
- Calvert County Wastewater Treatment Plant (9 acres) – sanitary lines
- Washington Gas Company (2 acres) – service line
- Patuxent Point Limited Partnership (400 square feet)

4. Access

NRC Solomons employees and visitors may access the installation by displaying valid military or DoD picture identification. For business purposes, temporary visitor passes may be requested by eligible sponsors through the NAS Patuxent River base access system.

Recreational facilities are available to active duty, reserve, delayed entry and retired military personnel; allied foreign nationals (with security clearance); military national guard; 100% disabled veterans; active and retired DoD civilians; family members with appropriate documentation; and sponsored guests. For recreational purposes, temporary visitor passes may be requested by eligible sponsors through the NRC Solomons Lodging Office. There is no public access to NRC Solomons.

Figure 2-3. NRC Solomons Natural Resources Constraints



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5. Opportunities

Areas with little or no restrictions provide the best opportunities for mission growth and change. The total area of unconstrained land at NRC Solomons is 67 acres (Figure 2-4), which are well-suited for additional recreational and lodging facilities. Additional constraints on recreational opportunities at NRC Solomons could occur through adjacent land development and other types of encroachment in the area surrounding the installation.

6. Operations and Activities

NRC Solomons, the largest outdoor recreation facility in the Navy (Tri-County Council for Southern Maryland 2003), provides outdoor recreational opportunities such as camping, fishing, boating, and swimming. Facilities at NRC Solomons are available to active duty, retired, and reserve military personnel, active DoD civilians, and sponsored guests. NRC Solomons is open year-round, and has as many as 50,000 visitors during the year (Rose 2014). Recreation facilities include 5 picnic pavilions, a recreation center, a 124-slip marina, fishing pier, a 4-pool swimming complex, beach, miniature golf, driving range, 3 basketball and 4 tennis courts, softball field, sand volleyball, horseshoe pits, and walking trails (Rose 2014). Lodging facilities include campsites, recreational vehicle (RV) hookups, yurts, cabins and cottages. NRC Solomons maintains a total of 15 group and 50 primitive camping sites, as well as 6 electric-only sites that can be utilized for tents or pop-ups. In addition, there are 305 RV sites (164 with water and electric, 141 with water, electric and sewer); 14 apartments (1-4 bedroom); 13 inland, 6 classic waterfront and 7 contemporary cottages (1-5 bedroom); 21 bungalows (3 bedroom); 5 duplex log cabins (1 bedroom); 2 yurts; and 3 camping cabins (1 bedroom with electric only) (Rose 2014).

7. Historic Land Use and Installation History

The Solomons Complex was established by the Navy in 1941, with the Naval Ordnance Laboratory being the first occupant. The Naval Mine Warfare Test Station was later established to provide research, development, and testing of Navy mine warfare and countermeasures. This location was chosen for its proximity to Washington D.C. and because of the sheltered, deep water surrounding the installation (MDE 2007).

The Naval Ordnance Laboratory Test Facility (NOLTF) was established on the site in 1947. NOLTF conducted high- and low-altitude aircraft drops (primarily mines), torpedo shots in the river, and other explosive tests in mine warfare until 1950. From 1948 to 1950, additional buildings and open space were acquired to create the Naval Civil Engineering Laboratory, which conducted research and development of amphibious equipment. Torpedo work was phased out in 1958 and the torpedo shop was converted into assembly areas (MDE 2007). In 1969, work was begun on converting the northern portion of the installation to a recreational facility for Naval District Washington (NDW) personnel and in 1971 NRC Solomons was officially dedicated. In 1981, the remaining portions of the site were incorporated into the recreational facility (Public Works Center NDW 2002).

Figure 2-4. NRC Solomons Opportunities



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8. Regional Land Use

NRC Solomons is located on the southern tip of Calvert County at the confluence of the Patuxent River and the Chesapeake Bay. Until 1977, when the Governor Thomas Johnson Bridge was completed, the southern portion of Calvert County was relatively isolated. Shipbuilding, oystering, and fishing were the primary occupations in the Solomons Island area. Today, charter-boat fishing, recreational boating, and tourism are the major activities (Solomons Business Association 2014). Tobacco farming was the primary industry throughout the rest of the county (Solomons Business Association 2014). The county is classified as rural; however, new development and residential areas have been expanding in recent years. The Calvert Cliffs Nuclear Power Plant and Dominion Cove Point liquefied natural gas (LNG) facilities, which are major employers and economic engines for the region, are also located in southern Calvert County, approximately 4 miles northeast of NRC Solomons.

B. General Physical Environment

1. Climatic Conditions

NRC Solomons is influenced by a continental climate, modified by the influence of the Chesapeake Bay and the Patuxent River. It is characterized by hot, humid summers and moderately cold winters with four distinct seasons (Table 2-1) (United States Department of Agriculture [USDA] 1971). Annual precipitation is relatively equally distributed throughout the year. The 30-year average annual rainfall is 45.3 inches (Northeast Regional Climate Center 2022). Light to heavy rain may occur in the spring, summer and fall seasons while rain, sleet, freezing rain, or snow may fall during the winter. No more than a few inches of snow will typically accumulate and such events usually last only a few days. Winds prevail from the northeast between the months of November and March, from the south in April, and east from May to October. The average wind speed is fairly constant throughout the year, being slightly higher in the winter months, when the wind is from the northwest (Windfinder 2022).

2. Climate Change Impacts

The Maryland Commission on Climate Change (MCCC), made up of numerous State agency heads and General Assembly members, was established in 2007 by State executive order. In 2015, the MCCC was codified into law and is chaired by MDE. The main goal of the MCCC was to develop and maintain a Climate Action Plan (CAP) that addressed climate change drivers and potential state impacts, and established mitigative goals and recommendations. The executive order and subsequent CAP (completed in 2008) call attention to Maryland's specific susceptibility to sea level rise; increased storm intensity, wind and rainfall events; and extreme droughts and heat waves. Human activities such as coastal development, fossil fuels usage, and increasing greenhouse gas (GHG) emissions are all highlighted as contributing factors to climatic instability. From a natural resources perspective, Maryland will likely see impacts to terrestrial and aquatic ecosystems, forest resources, fisheries, agriculture, and the drinking water supply. The State already lists more than 600 species of plants and animals as endangered, threatened, in need of conservation, or in danger of extirpation – climate change will undoubtedly compound the existing habitat loss and degradation stressors that impact these species.

The CAP includes the *Comprehensive Assessment of Climate Change Impacts in Maryland* (Chapter 2), produced by the Commission's Scientific and Technical Working Group (STWG), which is based on extensive literature review and supercomputer model projections to estimate future climatic conditions in Maryland. Two GHG emission scenarios were used to project the degree of climate change – a higher rate that assumes unchecked increases and a lower rate based on slower growth and eventual decline in emissions. The comprehensive assessment was revisited in 2016 to modify projections of future climatic conditions in Maryland based on new research findings. This assessment resulted in a number of key findings related to natural resources:

- Chesapeake Bay and coastal ecosystem restoration goals will likely be more difficult to achieve;
- Rising sea level will likely result in significant loss of tidal wetlands to inundation;
- Living resources will very likely change in species composition and abundance as warming continues;
- Aquatic ecosystems will likely be degraded by increased temperatures and flash-runoffs;
- Northern hardwood trees (e.g., maple, birch, beech) will likely disappear, replaced by oak, hickory and pines; and,
- Biodiversity of Maryland's forests (both plants and animals) will likely decline.

The STWG also contributed the *Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change, Phase I: Sea-level rise and coastal storms* (Chapter 5) to the CAP, and later (Boicourt et al. 2011) produced *Phase II: Building societal, economic, and ecological resilience*.

Phase I provides recommendations for risk reduction through legislative and policy actions. One particular recommendation that should continue to be implemented at NAS properties is the protection of natural shorelines and associated resources, including tidal wetlands – such as those found at NRC Solomons.

The Phase II strategy resulted from collaboration of governmental, non-profit and private sector experts. Two key points made in this document are that 1) climate change will alter distributions of species and habitats, exacerbating existing stressors at an uncertain rate and degree; and 2) strategically focused land management in “climate-sensitive” areas may increase ecosystem resilience and aid in maintaining biodiversity. The strategy outlines adaptation recommendations across a wide range of resource areas, including Bay and Aquatic Ecosystems (applicable to NRC Solomons).

In an effort to comprehensively integrate those recommendations that are pertinent to NRC Solomons, they have been incorporated throughout the INRMP in the appropriate management sections. Future adaptation strategies specific to Maryland, as well as climate change tools and guidance produced by DOD Legacy Program efforts, will be reviewed for inclusion in the INRMP as annual updates are conducted.

3. Physiography

NRC Solomons lies in the Atlantic Coastal Plain physiographic province, which is characterized by low elevations and little topographical relief. Elevations increase across the Coastal Plain in a westward direction from sea level in the east to approximately 200 feet above mean sea level in the west (Terwilliger and Tate 1995). Elevations at NRC Solomons range from sea level to about 30 feet above sea level (Figure 2-5). Steep bluffs, 20 to 30 feet in height, occur along much of the installation's shoreline.

Table 2-1. Historical Weather Data Recorded at Solomons, Maryland

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Avg. Max. Temp. (°F) ¹	45.3	47.6	54.9	65.4	74.2	83.8	87.9	86.3	79.9	68.7	58.6	50.1	66.9
Avg. Min. Temp. (°F) ¹	30.1	30.8	37.6	47.4	57.9	67.6	72.7	71	65	53.4	43	34.5	50.9
Avg. Normal Temperature (°F) ¹	37.7	39.2	46.3	56.4	66	75.7	80.3	78.7	72.4	61	50.8	42.3	58.9
Avg. Total Precip. (in.) ₁	2.91	2.84	4	3.68	3.66	4.27	4.49	4.66	4.15	4.03	3.07	3.54	45.3
Total Snowfall Normal (inches) ¹	3.9	6	1.3	0	0	0	0	0	0	0	0	1.3	12.5
Average Wind Speed (MHP) ²	5	5	7	7	6	6	5	5	6	6	5	5	5.6
Average Wind Direction ²	WSW	W	WSW	S	ENE	E	ESE	E	NE	NE	WSW	SW	

Source: ¹Northeast Regional Climate Center 2022; ²Windfinder 2022

4. Geology

The underlying geology of the Atlantic Coastal Plain consists of a 2,000- to 4,000-foot-thick wedge-shaped mass of unconsolidated sand, gravel, silt, and clay ranging in age from the Triassic to Quaternary Period. The younger formations crop out successively to the southeast across Southern Maryland and the Eastern Shore. A thin layer of Quaternary gravel and sand covers the older formations throughout much of the area (Maryland Geological Survey 2022). Sediment layers are underlain by hard bedrock, which is approximately 2,500 feet below sea level in southern Calvert County near NRC Solomons (Klohe and Kay 2007).

5. Soils

A majority of the soils found at NRC Solomons are deep, well-drained soils that were formed by marine and alluvial sediments commonly found in nearshore environments. These include Ingelside-Galestown, Ingelside-Woodstown, Matapeake-Beltsville, Matapeake-Dodon, Piccowaxen, Udurthents, and Woodstown-Piccowaxen. Annemessex, Dodon-Crosiadore, Downer-Woodstown, and Rosedale are well-drained soils typically found on stream terraces or low hills. There are three soil types at NRC Solomons that are classified as hydric. These soils are poorly drained, frequently flooded, and typically support wetlands. The Beaches-Brockatonorton complex is found on the shoreline and beaches. The Mispillion and Transquaking soils are mucky peat soil found in tidal marshes. The Zekiah and Issue soils are typically found on floodplains and drainage ways (Figure 2-6 and Table 2-2).

Table 2-2. Soils at NRC Solomons

Map Unit Symbol	Map Unit Name	Description	Acres
Hydric Soils			
BbB	Beaches-Brockatonorton complex, 0 to 5 percent slopes	Coarse sand found along beaches and shorelines, frequently flooded.	6.2
MZA	Mispillion and Transquaking soils, 0 to 1 percent slopes, tidally flooded	Mucky peat formed or herbaceous organic material over silty estuarine sediments. Very poorly drained, frequently flooded, moderately to strongly saline. Tidal marshes.	2.3
ZBA	Zekiah and Issue soils, 0 to 2 percent slopes, frequently flooded	Frequently flooded silt loam soil found on floodplains and drainage ways.	4.2
Non-hydric Soils			
AsA	Annemessex silt loam, 0 to 2 percent slopes	Fine textured silt loam typically found on stream terraces.	35.9
DeA	Dodon-Crosiadore complex, 0 to 2 percent slopes	Loamy, moderately well drained soil typically found on stream terraces.	30.2
DwE	Downer-Woodstown complex, 15 to 25 percent slopes	Deep, well drained, loamey sand forming low hills and knolls.	2.0
IgB	Ingelside-Galestown complex, 0 to 5 percent slopes	Well drained loamy sand formed by marine and river deposits typical of nearshore environments.	10.5
IwB	Ingelside-Woodstown complex, 2 to 5 percent slopes	Well drained loamy sand formed by marine and river deposits typical of nearshore environments.	25.9
IwC	Ingelside-Woodstown complex, 5 to 10 percent slopes	Well drained loamy sand formed by marine and river deposits typical of nearshore environments.	16.4

Map Unit Symbol	Map Unit Name	Description	Acres
IwD	Ingleside-Woodstown complex, 10 to 15 percent slopes	Well drained loamy sand formed by marine and river deposits typical of nearshore environments.	11.1
MeB	Matapeake-Beltsville complex, 2 to 5 percent slopes	Deep, well drained loamy sand formed by marine and river deposits typical of nearshore environments.	24.3
MfA	Matapeake-Dodon complex, 0 to 2 percent slopes	Deep, well drained loamy sand formed by marine and river deposits typical of nearshore environments.	69.9
MnB	Mattapex-Lenni complex, 2 to 5 percent slopes	Deep, somewhat poorly drained, silt loam found in depressions, swales, and terraces,	16.8
PcB	Piccowaxen loam, 2 to 5 percent slopes	Deep, somewhat poorly drained, loam formed by marine and river deposits.	6.3
RsB	Rosedale fine sand, 0 to 5 percent slopes	Well drained fine sand found on terraces.	1.3
Ub	Urban land	Land containing roads and structures, disturbed by human development.	19.3
UdB	Udorthents, loamy, 0 to 5 percent slopes	Deep, well drained loam formed by marine and river deposits.	6.5
WpD	Woodstown-Piccowaxen complex, 5 to 15 percent slopes	Deep, well drained sandy loam formed by marine and river deposits.	9.0

Source: USDA 2022a

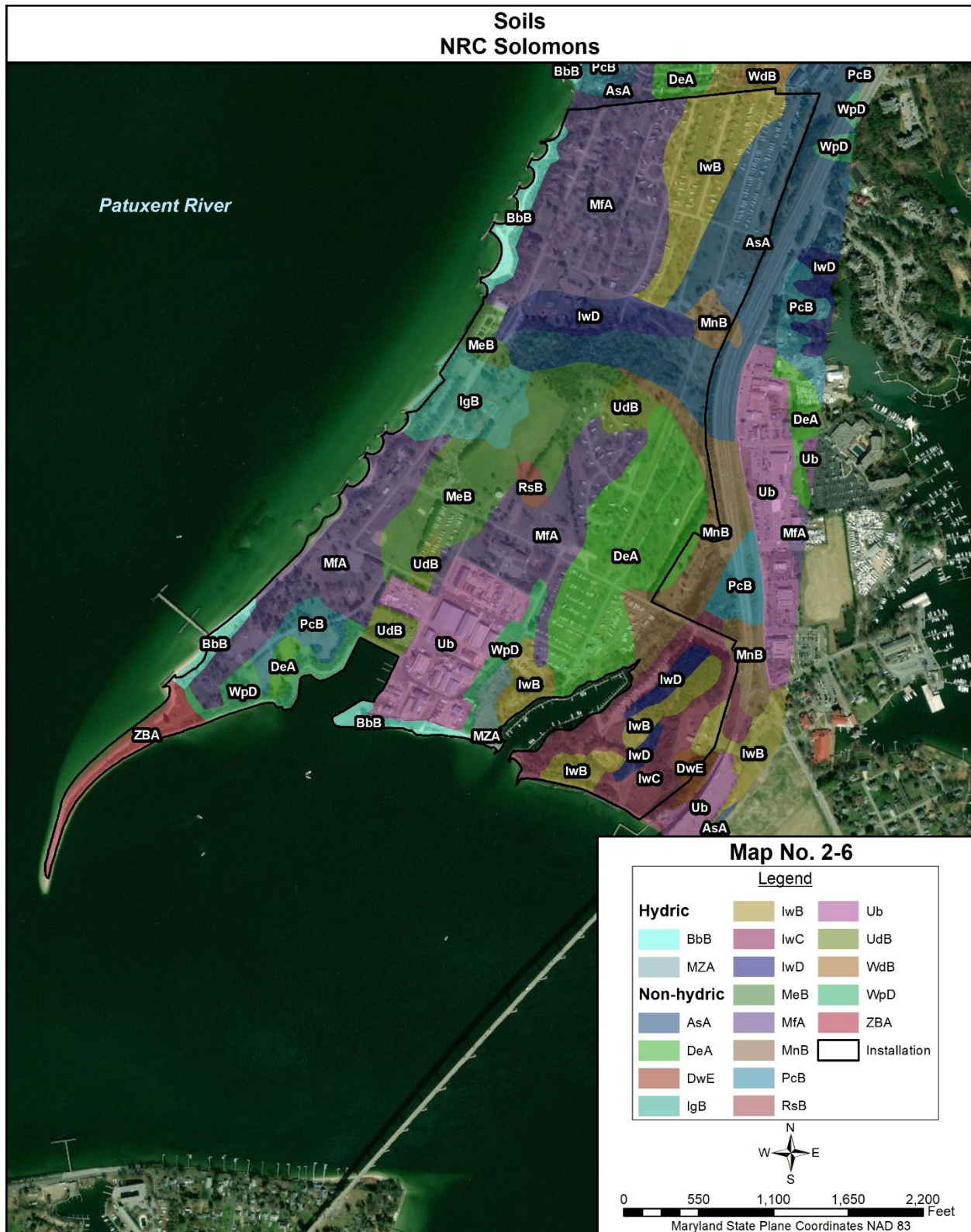
Figure 2-5. Elevation at NRC Solomons



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Figure 2-6. Soils at NRC Solomons



6. Hydrology and Aquatic Environment

a) Watersheds

NRC Solomons is in the Solomons Harbor subwatershed of the Lower Patuxent River watershed (Figure 2-7). The Lower Patuxent River Basin is classified as mesohaline, with salinities between 5 and 18 parts per thousand (ppt) (MDNR 2007a). St. John's Creek, Mill Creek, and Hungerford Creek are the major tributaries to the Patuxent River in the Solomons Harbor subwatershed. The Patuxent River empties into the Chesapeake Bay, linking the Patuxent watershed and the 64,000-square mile Chesapeake Bay watershed. The health of the Patuxent River and the ecological integrity of the Chesapeake Bay are dependent on the health of river tributaries.

b) Surface Water

Surface water present at NRC Solomons includes the Patuxent River, Second Cove, and Third Cove. Second Cove serves as a recreational marina (Point Patience Marina) and Third Cove is a harbor for the installation's industrial complex. Runoff from the central portion of NRC Solomons enters a small stream that flows southward into an unnamed tidal creek, then into Second Cove, and eventually into the Patuxent River. An additional drainage swale in the central portion of the installation can also carry stormwater runoff after a significant rain event.

c) Floodplains

Floodplains are defined as areas likely to be inundated by a flood with a particular degree of frequency. The Federal Emergency Management Agency (FEMA) flood insurance rate maps have been prepared for most of the region, including Calvert County. The 100-year flood levels for the Patuxent River and its tributaries that could pose a potential flood threat to NRC Solomons are established in the FEMA maps. A "100-year flood" or "100-year floodplain" describes an event or an area subject to a 1 percent probability of a certain size flood occurring in any given year. This concept does not mean such a flood will occur only once in one hundred years. Whether or not it occurs in a given year has no bearing on the fact that there is still a 1 percent chance of a similar occurrence in the following year. Since floodplains can be mapped, the boundary of the 100-year flood is commonly used to identify areas where the risk of flooding is significant.

Tidal flooding in the Mid-Atlantic region is increasing for a variety of reasons. These include, tropical storms, nor'easters, and hurricanes, as well as sea level rise and the thermal expansion of sea water as the earth warms. In addition, the Chesapeake Bay region is experiencing land subsidence. This nuisance flooding can affect some low-lying areas at every high tide. The NOAA tide gauge at Solomons shows a 3.88 mm per year increase in sea level from 1937 to 2019 which is 1.27 feet in 100 years (Calvert County 2020).

Floodplain data, including past vulnerability studies, are available from the NAS Patuxent River Public Works Department.

d) Groundwater

The major aquifers of Calvert County are the Piney Point-Nanjemoy, Aquia, and Magothy aquifers, though the Magothy aquifer is in the northern portion of the county and does not extend as far south as NRC Solomons (U.S. Geological Survey [USGS] 2014). The Piney Point-

Nanjemoy aquifer is primarily used for small water users, such as self-supplied domestic users and small businesses. It is 50-70 feet thick, and ranges from 213-260 feet below ground level (Klohe and Kay 2007). The Aquia aquifer is the primary source of public water supply within the county (USGS 2014), including NRC Solomons. The Aquia aquifer ranges from 125-200 feet thick and produces up to 3,000 foot squared of water per day (Drummond 2007). Groundwater monitoring wells installed throughout the county by the USGS and Maryland Geological Survey indicate that groundwater levels have been in decline over the past several decades because of increased usage. The level of the Aquia aquifer in the area of NRC Solomons has decreased from 25 feet below ground level to about 152 feet below ground level over the past 70 years (USGS 2014).

Water quality in the Aquia aquifer is generally good; however, arsenic concentrations in some areas exceed the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level for public water supplies (Drummond 2007). Water-supply managers in Calvert and St. Mary's counties are, therefore, seeking to shift some ground-water usage from the Aquia aquifer to deeper aquifers. This shift of usage should also reduce water-level declines, and ameliorate problems in the Aquia aquifer.

e) *Wetlands*

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory 1987). Wetlands at NRC Solomons were remotely delineated by the USFWS National Wetlands Inventory (NWI) based on aerial imagery flown in 1981 and 1982 (USFWS 2007). In addition, field delineations were conducted in the vicinities of the recreational trail and the marina in February 2014. In both instances, wetland classifications were assigned using the Cowardin system (Cowardin et al. 1979). The 2014 delineation reduced the total area of wetlands found to occur at NRC Solomons from approximately 16 acres to almost 6.5 acres. The wetlands consist of beach, palustrine forested, palustrine scrub-shrub, and estuarine emergent types (Figure 2-8).

Figure 2-7. NRC Solomons Water Resources



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Figure 2-8. NRC Solomons Wetlands



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C. General Biotic Environment

1. Rare, Threatened and Endangered Species, and Species of Concern

The term “rare species” includes state- or federally listed threatened and endangered species, species of special conservation concern, species that are periodically reviewed for change in state or federal status, and species that are at the extreme of their distribution.

a) Federally Listed Species

The NAS Complex has documented occurrences of certain federally listed species, as well as suitable habitat for others. While there are no federally listed species known to occur at NRC Solomons, several species have the potential to be found in waters bordering the installation.

Shortnose Sturgeon (*Acipenser brevirostrum*) are found in the lower Chesapeake Bay and are capable of sustaining populations in the Patuxent River, where they may use adjacent bays for foraging. Atlantic Sturgeon (*A. oxyrinchus*) occur throughout the Bay and have been confirmed from the waters surrounding NAS Patuxent River. Both species are listed as federally endangered.

Leatherback (*Dermochelys coriacea*) and Kemp’s Ridley (*Lepidochelys kempii*) are transient sea turtles within the Chesapeake Bay and may use the open waters adjacent to NRC Solomons while in the area. Kemp’s Ridley carcasses have been found on NAS beaches. These species are also listed as federally endangered.

Atlantic Loggerhead sea turtles (*Caretta caretta*), which are federally threatened, also transient the Bay and the Patuxent and Potomac rivers. Loggerhead carcasses have also been found on NAS beaches. NAS biologists coordinate with NOAA Fisheries and the Maryland Cooperative Oxford Laboratory to collect data and samples from all dead, stranded sea turtles. All live sea turtle or marine mammal sightings or strandings are reported to the Marine Mammal/Sea Turtle Stranding Network.

b) State-listed Species

A comprehensive survey for rare, threatened, and endangered (RT&E) species and species of concern was conducted at NRC Solomons in 2007 (Davis 2007). This survey and coordination with USFWS and MDNR (Byrne 2007) indicate that no federally threatened or endangered species are known to occur on the installation. However, one state-endangered bird species, Royal Tern (*Thalasseus maximus*), and one state-threatened plant species, Showy Goldenrod (*Solidago speciosa*), were observed during the 2007 survey (Davis 2007; MDNR 2021a, 2012b). One state-rare plant, White Spikerush (*Eleocharis albidia*), that was documented during the 2007 survey has since been delisted (Davis 2007, MDNR 2021b). White Spikerush and Showy Goldenrod were also documented at NRC Solomons in subsequent surveys (Davis 2010, DoN 2014).

The state-endangered Nashville Warbler (*Leiothlypis ruficapilla*) has been observed at the installation, with the earliest confirmed sighting during a survey in 2008. One additional state-rare species has been noted at NRC Solomons. Peregrine Falcons (*Falco peregrinus*) have been seen at the installation and have been documented as nesting in the vicinity of the site under the Governor Thomas Johnson Bridge (Byrne 2000). Peregrine Falcons were previously state- and

federally endangered but are now listed as “In Need of Conservation” in Maryland. Both Peregrine Falcons and Nashville Warblers remain protected under MBTA.

c) *Species of Concern*

Bald Eagles (*Haliaeetus leucocephalus*) have been documented foraging in the waters near and roosting at NRC Solomons (DoN 2001, Rambo 2014b). Bald Eagle nest and roost-site surveys are conducted annually at NRC Solomons; however, suitable nesting habitat is lacking on the installation, so nests have not been seen, nor are they expected. Bald Eagles were removed from the federal list of threatened and endangered species in 2007, but remain a watch-list species in Maryland (MDNR 2021a). Bald Eagles continue to be protected by the Bald and Golden Eagle Protection Act (BGEPA) and MBTA.

The Monarch Butterfly (*Danaus plexippus plexippus*), a candidate species, is being studied by the USFWS for official federal listing as either threatened or endangered. The Monarch Butterfly likely uses the property. To assess the occurrence, distribution, and quality of Monarch Butterfly habitat as well as determine the extent of Monarch Butterfly presence within the identified habitat, surveys should occur during the active flying season

Tables B-1 through B-6 in Appendix B list the animal and plant species known or expected to occur at NRC Solomons. Rare species are so indicated.

2. **Fauna**

NRC Solomons encompasses a variety of natural and cultural habitat types that support populations of wildlife. Included are: open fields and lawns, forested areas, marshes, and beaches along the Patuxent River shoreline. Faunal surveys including Lepidoptera, herpetofauna, mammals, and birds were conducted at NRC Solomons in 2008 (Rambo 2014b). In addition, a number of incidental observations of wildlife species were made during site visits for the 2001 INRMP, the 2010 INRMP update, and other installation and regional survey efforts (MDNR 2003, MDNR 2009, U.S. Army Corps of Engineers [USACE] 1996, Rambo 2014a). Surveys of birds 2020 and 2021. Faunal species that are known or expected to occur at NRC Solomons are listed in Appendix B.

a) *Mammals*

Mammalian species that are known to inhabit the terrestrial and wetland areas at NRC Solomons include medium-sized mammals such as Groundhog (*Marmota monax*), River Otter (*Lutra canadensis*), American Beaver (*Castor canadensis*), Raccoon (*Procyon lotor*), Eastern Cottontail (*Sylvilagus floridanus*), Eastern Gray Squirrel (*Sciurus carolinensis*), Striped Skunk (*Mephitis mephitis*), Muskrat (*Ondatra zibethicus*), and Virginia Opossum (*Didelphis virginiana*). White-tailed Deer (*Odocoileus virginianus*) is the only large mammal species known to occur at the facility. Table B-2 in Appendix B lists the mammalian species known to occur at NRC Solomons.

b) *Herpetofauna*

While previous herpetofauna records were mostly incidental, intensive surveys were conducted at NRC Solomons as part of the five-year Maryland Amphibian and Reptile Atlas project that ended in 2014 (Rambo 2014b). Amphibians known to be present at NRC Solomons include: American

Bullfrog (*Lithobates catesbeiana*), Fowler's Toad (*Anaxyrus woodhousii fowleri*), Southern Leopard Frog (*L. sphenoccephalus*), Northern Green Frog (*L. clamitans melanota*), Marbled Salamander (*Ambystoma opacum*) and Spotted Salamander (*A. maculatum*). Reptiles known to occur on the facility include: Eastern Rat Snake (*Pantherophis alleghaniensis*), Eastern Garter Snake (*Thamnophis s. sirtalis*), Northern Watersnake (*Nerodia s. sipedon*), Eastern Hognose Snake (*Heterodon platirhinos*), Eastern Worm Snake (*Carphophis a. amoenus*), Eastern Box Turtle (*Terrapene c. carolina*), Eastern Snapping Turtle (*Chelydra s. serpentina*), and Eastern Mud Turtle (*Kinosternon s. subrubrum*). The Patuxent River supports a population of Northern Diamondback Terrapin (*Malaclemys t. terrapin*), and this species may have historically used the beaches of NRC Solomons for nesting. Surveys for terrapin nests have been ongoing at NAS Patuxent River since 2013; however, surveys at NRC Solomons have not identified any nests. During the surveys, there was evidence of frequent human activity on all beaches. For a complete list of herpetofauna known or expected to occur at NRC Solomons, see Table B-3 in Appendix B.

c) Birds

The avifaunal community at NRC Solomons is the most diverse faunal community on the installation. Birds that frequently utilize the installation's open areas and urban settings include Northern Mockingbird (*Mimus polyglottos*), American Robin (*Turdus migratorius*), Northern Cardinal (*Cardinalis cardinalis*), Brown-headed Cowbird (*Molothrus ater*), House Sparrow (*Passer domesticus*), House Finch (*Haemorhous mexicanus*), Rock Pigeon (*Columba livia*), and European Starling (*Sturnus vulgaris*). The limited marshland and shoreline also provide habitat for a number of shorebirds and wading birds including the Great Black-backed Gull (*Larus marinus*), Herring Gull (*Larus argentatus*), Laughing Gull (*Leucophaeus atricilla*), Ring-billed Gull (*Larus delawarensis*), Great Blue Heron (*Ardea herodias*), Snowy Egret (*Egretta thula*), and Green Heron (*Butorides virescens*), Great Egret (*Ardea alba*), and Red-winged Blackbird (*Agelaius phoeniceus*).

The waters adjacent to NRC Solomons are known waterfowl concentration areas and a variety of waterfowl overwinter in the area, including grebes (*Podiceps* spp. and *Podilymbus* spp.), loons (*Gavia* spp.), Bufflehead (*Bucephala albeola*), Common Goldeneye (*Bucephala clangula*), scaup (*Aythya* spp.), and Long-tailed Duck (*Clangula hyemalis*).

Over thirty species have confirmed breeding status at NRC Solomons based on recent breeding bird surveys. Osprey (*Pandion haliaetus*) have also been observed nesting on channel markers just off the western shore of the installation and other structures. For a complete list of known bird occurrences for NRC Solomons, see Table B-1 in Appendix B.

d) Fish

Fish are another abundant wildlife guild that inhabit the tidal waters off the shore of NRC Solomons and the installation coves. Regional fish surveys (MDNR 2003) and studies (USACE 1996) indicate that a number of species of environmental and/or economic importance are indigenous to the estuarine reaches of the Patuxent River and its tributaries. Estuarine species expected to occur in the waters of NRC Solomons include Striped Bass or Rockfish (*Morone saxatilis*), American Shad (*Alosa sapidissima*), Hickory Shad (*A. mediocris*), Alewife (*A. pseudoharengus*), Blueback Herring (*A. aestivalis*), Atlantic Croaker (*Micropogonias undulatus*),

Bay Anchovy (*Anchoa mitchilli*), Spot (*Leiostomus xanthurus*), Yellow Perch (*Perca flavescens*), White Perch (*Morone americana*), Atlantic Menhaden (*Brevoortia tyrannus*), American Eel (*Anguilla rostrata*), Softshell Clam (*Mya arenaria*), Eastern Oyster (*Crassostrea virginica*), and Blue Crab (*Callinectes sapidus*). See Table B-5 in Appendix B for a list of fish species known or expected to occur at NRC Solomons.

e) *Essential Fish Habitat*

Essential fish habitat (EFH) is defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (Public Law 94-265), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), as “those waters and substrate necessary to fish for spawning, breeding, and feeding or growth to maturity.” The Sustainable Fisheries Act requires that EFH be identified for those species actively managed under federal fisheries management plans. This includes species managed by the regional fisheries management councils established under the MSFCMA, as well as those species managed by NOAA Fisheries under federal fisheries management plans developed by the Secretary of Commerce.

EFH designations emphasize the importance of habitat protection to healthy fisheries and serve to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. EFH embodies both the water column (including its physical, chemical, and biological growth properties) and its underlying substrate (including sediment, hard bottom, and other submerged structures). Under the EFH definition, necessary habitat is that which is required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem. EFH is designated for a species’ complete life cycle, including spawning, feeding and growth to maturity, and may be specific for each life stage (e.g., eggs, larvae). EFH that is either important to the long-term productivity of one or more managed species populations or deemed to be particularly vulnerable to degradation may be identified by fishery management councils and NOAA Fisheries as a Habitat Area of Particular Concern (HAPC).

The Navy is required to consult with NOAA Fisheries prior to undertaking any projects or actions that have the potential to adversely affect EFH. In March 2011, DoN released policy and procedures that aim to improve consistency in EFH consultations across the Navy. At a minimum, EFH analysis must be captured in NEPA documentation, as applicable.

NOAA Fisheries and Mid-Atlantic and New England Fishery Management Councils have identified EFH in major estuaries, bays, and rivers along the northeastern coast of the United States. EFH has been designated for the following species within the Patuxent River near NRC Solomons (NEFMC 2017; NOAA 2022a):

- Three skates have EFH designations in the Chesapeake Bay and associated inlets. Clearnose Skate (*Raja eglanteria*) has EFH designations for juvenile and adult in areas of the Chesapeake Bay and associated inlets in habitats with soft bottom, rocky or gravelly substrates. EFH is also designated for the adult stage of Little Skate (*Leucoraja erinacea*) and Winter Skate (*Leucoraja ocellata*), including sandy, gravelly, or mud substrates in the Chesapeake Bay. NRC Solomons contains bottom habitat suitable for the presence of these skate species.

- Windowpane Flounder (*Scophthalmus aquosus*). EFH for juvenile and adult Windowpane Flounder includes bottom habitats with a substrate of mud or fine-grained sand, extending from the intertidal zone to a depth of 70 meters. Windowpane Flounder could occur in the vicinity of NRC Solomons throughout the year.
- Summer Flounder (*Paralichthys dentatus*). EFH for larvae, juvenile and adult Summer Flounder includes demersal (i.e., bottom) waters, including tidal guts. Juveniles may use estuarine habitats such as submerged aquatic vegetation (SAV) beds and open bay areas as nursery areas, and adults generally inhabit shallow estuarine waters during the warmer months.
- Atlantic Herring (*Clupea harengus*) is a pelagic species that distribute their eggs in mats on the sea floor. EFH for this species includes all habitat within the region that has the desired conditions of the species. EFH for juveniles includes bays and estuaries and EFH for adults includes sub-tidal areas into waters up to 300 meters deep. They are more common in bays and estuaries along the coast from Maine to the Outer Banks but may also occur in the Chesapeake Bay.
- Red Hake (*Urophycis chuss*). EFH for eggs and larvae include pelagic habitats and in bays and estuaries, including the Chesapeake Bay. EFH for juveniles includes intertidal and sub-tidal benthic habitats throughout the region on mud and sand substrates, to a maximum depth of 80 meters including bays and estuaries. EFH for adults includes benthic habitats as shallow as 20 meters in a number of inshore estuaries and embayments as far south as the Chesapeake Bay. Shell beds, soft sediments (mud and sand), and artificial reefs provide essential habitats for adult Red Hake.
- Bluefish (*Pomatomus saltatrix*) is a highly migratory, schooling pelagic species found along the Atlantic coast. EFH for juvenile and adult Bluefish includes the pelagic water column, and inland within the mixing (between 0.5 and 25 ppt. salinity) and seawater (greater than 25 ppt. salinity) zones. This species could be present in the vicinity of NRC Solomons primarily from April through October.
- Scup (*Stenotomus chrysops*). EFH for juvenile and adult Scup includes shallow estuarine waters with sand, mud, mussel, and Eelgrass and salinities greater than 15 ppt. Juvenile and adults use estuarine habitat in summer months. Adults winter offshore. Bottom habitat surrounding NRC Solomons includes Eelgrass, sand, and mud.
- Black Sea Bass (*Centropristis striata*). EFH for juvenile and adult Black Sea Bass includes estuarine tidal waters. Adults can mainly be found from May to October in areas with sand or shell bottom. They generally winter offshore. Juvenile Black Sea Bass are found in estuarine waters in spring and summer and utilize areas with rough bottom, shellfish, eelgrass beds, and manmade structures. NRC Solomons provides potential habitat for both adult and juvenile Black Sea Bass.

EFH that is either important to the long-term productivity of one or more managed species populations or deemed to be particularly vulnerable to degradation may be identified by fishery management councils and NOAA Fisheries as a Habitat Area of Particular Concern (HAPC). SAV beds occurring near NRC Solomons are considered HAPC for Summer Flounder.

3. Flora

a) Ecological Communities

Although a comprehensive floral inventory has not been conducted at NRC Solomons, more than 70 plant species have been identified by incidental observations and via the following:

- Urban forest survey (DoN 2003)
- RT&E species survey (Davis 2007)
- Invasive species survey (DoN 2009)

Because of the high level of disturbance and development at NRC Solomons, a large number of invasive species have invaded these natural areas. Invasive species are non-native or exotic plants and animals found outside of their natural range that out-compete native species in a specific habitat. The invasive species survey conducted in 2019 identified 24 invasive, non-native plant species covering 16.36 acres within the installation (DoN 2019). Japanese Honeysuckle (*Lonicera japonica*), English ivy (*Hedra helix*), Multiflora Rose (*Rosa multiflora*), Common Reed (*Phragmites australis*), and privet (*Ligustrum* spp.) are the most wide-spread and problematic invasive species on the installation. A list of native and non-native plant species known to occur at NRC Solomons (Table B-6) is in Appendix B.

Natural vegetative communities are very limited at NRC Solomons; improved lands with mowed lawns, ornamental trees and shrubs are the dominant vegetative cover (Figure 2- 9). The largest natural area consists of a mixed shrub/woodland (approximately 13 acres) located in a wet depression in the central part of the installation. This site is a mid-successional forest stand that developed once maintenance was ceased on a site previously used for munitions storage.

Black Willow (*Salix nigra*), Black Cherry (*Prunus serotina*), Eastern Red Cedar (*Juniperus virginiana*), and Red Maple (*Acer rubrum*) are the dominant tree species. Common shrubs at the site are privet, Multiflora Rose, Winged Sumac (*Rhus copallina*), Groundsel Tree (*Baccharis halimifolia*), and Silky Dogwood (*Cornus amomum*). Japanese Honeysuckle blankets much of the vegetation on this site and a wetland swale that passes through is dominated by Common Reed. Numerous grasses, forbs, and herbaceous species occur along the nature trail and throughout the area as well. Several previously disturbed sites in the southern portion of the installation, which served as debris disposal areas or industrial waste sites, are also classified as mixed shrub/woodlands and have similar species compositions.

A second natural area is a small pine stand (approximately 7 acres) in the southeast portion of the installation, east of Second Cove. Loblolly Pine (*Pinus taeda*) is the dominant canopy tree and there is little understory or herb layer in this stand. The beach area and small areas of emergent and forested wetlands are other ecological communities at NRC Solomons.

b) Submerged Aquatic Vegetation

SAV is a diverse assembly of marine and bay grasses found in shoal areas of the Chesapeake Bay, from its mouth to the headwaters of its tributaries (Virginia Institute of Marine Science [VIMS] 2014). SAV provides protection and nursery habitat for a broad range of aquatic organisms, contributes to the oxygenation of the water, and prevents erosion and sedimentation. During the

growing season, SAV removes excess nutrients and reduces algal growth by retaining nitrogen and phosphorus. Historically, SAV was estimated to cover 600,000 acres of the Bay (VIMS 2022), but by the 1970s less than 40,000 acres of SAV remained (Moore et al. 2004). SAV beds were dramatically impacted by hot summers in 2005 and 2010; these declines continued through 2012, reducing SAV abundance to mid-1980s levels. The 2014 survey showed a Bay-wide recovery, with more than 75,000 acres mapped within the Bay and its tributaries (VIMS 2015).

VIMS has mapped SAV in different regions of the Chesapeake Bay regularly since 1971 using aerial photo-interpretation and ground verification. In 2020, the survey mapped 63,132 acres of SAV (Patrick et.al. 2020). SAV surveys of the Patuxent River in the vicinity of NRC Solomons have documented three species: Widgeon Grass (*Ruppia maritima*), Horned Pondweed (*Zannichellia palustris*), and Eelgrass (*Zostera marina*).

Widgeon Grass was planted at NRC Solomons in April 2000 as part of a shoreline stabilization project initiated in the spring of 1999. However, the VIMS surveys have not documented any SAV beds at NRC Solomons, indicating that this planting effort was unsuccessful. No SAV beds have been documented in the vicinity of NRC Solomons since 2002, when one SAV bed was documented to the north of the installation, and three SAV beds were documented to the east of Solomons Island (VIMS 2014b). In 2005, Horned Pondweed and Eelgrass were present in the vicinity of NRC Solomons, but no beds were documented (VIMS 2014b) (Figure 2-10). VIMS operates an interactive mapping portal, available at <https://www.vims.edu/research/units/programs/sav/access/maps/index.php>, and with data from annual surveys of the Chesapeake Bay. This was reviewed as part of the INRMP update with no SAV present.

Figure 2-9. Vegetative Communities at NRC Solomons



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Figure 2-10. Submerged Aquatic Vegetation in the Vicinity of NRC Solomons



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3. ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

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

1. Military Mission and Sustainable Land Use

A primary goal of natural resources management at NRC Solomons is to preserve and sustain conditions that are compatible with the installation's military and recreational missions. Mission requirements are met through the protection and enhancement of significant resources such as wetlands, rare species, and habitat for migratory birds and other at-risk species; land and watershed management; and invasive species control. Sustainable management of natural resources helps to ensure compliance with environmental laws and regulations and the continued availability of the facility to meet DoD's mission and recreational requirements.

2. Defining Impact to the Military Mission

Natural resources management efforts at NRC Solomons are focused on reducing impacts to the installation's military mission while enhancing the installation's recreational mission. Natural resources management efforts such as reducing shoreline erosion and restoring the facility's beaches help to protect shoreline facilities while greatly enhancing recreational opportunities at NRC Solomons. Controlling nuisance wildlife and non-native plant species, creating an interpretive cultural and natural resources trail, and restoring wetlands are other management activities that have been undertaken to enhance the mission.

3. Relationship to Operational Area Plans

a) Encroachment Action Plan

Per OPNAVINST 11010.40 (Encroachment Management Program), encroachment is defined as "any action or condition that restricts or prohibits the attainment or sustainment of the Navy's statutory responsibilities to man, train, maintain, and equip a combat-ready force." The Patuxent River Complex Encroachment Action Plan (EAP), updated in 2016, identifies, quantifies, and provides mitigation strategies for the potential encroachment threats to all facilities in the Complex, including NRC Solomons (DoN 2016a).

b) Range Air Installation Compatible Use Zones (RAICUZ)

The first RAICUZ study for the Atlantic Test Range (ATR) Inner Range was completed in November 2009 in accordance with OPNAVINST 3550.1A (Range Air Installation Compatible Use Zones [RAICUZ] Program) guidelines. The purpose of the study was to analyze current and future aircraft operations in the ATR Inner Range (including NRC Solomons) and to assess the impact of future research, development, testing, evaluation, and training operations conducted within the ATR Inner Range on nearby development, uses and natural resources. The findings of the study were shared with counties and local community organizations as a planning tool (NAVFAC 2009).

The RAICUZ study was also used as a reference tool for the NAS Patuxent River Joint Land Use Study (JLUS) completed in January 2015. The JLUS is a cooperative land-use planning effort between military installations and surrounding communities, administered by the DoD Office of Economic Adjustment. The goal of the NAS Patuxent River JLUS is to protect the viability of current and future military mission and operations, while simultaneously guiding community growth, sustaining the environmental and economic health of the region, and protecting public health, safety, and welfare. The NAS Patuxent River JLUS includes the participation of nine counties and three municipalities in Southern Maryland, as well as on Maryland's Eastern Shore and Virginia's Northern Neck.

The Statewide Joint Land Use Study Response Implementation Strategy (SJRIS), completed in 2019, defines plans and goals for the state, military, and community partners to identify compatibility issues, address concerns, and access opportunities in areas surrounding military installations in Maryland. The strategy aims to identify where there are potential compatibility issues between Maryland military installations and their surrounding communities that may have statewide and/or regional impacts, and determine where there are opportunities for the State of Maryland to take policy actions or assist local jurisdictions with compatibility planning. This strategy is the result of a state iterative planning process involving stakeholders from the state, localities and communities, and the military. Twelve military installations in Maryland were evaluated, including NAS Patuxent River.

c) Stormwater Pollution Prevention Plan

The NRC Solomons Stormwater Pollution Prevention Plan (SWPPP) identifies and maps potential pollutant sources that may contribute to the contamination of the stormwater discharges from permitted outfall drainage areas (DoN 2018a). Potential sources of pollutants include outdoor industrial activities and processing areas; material storage and handling areas; areas where hazardous material/hazardous waste/or petroleum, oil, and lubricant products are stored; construction and demolition sites; and land areas where chemicals are applied. The plan also describes stormwater management standards, stormwater management controls, and best management practices (BMPs) used at NRC Solomons to maintain and protect water quality.

d) Environmental Restoration Program

The installation recognizes that adverse impacts to natural resources addressed in this INRMP may result from the release of hazardous substances, pollutants, and contaminants into the environment or from the actual restoration of contaminated sites. The DoN Environmental Restoration Program (ERP) is responsible for identifying Comprehensive Environmental Response, Compensation, and Liability Act releases, Resource Conservation and Recovery Act releases, and releases under related provisions; considering risks and assessing impacts to human health and the environment, including impacts to endangered species, migratory birds, and biotic communities; and developing and selecting response actions when a release may result in an unacceptable risk to human health and the environment.

When appropriate, the regional or installation natural resources management staff will help the ERP Remedial Project Manager (RPM) identify potential impacts to natural resources caused by the release of contaminants.

Regional or installation natural resources staff will also participate, as appropriate, in the ERP decision-making process by communicating natural resources issues on the installation to the RPM, attending Restoration Advisory Board meetings, reviewing and commenting on ERP documents (e.g., remedial investigation, ecological risk assessment), and ensuring that response actions, to the maximum extent practicable, are undertaken in a manner that minimizes impacts to natural resources on the installation.

When appropriate, the regional or installation natural resources staff will make recommendations to the ERP RPM regarding cleanup strategies and site restoration. During initial monitoring protocols, the natural resources manager has the opportunity to recommend site restoration practices that are outlined within this INRMP. Examples include landfill caps restored to grasslands, excavation areas restored to wetland/pond areas, and treated water located to enhance a pond area.

Remedial investigations at NRC Solomons revealed a number of sites contaminated with hazardous and non-hazardous waste, including unexploded ordnance (UXO), resulting from past land uses and waste disposal practices. The Navy completed remediation of all known ER sites at the end of 2008 (Smith 2014). However, there is always a possibility for future discoveries.

B. Applicable Laws, Regulations, and Policies

The requirements underlying this INRMP arise from multiple environmental laws, regulations and policies. These include public laws; executive orders (EOs); United States codes (USCs); and DoD, DoN and installation-specific directives, instructions and notices.

As a general rule, the Federal government is protected from regulation by state governments by the principle of sovereign immunity. Sovereign immunity exists with respect to all state laws unless and until the Federal government has affirmatively waived it. Until such time as a waiver of sovereign immunity has occurred, Maryland's statutory authority over the Federal government, including Federal installations, is not binding.

The following paragraphs discuss the major legislation specifically applicable to the NAS mission to execute this INRMP.

1. Public Laws and Executive Orders

Conserving Programs on Military Installations (Sikes Act), as amended; Public Law 86-797, 16 USC 670(a) et seq., requires Federal military installations with adequate wildlife habitat to implement cooperative agreements with other agencies and develop long-range INRMPs. Thereby, it is appropriate to manage natural resources for multipurpose uses and provide the public access to those uses to the extent consistent with the military mission. This act sets guidelines for the collection of fees for the use of natural resources such as hunting, fishing and trapping.

National Environmental Policy Act of 1969 (NEPA), as amended; Public Law 91-190, 42 USC 4321 et seq., requires Federal agencies to consider the environmental impacts of their proposed activities. NEPA promotes an interdisciplinary approach in decision making designed to identify unacceptable or unnecessary impacts to the environment and avoid or mitigate them as much as possible. NEPA is further discussed in section 3.C.

Clean Water Act of 1972 (CWA), as amended; Public Law 92-500, 33 USC 1251 et seq., Section 404 establishes a program to regulate the discharge of dredged or fill material into waters of the U.S. (including wetlands) and establishes a permitting program administered by the U.S. Army Corps of Engineers (USACE).

Rivers and Harbors Act of 1899; 33 USC 403, Section 10 requires authorization from the Secretary of the Army, acting through the USACE, for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States and applies to all structures from the smallest floating dock to the largest commercial undertaking. Regulated activities include construction of wires and cables over, under, or through the water; any obstruction or alteration of navigable water; filling of wetland adjacent or contiguous to waters of the United States; construction of riprap, revetments, groins, breakwaters, and levees; and transportation of dredged material for dumping into ocean waters.

Coastal Zone Management Act of 1972 (CZMA), Public Law 92-582, 16 USC 1451 et seq., along with the appropriate amendments (Coastal Zone Reauthorization Amendments of 1990 and Coastal Zone Protection Act of 1996) are designed to encourage coastal states to develop coastal area management programs to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats. Although federal lands and actions are exempt from state law jurisdiction, the CZMA requires activities on federal lands that are reasonably likely to affect use of lands or waters, or natural resources of the coastal zone beyond the boundaries of the federal property, to be conducted in a manner that is consistent with enforceable policies of a state's federally approved Coastal Zone Management Program (CZMP). Coastal zone management is further discussed in section 4.L.

Endangered Species Act of 1973 (ESA), as amended; Public Law 93-205, 16 USC 1531 et seq., protects threatened, endangered and candidate species of fish, wildlife and plants and the designated critical habitats. Under this law, no Federal action is allowed to jeopardize the continued existence of an endangered or threatened species. ESA also requires consultation with the USFWS and NOAA Fisheries on any action that has the potential to affect a listed species. Rare, threatened, and endangered species occurring and potentially occurring on NRC Solomons are presented in Tables B-1 through B-6 in Appendix B.

National Defense Authorization Act of 1989, Public Law 101-189; Volunteer and Partnership Cost-Share Program, amends two acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands.

Defense Appropriations Act of 1991, Public Law 101-511; Legacy Resource Management Program, establishes a program for the stewardship of biological, geophysical, cultural and historic resources on DoD lands.

Exotic Organisms, EO 11987, requires agencies to restrict the introduction of exotic/non-native organisms into natural ecosystems on lands and waters that they own, lease or hold for purposes of administration.

Protection of Wetlands, EO 11990, requires Federal agencies to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practical alternative and all practicable measures to minimize harm to wetlands have been implemented.

Invasive Species, EO 13112, requires Federal agencies to identify and prevent actions that are likely to cause or promote the introduction or proliferation of invasive species, and calls for the minimization of ecological, economic and human health impacts caused by invasive species.

Chesapeake Bay Protection and Restoration, EO 13508, recognizes the Chesapeake Bay as a national treasure and calls on the Federal government to lead a renewed effort to restore and protect the nation's largest estuary and its watershed.

Stewardship of our Ocean, the Coasts, and the Great Lakes, EO 13547, establishes a national policy to ensure the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources.

Invasive Species, EO 13751, directs federal agencies to act to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive, non-native species that are established on federal lands.

2. United States Codes

Bald and Golden Eagle Protection Act (BGEPA), 16 USC 668a-d et seq., prohibits any form of possession or taking of Bald and Golden Eagles. The statute imposes criminal and civil sanctions as well as an enhanced penalty provision for subsequent offenses. This act is especially important from a compliance perspective because the NAS Complex supports several active Bald Eagle nests at NAS Patuxent River and Bloodsworth and (historically) Adam islands, and Bald Eagles are known to roost at NRC Solomons. In addition, BGEPA has become increasingly important since the delisting of the Bald Eagle and loss of federal ESA protections in July 2007. That same year, USFWS published a set of National Bald Eagle Management Guidelines that provide direction for landowners seeking to protect eagles while conducting activities on their properties. For example, the guidelines recommend buffers around nests to screen nesting eagles from noise and visual distractions caused by human activities.

While the Bald Eagle was listed under ESA, a permit was available under that act to take Bald Eagles incidental to an otherwise lawful activity. Because there were no regulations under the BGEPA to allow disturbance and other incidental take of either species of eagle, regulations were proposed to establish permits for activities or projects that result in such take. In April 2009, USFWS published a Final Environmental Assessment (FEA) for issuance of Bald and Golden Eagle permits. The FEA analyzes the proposal to permit take of eagles, their nests, eggs, or young that may result from otherwise legal activities, and considers take of nests where necessary to protect public health and welfare. In the FEA, USFWS considered three alternatives to address eagle permitting in the United States.

The Final Rule was published in September 2009, and the regulations took effect in November of that year. The regulation set forth in 50 CFR § 22.26 provides for issuance of permits to take Bald and Golden Eagles where the taking is associated with, but not the purpose of, the activity and cannot practicably be avoided. Most take authorized under this section will be in the form of disturbance; however, permits may authorize non-purposeful take that may result in mortality. The regulation at 50 CFR § 22.27 establishes permits for removing eagle nests where: (1) necessary to alleviate a safety emergency to people or eagles; (2) necessary to ensure public health and safety; (3) the nest prevents the use of a human-engineered structure; or (4) the activity or mitigation for the activity will provide a net benefit to eagles. Only inactive nests may be taken, except in the case of safety emergencies. Inactive nests are defined by the continuous absence of any adult, egg, or dependent young at the nest for at least 10 consecutive days leading up to the time of the take.

Migratory Bird Treaty Act (MBTA), 16 USC 703-712 et seq., protects migratory birds and their habitats, and establishes a regulatory permitting process for legal taking. Except as permitted, actions of the Navy may not intentionally result in pursuit, hunting, taking, capture, killing, possession, or transportation of any migratory bird, bird part, nest or egg thereof. Several legal opinions and court rulings occurred debating the terms of the MBTA. The USFWS issued a final rule in the Federal Register on October 4, 2021, effective December 4, 2021, returning the scope of the MBTA to prohibiting incidental take and applying enforcement discretion that was established prior to 2017. The Migratory Bird Treaty Reform Act of 1998 (Public Law 105-312) amended MBTA to make it unlawful to take migratory game birds by the aid of bait. These amendments also make it unlawful to place or direct the placement of bait on or adjacent to an area for the purpose of taking or attempting to take migratory game birds, and make these violations punishable with fines up to \$100,000 for individuals and \$200,000 for organizations, imprisonment for not more than 1 year, or both. The Act amendment also changed the fine structure for misdemeanor convictions to be up to \$15,000 rather than \$5,000 per count.

FY2003 National Defense Authorization Act – Military Readiness Activities. While some courts held that MBTA did not apply to Federal agencies, in July 2000, the U.S. Court of Appeals for the District of Columbia ruled that Federal agencies are subject to the take prohibitions of MBTA. In May 2002, the Center for Biological Diversity obtained an injunction prohibiting live-fire military training exercises by DoN that killed migratory birds on the island of Farallon de Medinilla in the Pacific Ocean. In December of that year, following a series of legal determinations on the case from the District Court for the District of Columbia and the Circuit Court, Congress authorized (in the FY2003 National Defense Authorization Act, section 315), an interim period during which the prohibitions on incidental take of migratory birds would not apply to otherwise authorized military readiness activities. Congress believed the authorization to be an appropriate balance between the needs of national security and those of bird conservation. The Final Rule was published in the Federal Register on February 28, 2007. The measure directs DoD to assess the effects of military readiness activities on migratory birds in accordance with NEPA. It also requires DoD to develop and implement appropriate conservation measures if a proposed action may have significant adverse effects on a migratory bird population. The rule also provides that, when conservation measures require monitoring of migratory bird populations, DoD retain the data for five years.

Memorandum of Understanding – Military Non-readiness Activities. On July 31, 2006, DoD and USFWS entered into a Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds in accordance with EO 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds.” This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD operations – other than military readiness activities – are consistent with MBTA. The MOU also describes how USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; USFWS, however, may develop incidental take authorization for Federal agencies that complete an EO MOU. It strongly encourages all DoD personnel to work cooperatively with USFWS to implement the actions described in the MOU and to take steps to further migratory bird conservation. This MOU specifically pertains to the following categories of DoD activities that are applicable to NRC Solomons:

- Natural resources management activities, including (but not limited to) habitat management, erosion control, conservation law enforcement and invasive weed management;
- Installation support functions, including (but not limited to) storage facilities and nontactical equipment; and,
- Hazardous waste cleanup.

The MBTA statute, subsequent legal decisions and the MOU are significant for the Station because it is an essential migratory bird activity area. Full compliance with these has become an increasingly important oversight activity for the NAS NR Program. Development of season-specific surveys and migration planning for all projects in or adjacent to migratory bird nesting, feeding or roosting areas has become more significant for compliance documentation. The USFWS has identified bird strikes on buildings as adversely impacting migratory bird populations and through the MOU, installations have a responsibility to conserve migratory bird populations. The USFWS is developing recommendations for assessment protocol and mitigation strategies for structures to determine and address the risk for bird strikes. These changes will be captured in annual updates and addressed where practicable.

Marine Mammal Protection Act (MMPA), 16 USC 1364 et seq., protects marine mammals (cetaceans, pinnipeds, polar bears) and their habitats, and establishes a marine mammal commission. Federal agencies must not take (i.e., harass or kill) any marine mammal on the high seas, or in water or lands under U.S. jurisdiction.

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended, 16 USC 1801-1882, sets mandates for NOAA Fisheries, regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The councils, with assistance from NOAA Fisheries, are required to delineate essential fish habitat (EFH) in fishery management plans or fishery management plan amendments for all managed species. Authority to implement the MSFCMA is given to the Secretary of Commerce through NOAA Fisheries. The MSFCMA requires that the EFH be identified and described for each federally managed species. The MSFCMA requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH or when NOAA Fisheries independently

learns of a federal activity that may adversely affect EFH. NOAA Fisheries, in return, must provide recommendations such as measures for impact avoidance/minimization or mitigation to conserve EFH.

The MSFCMA defines an adverse effect as “any impact which reduces quality and/or quantity of EFH [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species’ fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.810). Per OPNAVINST 5090.1 (series), temporary or minimal impacts are not considered to “adversely affect” EFH. “Temporary impacts” are those that are limited in duration and that allow the particular environment to recover without measurable impact. “Minimal impacts” are those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions.

Fish and Wildlife Coordination Act (FWCA), as amended in 1964, requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. Under this authority, NOAA Fisheries works to protect, conserve, and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not managed by the federal fishery management councils and do not have designated EFH.

3. Department of Defense (DoD) Directives/Instructions

DoDD 4700.4, Natural Resources Management Program, requires that the Department of the Navy implement and maintain a balanced and integrated program for the management of natural resources.

DoDD 4715.1, Environmental Security, establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This directive also ensures that environmental factors are integrated into DoD decision-making processes that may impact the environment, and are given appropriate consideration along with other relevant factors.

DoDI 4715.03, Natural Resources Conservation Program, implements new Natural Resources Conservation metrics, develops new policy and updates policy, assigns responsibility, and prescribes procedures under DoDD 4715.1 for the integrated management of natural and cultural resources on property under DoD control.

4. Secretary of the Navy (SECNAV)/Office of Naval Operations (OPNAV) Instructions

SECNAVINST 6240.6 (series), Environmental Protection and Natural Resources, assigns responsibility to the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps for the development and implementation of natural resources programs on all land and water areas under the jurisdiction of the Department of the Navy.

SECNAVINST 5090.8 (series), Policy for Environmental Protection, Natural Resources, and Cultural Resources Programs, re-issues policy and assigns responsibilities within the Department of Navy concerning environmental protection, natural resources, and cultural resources programs.

OPNAVINST 5090.1 (series), *Environmental and Natural Resources Program Manual*, establishes broad policy and assigns responsibilities for the Naval Natural Resources Program. Naval Facilities Engineering Systems Command is assigned overall program management responsibility with authority to establish, coordinate, and promulgate the program; to issue appropriate instructions to the Naval installations for implementation of the various natural resources programs; and to provide professional natural resources services and technical assistance, through the Facilities Engineering Commands (FECs), to Navy and Marine Corps installations. OPNAVINST 5090.1 (series) directs major claimants and intermediate commands to ensure that subordinate commands support natural resources programs on installations under their control. Installation Commanders/Commanding Officers are tasked with:

- Requesting and using technical assistance from the appropriate FEC in developing and maintaining an effective natural resources program;
- Requesting funding to ensure adequate support of the natural resources program;
- Applying practices set forth in approved natural resources management plans; and,
- Assigning specific responsibilities, centralized supervision, and qualified personnel to the natural resources program.

C. Planning for National Environmental Policy Act (NEPA) Compliance

NEPA is a procedural law that requires review and compliance with other laws. In addition, it requires all federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The objectives of NEPA are to ensure that the government makes informed decisions, the public is included in the decision-making process, and all reasonable alternatives for an action are considered.

OPNAVINST 5090.6 (series) and OPNAVINST 5090.1 (series) establish Navy policy, procedures, and responsibilities for NEPA documentation for Navy actions. It is Navy policy to initiate the NEPA process at the earliest possible time so that it may be an effective decision-making tool in the course of identifying a proposed action and to develop and carefully consider a reasonable range of alternatives for achieving the purpose of the proposed action.

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

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

- Utilize a systematic, interdisciplinary approach to ensure the consideration of natural resources and the environment in planning and decision making;
- Prepare a detailed statement (i.e., an environmental impact statement [EIS]) for major federal actions significantly affecting the quality of the environment;

- Study, develop, and describe appropriate alternatives to actions that use or impact natural resources or the environment;
- Recognize the worldwide and long-range character of environmental problems; and,
- Initiate and utilize ecological information in the planning and development of resource-oriented projects.

Any action at NRC Solomons requiring NEPA documentation is coordinated by the NEPA Program Manager in the Environmental Division at NAS Patuxent River. The installation's Project Planning Checklist ensures that planners and NR Program personnel are actively involved with and aware of the various projects at NRC Solomons that require environmental review and coordination.

D. Beneficial Partnerships and Collaborative Resource Planning

The development of partnerships with state and federal resource agencies as well as local conservation and academic institutions assists in identifying and implementing sound management practices. The following is a list of groups and agencies that have formed or could form significant partnerships with NAS Patuxent River and NRC Solomons.

- USFWS, to provide assistance in matters that concern the conservation, protection, and management of fish and wildlife species.
- USFWS Chesapeake Bay Ecological Services Field Office, to provide assistance in the management of invasive species.
- MDNR Wildlife and Heritage Service, to assist in matters that concern the conservation, protection, and management of fish and wildlife species.
- MDNR Natural Heritage Program, to provide information and guidance related to RT&E species information.
- Calvert County Soil Conservation District, to assist with soil conservation and erosion, as well as shoreline stabilization issues.
- DoD Chesapeake Bay Program, to provide assistance in meeting the mandates of the Agreement of Federal Facilities on Ecosystem Management in the Chesapeake Bay and other Chesapeake Bay Agreements.

E. Outreach

NAS Patuxent River NR Program staff provide environmental education programs and events for NRC Solomons visitors as requested, approximately two to three times per year. Historically, activities have also been conducted to include visitor participation in National Public Lands Day events.

F. Encroachment Management

Incompatible urban development could present NRC Solomons with a long-range threat to the military mission. As the town of Solomons, Maryland, continues to grow toward the boundaries of NRC Solomons, land development could become incompatible with the installation's recreational mission and potentially result in pressure to modify land use at the installation.

The NAS Patuxent River Complex Encroachment Action Plan was prepared in accordance with OPNAVINST 11010.40 (Encroachment Management Program). An updated EAP was finalized in 2016 and includes NRC Solomons. This EAP is a proactive strategy that addresses all types of encroachment pressures (e.g., adjacent private development, certain environmental restrictions, or growing competition for resources such as groundwater or waterfront) at the installation and other operating areas, such as Bloodsworth Island Range and Webster Outlying Field, to preserve the ability to meet existing and future mission requirements and to provide effective testing and training capabilities.

G. State Comprehensive Wildlife Plans

The Maryland State Wildlife Action Plan (SWAP) was developed in 2005 and updated in 2015, and is implemented by the MDNR Wildlife and Heritage Service (MDNR 2015). The SWAP is a 10-year strategic plan required for continued funding through the State Wildlife Grant Program (administered by USFWS). The SWAP was developed with extensive input from other state and federal agencies, non-governmental organizations, and private citizens. A DoD representative served as the Conservation Team Leader on the External Steering Committee, which acted as an advisory board to ensure that a wide range of resource conservation interests were addressed in the development and implementation of the SWAP.

The SWAP addresses eight required elements, with corresponding conservation actions organized by threats. A total of 610 species of greatest conservation need (SGCN) and 59 key wildlife habitats are assessed. The SWAP then identifies significant threats for each, including habitat loss, degradation, fragmentation, disturbances (both natural and anthropogenic) and pollution. Ultimately, the SWAP is used in conjunction with INRMPs to outline conservation actions for planning purposes and future project considerations.

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

- Mapping and protecting wetlands from drainage, ditching, filling, and other damaging practices that alter hydrology;
- Conducting baseline and follow-up faunal surveys for migratory and breeding birds, small mammals, furbearers, and herpetofauna;
- Enhancing natural areas through the control of invasive plant species; and,
- Continuing soil erosion prevention and shoreline stabilization efforts.

4. PROGRAM ELEMENTS

The following elements are not applicable to management at NRC Solomons and will not be discussed further: agricultural outlease, critical habitat management, and training of natural resources personnel.

A. Management of Rare, Threatened, and Endangered Species and Species of Concern

1. Program Description

The primary regulatory protection for RT&E species on military installations is ESA. Under the mandates of ESA, federal agencies must protect and conserve listed species and ensure that agency actions do not jeopardize the continued existence of those species.

Although initial and follow-up RT&E species surveys and coordination with USFWS and MDNR indicate that no federally listed species are known to occur on NRC Solomons, there are five that have the potential to occur in the waters bordering the installation: Shortnose and Atlantic Sturgeon (both federally endangered), Leatherback and Kemp's Ridley sea turtles (also federally endangered), and Atlantic Loggerhead sea turtle (federally threatened).

Several state-protected species have been documented on the installation. one state-endangered bird species, Royal Tern and one state-threatened plant species were observed during the 2007 survey. The state-endangered Nashville Warbler has been seen at the installation, with the earliest confirmed sighting in 2008. One state-rare plant, White Spikerush, that was documented has since been delisted. White Spikerush and Showy Goldenrod were also documented at NRC Solomons in subsequent surveys (Davis 2010, DoN 2014). The Bald Eagle (species of concern) has also been documented in the area. The Diamondback Terrapin is a Maryland state species of GCN known to occur at NRC Solomons. However, nest surveys conducted in 2017 and 2018 concluded that there was no nesting habitat there that did not have some level of human activity. The Monarch Butterfly (species of concern) has not been surveyed, but likely uses the property.

2. Management Objectives

NAS Patuxent River is responsible for rare species management at NRC Solomons. NAS Patuxent River natural resources professionals coordinate the planning, budget controls, and general administrative functions of the program. USFWS and the MDNR Wildlife and Heritage Division provide guidance on management issues and projects related to rare species and species of concern.

The overall objective of the program element is to ensure compliance with ESA, BGEPA, DoD and DoN policies, and applicable state regulations; and to protect and enhance rare species populations and their habitats. All NEPA reviews will specifically document (in Categorical Exclusion records, Environmental Assessments and EISs) impacts to these species (or lack thereof). Management criteria for the program include the following:

- Assess and monitor known populations of RT&E species and species of concern;
- Avoid impacts to RT&E species and their habitat; and,

- Maintain existing population levels and habitat; where feasible, increase populations and enhance habitat.

3. Management Practices

The location of the identified RT&E species have been mapped using global position systems (GPS) technology and are maintained in the NAS Patuxent River geographic information system (GIS) database to provide critical information to improve land use decisions. Continued monitoring of known rare species and periodic survey for new species of concern will help ensure compliance with federal and state laws and DoD and Navy policies. Specifically, continued Bald Eagle nest and roost-site surveys and periodic Diamondback Terrapin nest surveys will ensure current species presence/absence information so that the management program can be updated as needed. Additionally, projects will continue to be reviewed for natural resources impact; those that have potential to impact state or federally listed species or species of concern may require additional evaluation and must be coordinated with MDNR and USFWS.

B. Wetlands Management

1. Program Description

Wetlands protection is vital to the ecological integrity of the aquatic resources on and adjacent to the Complex properties. Chesapeake Bay waters have been heavily impacted over the decades through intensive farming, sedimentation, and loss of wetlands. In addition, predicted sea-level rise may result in loss of many wetlands to inundation. Wetlands play a vital role in cleansing runoff of dissolved and particulate pollutants before they reach open waters such as the Bay.

Wetlands management at NRC Solomons is applicable to all jurisdictional wetlands and is designed to ensure compliance with federal and state wetland regulations. NAS Patuxent River personnel oversee management of tidal and non-tidal wetland areas and deepwater habitats on the installation. Basewide wetlands mapping at NRC Solomons was conducted using 1981-1982 aerial imagery as part of the NWI effort, which provides only very coarse, planning level data. In addition, field delineations were conducted in the vicinities of the recreational trail and the marina in February 2014. Conducting periodic, follow-up wetlands survey and delineation (using GPS technology or traditional land survey methods) in order to update the NAS Patuxent River Natural Resources Office GIS would continue to improve planning capabilities and wetlands protection at NRC Solomons.

2. Management Objectives

The overall objective of wetlands management at NRC Solomons is to ensure compliance with Section 404 and 401 of CWA; EO 11990, Protection of Wetlands; EO 11988, Floodplain Management; and applicable state regulations; as well as to protect and enhance wetland communities at NRC Solomons. Management criteria for the program include:

- Protect and enhance the biodiversity, functions, values, and habitat availability of wetland communities;
- Maintain no net loss of installation wetlands;
- Implement ecosystem management practices to achieve program goals; and,

- Comply with existing federal and state wetland regulations.

3. Wetland Permitting

Under Section 404 of the CWA, discharge of dredge and fill material into waters of the United States, including wetlands, is prohibited unless a permit is issued by USACE. In accordance with Section 401 of the CWA, federal agencies must also obtain a water quality certificate from the state for any action requiring a federal license or permit. MDE requires state permits for any impacts to state waters and wetlands, including isolated wetlands. The nature of regulated activities is broadly interpreted and may include filling, grading, grubbing, excavating, and pile-driving. It should be considered that, with a few exceptions, nearly any activity within a jurisdictional wetland requires a joint permit from USACE and MDE.

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

A General Permit may be issued for activities that are similar in nature and would have only minimal individual or cumulative adverse environmental effects. General permits can be issued on a nationwide, regional, or state basis for particular categories of activities (EPA 2022). The Baltimore District Engineer has implemented a Maryland State Programmatic General Permit (MDSPGP) which was reissued in 2021. This regional permit is designed to continue to authorize certain activities previously covered by the nationwide permit program and institute an integrated state and federal regulatory process (USACE 2021). It is applicable to actions that will not individually and/or cumulatively result in direct or indirect impacts to more than 1.0 acre of waters of the United States, including jurisdictional wetlands and navigable waters.

Compensatory mitigation requirements for wetlands impacts are determined by district engineers on a case-by-case basis, after considering relevant and available information, such as the ecological conditions of the project site, the type of activity, the impacts of the activity on the aquatic environment and other public interest factors. Compensatory mitigation, which is generally triggered when proposed wetlands impacts exceed 5,000 square feet, may be accomplished through the following ways:

- **Mitigation Banks:** A permit applicant may obtain credits from a mitigation bank, which is a wetland, stream or other aquatic resource area that has been restored, established, enhanced, or preserved. This resource area is then set aside to compensate for future impacts to aquatic resources resulting from permitted activities. The value of a bank is determined by quantifying the aquatic resource functions restored, established, enhanced, and/or preserved in terms of credits. There are currently no mitigation banks available to the Complex (Smith 2014).

- **In-Lieu Fee Mitigation:** A permit applicant may make a payment to an in-lieu fee program that will conduct wetland, stream or other aquatic resource restoration, creation, enhancement, or preservation activities. In-lieu fee programs are generally administered by government agencies or non-profit organizations that have established an agreement with the regulatory agencies to use in-lieu fee payments collected from permit applicants. There is currently no in-lieu fee program available in Maryland (Smith 2014).
- **Permittee-Responsible Mitigation:** A permittee may be required to provide compensatory mitigation through an aquatic resource restoration, establishment, enhancement, and/or preservation activity. This compensatory mitigation may be provided at or adjacent to the impact site, or at another location, usually within the same watershed as the permitted impact. The permittee retains responsibility for the implementation and success of the mitigation project.

4. Submerged Aquatic Vegetation

SAV beds are considered Special Aquatic Sites, as defined in 40 CFR Part 230 (Section 404 (b)(1) Guidelines), Subpart E (230.4 through 240.45) and are an important resource that provides protection and nursery habitat for a broad range of aquatic organisms. SAV, or bay grass, is comprised of vascular plants that grow completely submerged below the low-tide line. In the murky waters of the Bay, they are often restricted to depths up to 3 feet. SAV is an important contributor to the primary and secondary production of the Chesapeake Bay as beds of SAV provide food and habitat for waterfowl, fish, shellfish, and invertebrates. SAV beds also produce oxygen, filter and trap sediments, protect shorelines from erosion by reducing the energy of wave action, and remove excess nutrients from the water column (thereby reducing the occurrence of algal blooms) (NOAA 2022b). Over the last two decades, however, the trend in SAV decline has gradually been reversing as efforts have been made through the Chesapeake Bay Agreement and other initiatives to restore and manage the water quality of the Bay. The changes in SAV coverage have been mapped by VIMS, which conducts annual aerial surveys of the Chesapeake Bay (VIMS 2015).

In April 2000, Widgeon Grass was planted at NRC Solomons; however this planting appears unsuccessful as no SAV have been documented at NRC Solomons during the VIMS surveys. In 2003, MDNR began SAV (Eelgrass) restoration projects at five locations in the lower Patuxent River (MDNR 2007b). These restoration efforts continued through 2004 and 2005. Three of the restoration sites (Hungerford Creek, Myrtle Point, and Solomons Island) are in the vicinity of NRC Solomons. The Hungerford Creek restoration site is just north of NRC Solomons at the mouth of Hungerford Creek. A total of 2.25 acres were seeded at this site in 2004 and 2005. The Hungerford Creek restoration site is located on the western shore of the Patuxent River directly across from NRC Solomons. A total of three acres were seeded at this site in 2004 and 2005. The Solomons Island restoration site is located at the southern tip of Solomons Island. Over five acres were seeded at this site in 2004. The 2005 VIMS survey indicate that SAV species are present at all three restoration sites in the vicinity of NRC Solomons, although no beds were documented (VIMS 2014a). The VIMS interactive map data confirms no beds located at NRC Solomons.

C. Fish and Wildlife Management

1. Program Description

The availability and diversity of suitable habitats at NRC Solomons influence the fish and wildlife populations that can occur on the installation. With over 86 percent of the installation developed or comprised of mowed lawn, the potential for supporting a wide diversity of wildlife is relatively low and most species known or expected to occur are those that are adapted to urban and suburban environments. Although a comprehensive biological survey of the installation has not been conducted, a number of fish and wildlife species have been observed during surveys conducted in 2009 (Rambo 2014a), reconnaissance site visits (Geo-Marine, Inc. 2007), other survey efforts (USACE 1996), and indirectly during other site visits (see Tables B-1 through B-5 in Appendix B).

2. Management Objectives

The overall objective of fish and wildlife management is to maintain and enhance ecosystem functions and values in a manner that is consistent with the military mission and within habitat carrying capacity. NAS Patuxent River natural resources program personnel coordinate daily planning, budget controls, and general administrative functions of the program. USFWS and MDNR are cooperating agencies and are available to provide guidance on management issues and projects. Specific management objectives for the program include:

- Protect, conserve, and manage fish and wildlife populations that are capable of supporting non-consumptive and consumptive uses;
- Balance wildlife population levels with habitat-carrying capacity;
- Maintain and enhance biodiversity to the greatest extent practicable within the constraints of the military mission and given the urban setting; and,
- Ensure that wildlife populations do not conflict with the military mission.

3. Management Practices

In accordance with Navy policy, fish and wildlife management focuses on protecting and enhancing biodiversity through ecosystem management. Conserving habitat diversity is a primary tenet of ecosystem management and, because of the high level of development at NRC Solomons, the conservation and enhancement of any remaining natural habitat is important to protecting the installation's wildlife resources. Management efforts currently underway to conserve and enhance habitat diversity include shoreline stabilization, use of native species in landscaping, and invasive species control.

Further efforts that focus on maintaining a diversity of habitat types that provide year-round food and cover (coniferous vegetation) as well as seasonal food and cover (mast-producing deciduous vegetation) provide the greatest benefits for wildlife. Supplemental plantings of native trees and shrubs in maintained open areas and around building and recreational areas, where consistent with current and planned land uses, would help enhance habitat diversity and meet wildlife management objectives. Providing additional artificial nesting habitat in urban areas is another management action that can enhance wildlife habitat at the installation.

4. Nest Box Program

Providing properly maintained nest boxes is an effective management practice for improving habitat for the installation's avian wildlife; however, improperly maintained boxes can actually increase populations of non-native/invasive species. Artificial nest boxes are useful for enhancing habitat conditions for a number of bird and wildlife species in areas where there are few natural cavity trees or where competition from aggressive non-native species such as House Sparrows and European Starlings is great. Placement of structures that benefit insectivorous birds in urban and housing areas also provides a benefit to people as these birds consume thousands of insects a day and provide enjoyment for human observers. Eastern Bluebirds (*Sialis sialis*), Tree Swallows (*Tachycineta bicolor*), Purple Martins (*Progne subis*), owls, Wood Ducks (*Aix sponsa*), mice, squirrels, and bats are species that commonly utilize artificial structures. NRC Solomons currently has several bluebird and Wood Duck nest boxes and nesting platforms for Ospreys. Mapping nest box locations using GPS technology, the addition of new nest boxes and houses, and annual maintenance and monitoring improve the effectiveness of this program.

5. Nuisance Animal Management

The presence of wildlife in urban environments can pose difficulties as well as benefits. Nuisance situations occur when wildlife populations, including feral animals, exceed human expectations. It is Navy policy (DoD DIR 4150.7 [DoD Pest Management Program], OPNAVINST 62.50 [series] [Navy Pest Management Program], and OPNAVINST 5090.1 [series]) to employ an integrated pest management (IPM) approach to pest control. IPM is an environmentally sound approach to pest management that promotes non-chemical controls and stresses prevention to avoid unacceptable levels of pest damage. A variety of biological, cultural, and mechanical pest management strategies are used towards a goal of economically and environmentally optimum results. NAS Patuxent River has an IPM Plan that guides the IPM program at the Complex, including NRC Solomons (DoN 2016b).

Wildlife at NRC Solomons that are considered nuisance species include Groundhogs, beavers, skunks, and jellyfish. Other potential nuisance species include feral cats, rats, White-tailed Deer, and rabid mammals. These species may cause safety hazards to people, property, and other wildlife. Beaver, skunk, and deer are protected as game species under Maryland law; as such, special permits are needed to trap, transport, or otherwise control these species. The Public Works Department manages a grounds maintenance and pest control contract under which licensed pest controllers perform nuisance wildlife control at NRC Solomons.

a) *Groundhogs, Beavers, and Skunks*

Nuisance animals at NRC Solomons that pose a potential safety hazard and could damage personal property include Groundhogs, beavers, and skunks. An active Groundhog population that digs tunnels under facilities or at outdoor recreational sites could undermine the structural integrity of buildings or the pier complex. Skunks, which also den in Groundhog burrows, can occur too close to buildings for the comfort of NRC Solomon's visitors. Beavers are another nuisance animal that have been observed on the installation. A small beaver population that inhabits Second Cove has been cutting large trees in close proximity to the boat storage area and the marina. Beaver damage

could create substantial costs in replacement and repair of boats and marina facilities if one or more trees fell into the boat storage or marina area.

b) *Stinging Jellyfish*

The Sea Nettle (*Chtysaora quinquecirrha*) is a stinging jellyfish that can make the Chesapeake Bay and its tributaries inhospitable to swimmers in the summer. These jellyfish are found most abundantly in the tributaries of the middle Chesapeake Bay where the salinity is between 10 and 20 ppt.

Efforts to control jellyfish in the Bay during the 1960s were largely unsuccessful. Nets and bubble screens were employed to keep them away from swimming areas; however, the jellyfish tended to clog the nets and to break into pieces that continued to sting. The benthic polyp stage also was targeted using chemicals, but this resulted in the mortality of non-target species and was discontinued. The only method known to reduce jellyfish populations is an influx of fresh water, which decreases their reproductive potential; however, reducing the salinity is harmful to shellfish and submerged aquatic vegetation in the area (Maryland Sea Grant College 2004).

A more practical solution to Sea Nettle encounters in the swimming area involves informing and educating swimmers on the presence of jellyfish and ways to avoid contact. MWR could coordinate with MDNR to prepare a brochure for Sea Nettle safety and treatment.

c) *Feral Cats and Dogs*

Pets that have been abandoned or left behind by owners often become serious pests on military installations. Feral animals may carry diseases such as rabies, distemper, and feline leukemia (in cats) and pose a serious health threat to humans and family pets. It is, therefore, important to ensure that pets are properly vaccinated, tagged, and registered when brought onto NRC Solomons. In addition, feral animals and loose pets, particularly cats, are known to be very damaging to migratory bird populations and other native wildlife. To reduce impacts to native wildlife and in accordance with OPNAVINST 5090.1 (series), privately owned animals are not permitted to run at large on the installation. Pet owners should also be encouraged to neuter their pets to reduce the occurrence of unwanted animals.

The Armed Forces Pest Management Board issued Technical Guidance No. 37 – Integrated Management of Stray Animals on Military Installations, updated in December 2016, provides guidelines for humane capture and disposition of stray animals. Prior to that, in 2002, CNO issued a policy letter (Preventing Feral Cat and Dog Populations on Navy Property) that stated the Navy policy on feral pets. In accordance with both the policy and the technical guidance, NRC Solomons must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations on the installation and must ensure the humane capture and removal of feral cats and dogs. Every effort should be made to find homes for adoptable animals. Due to the potential of feral or free-ranging cat populations to act as disease reservoirs (threatening human health, native wildlife populations and natural ecosystems), Navy commands shall not allow Trap-Neuter-Release or similar programs on their lands. Assistance from the local animal control warden should be sought for capture and placement or disposal of feral cats and dogs. Increasing public awareness on the problems associated with feral cats is a primary factor in controlling feral

animal populations. Installation personnel and guests should understand that feeding feral cats and dogs is an unacceptable practice that may cause feral and other predator populations such as raccoons to increase. Prompt garbage removal and keeping dumpster and refuse receptacles covered with tight-fitting lids are other important practices.

d) Rabies

A potential problem at NRC Solomons is the occurrence of rabies in feral animals and wildlife. Rabies is a viral disease carried by mammals and often transmitted through the saliva of a symptomatic animal. Rabies affects the central nervous system and causes death without early detection and treatment. Today, rabies is most often transmitted to humans by wild animals. The optimal defense against rabies is through an education program for installation personnel. The NR Program offers a biohazards presentation that incorporates rabies awareness and prevention.

6. Fisheries Management

a) Habitat Management

The waters of the Patuxent River and its tributaries serve as important spawning or nursery sites for many finfish species such as Spot, Croaker, Striped Bass, and multiple species of flounder, menhaden, herring, and shad, as well as Blue Crabs, oysters, and clams. Fish populations in the river, however, have decreased significantly from historic numbers because of overconsumption, pollution, and water quality degradation (USACE 1996). A number of projects have been undertaken at NRC Solomons to improve water quality and fish habitat. Shoreline stabilization efforts along the western and southern shorelines, which are being completed in phases, have resulted in improved water clarity and the enhancement of fish habitat. Beach grass and SAV plantings at various locations along the shoreline have also helped reduce erosion and improve aquatic habitats.

The installation also participates in the state's Clean Marina Program and the Point Patience Marina is a certified Maryland Clean Marina (MDNR 2022). The Clean Marina Initiative is a voluntary program that encourages marina operators and recreational boaters to protect coastal water quality by engaging in environmentally-sound operating and maintenance procedures. Certified marinas meet the rigorous pollution prevention standards established by the Maryland Clean Marina Committee and the MDNR. CNIC's goal for recreational marinas is to have all marinas that are located in states with a clean marina program achieve certification.

b) Population Management

Fishing and crabbing are popular recreational activities at NRC Solomons. Visitors may rent boats to get onto the Patuxent River to fish, or may fish from the recreational pier. Regional fisheries management plans are supported at NRC Solomons through strict enforcement of all MDNR Fisheries Service regulations regarding minimum fish size, time of year restrictions, creel limits, and special considerations for all regulated species.

The dispersal and introduction of non-indigenous aquatic species is largely caused by the release or escape of bait fish and other organisms released by anglers. Although the state of Maryland does not currently have restrictions on non-native live bait, the Navy has implemented proactive

measures to protect native fish populations and prevent the spread of aggressive non-native species by prohibiting use of all live bait other than night crawlers and bloodworms. Additional measures including prohibiting use of all live non-native bait and the release of live bait (on land or water) also help prevent the introduction and spread of invasive species. All unused bait must be put in a plastic bag or container and placed in the trash for proper disposal. Use of non-native alternative live baits such as Nuclear Worms (*Namalycastis abiuma*) will continue to be prohibited at NRC Solomons.

c) *Oyster Restoration*

Although oyster production was once the primary industry in the area around Solomons Island, over-harvesting, degraded habitat, pollution, and diseases have caused a severe decline in oysters over the last century and very little harvest occurs in the Patuxent River today. Oysters are also an important part of the aquatic ecosystem as they filter pollutants and provide habitat for many other aquatic organisms.

As part of the 1999 shoreline stabilization project, an oyster reef was developed at the southern end of the installation in cooperation with MDNR. The Navy built the reef and purchased oyster spat for seeding; additional spat was added several years later. Further efforts like this would support regional efforts to restore water quality and fish habitat in the Patuxent River.

D. Migratory Bird Management

1. Program Description

Migratory birds are a large, diverse group that utilize breeding grounds in the United States and Canada, and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. MBTA is the primary legislation in the United States established to conserve migratory birds. It prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. As of April 2020, 1,093 species are included on the list of migratory birds (85 FR 21282). Non-native species such as House Sparrow (*Passer domesticus*), European Starling, Rock Pigeon (*Columba livia*), and Mute Swan are not protected under MBTA.

As discussed earlier in this INRMP, an exemption to the rule that allows for the incidental take of migratory birds by DoD during military readiness activities was finalized in February 2007 (72 FR 8931). As directed by 315 of the 2003 National Defense Authorization Act, this rule authorizes such take, with limitations, that result from military readiness activities. If DoD determines that a proposed or ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.

Military readiness activities include all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness does not include routine operation of installation support functions, such as administrative offices, military exchanges, commissaries, storage facilities, laundries, MWR activities, shops, the operation of industrial activities, or the construction or demolition of facilities listed above (72 FR 8931).

During annual INRMP reviews, the Navy must report any migratory bird conservation measures that have been implemented and the effectiveness of those measures in avoiding, minimizing, or mitigating take of migratory birds.

2. Management Objectives

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

3. Management Practices

The Natural Resources Program has enhanced migratory bird nesting habitat by installing nesting boxes for Eastern Bluebirds and Wood Ducks and nesting platforms for Ospreys. Additional monitoring and maintenance of existing structures and the installation of additional nesting boxes would improve the program's effectiveness and value to migratory bird populations.

E. Forest Management

1. Program Description

NRC Solomons is a highly developed installation that consists of developed and mowed areas with small, isolated stands of trees ranging in size from less than an acre to approximately 12 acres. With the exception of firewood sales, there is no potential for commercial forest management on the installation. Forest resources do, however, provide a number of social, environmental, and economic benefits including aesthetic enhancement, water quality improvement, and wildlife habitat.

2. Management Objectives

The primary objectives of forest management are to:

- Conserve and enhance existing forested areas that contribute to overall ecosystem function, and,
- Increase forested acreage through reforestation where practicable, within the constraints of the military mission.

3. Management Practices

Although commercial forestry is not an objective of forest management at NRC Solomons; management of the forested areas is necessary to maintain this valuable resource. The primary issues concerning the forested areas are land development and invasive plant species. Land-use plans for NRC Solomons focus on demolition and redevelopment of previously disturbed sites (i.e., abandoned housing areas) in order to minimize habitat loss. Future land-use changes should continue to restrict development to the existing disturbed footprint, and any areas no longer required for mission purposes could be planted or allowed to naturally revert to meadow or forested land. As with other areas that developed on previously disturbed sites, efforts must be taken to control invasive species on any areas on which mowing or other maintenance is discontinued.

F. Vegetative Management

1. Program Description

Vegetative management includes grounds maintenance in improved grounds, landscaped areas, and other non-forested areas at NRC Solomons. Relevant to vegetative management on federal facilities, EO 13508 (Chesapeake Bay Protection and Restoration) requires federal agencies to implement land management practices to protect the Chesapeake Bay and its tributary waters. As specific DOD guidance is generated under this EOs, BMPs will be added to the INRMP and appropriate projects will be defined.

Vegetative management at NRC Solomons should emphasize the use of low maintenance, native species for landscaping. Vegetative management is closely linked with Pest Management, Fish and Wildlife Management, Urban Forest Management, Wetland (and Watershed) Management, and Invasive Species Management.

2. Management Objectives

The objectives of vegetative management and grounds maintenance are to:

- Maintain safe conditions for personnel and visitors to NRC Solomons;
- Provide an attractive, well-maintained working environment for installation personnel through the proper management and enhancement of landscaped areas; and,
- Enhance landscaped areas to better contribute to overall biodiversity and ecosystem function.

3. Beneficial Landscaping

The primary method for meeting vegetative management objectives is through implementing beneficial landscaping practices that reduce the use of energy, water, and fertilizers as described in the 1994 President's Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 Federal Register 40837). The concept of beneficial landscaping emphasizes:

- Using regionally native plants;
- Using construction practices that minimize adverse effects on the natural habitat;
- Preventing pollution by reducing fertilizers and pesticides, using IPM techniques, recycling green waste, and minimizing runoff;
- Using water-efficient practices; and,
- Creating outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive.

The term beneficial landscaping describes practices that integrate native vegetation and wildlife habitat into the landscape and minimize the adverse effects that landscaping has on the natural environment. The use of regionally native plant species, which are generally better suited for local site conditions than non-native species, reduces the need for intensive maintenance and the use of

fertilizers and pesticides. Native plant species are also less likely to become invasive pests than non-native species and serve as better sources of food and cover for native wildlife.

4. Pollinator Habitat Management

Pollination is an ecosystem service that is vital to installation landscapes and, subsequently, to carrying out the military mission. Many of the listed and at-risk species located on DoD lands are either pollinators (e.g., bees, bats and butterflies) or flowering plants that require pollination. As pollinators decline in numbers, native landscapes could become barren or be overrun by invasive species. Declines in populations of listed or at-risk species may result in access restrictions, which in turn could reduce the military's capacity to test and train or limit access to recreational areas. Diverse native plant communities, which may depend heavily on pollinators, are frequently more resilient to impacts from training and nearby development activities than poorer quality habitats – they resist erosion from terrestrial testing/training and recreational use and are more resilient to fire.

In September 2014, DoD released memorandum that addresses the use of pollinator-friendly management practices, which expands on pollinator policies found in DoD Instructions 4150.7 and 4715.03. This requires (where practicable) the use of native landscaping and minimized use of pesticides in sensitive habitats. The policy also directs military branches to coordinate with other agencies and non-governmental organizations on pollinator management. The 2018 Armed Forces Pest Management Board Technical Guide, No. 9, DoD Pollinator Conservation Reference Guide, provides technical information for programs to develop a strategy and training to support the efforts of DoD personnel to conserve pollinators. NAS has been proactive in managing for pollinators with habitat restoration activities including milkweed planting.

The NR Program should continue to review all planting proposals and recommend the use of native pollinator plants in stormwater management and general landscape design. This should include NR Program participation in reviewing and updating the Installation Appearance Plan for the NAS Complex.

5. Landscaping Design and Implementation

Creating a pleasant working environment for base personnel and recreational visitors is an important mission requirement for NRC Solomons and can be accomplished through appropriate landscape design and implementation. The Naval District Washington Regional Landscape Management Plan (DoN 2003) addressed landscaping issues and concerns at eight installations, including NRC Solomons.

To address these issues at NRC Solomons, new landscaping initiatives should be undertaken for different settings and site conditions, where practical, using the landscaping standards, practices and templates presented in the Regional Landscape Management Plan as well as the Installation Appearance Plan for the NAS Complex, while ensuring the use of native plants and pollinator-friendly species to the greatest extent practicable.

6. Mowed Lawns

The lawns at NRC Solomons are mowed to present a neat and attractive appearance. Grassy areas generally are planted with cool season fescues. Beneficial landscaping practices that could be implemented at NRC Solomons include reducing the area of mowed lawn by increasing the use of native trees, shrubs, and ground covers; proper use of mulch; maintaining lawn grass at a height of approximately three inches; and restricting mowing during dry periods. Lawns and landscaped areas should also be maintained to minimize invasive species infestation. Because of the highly disturbed nature of the installation, areas that are removed from the mowing contract and allowed to naturalize must be monitored and treated for invasive species control.

7. Urban Shade Trees and Forests

Navy policies on urban forests, as stated in NAVFAC P-73, require consideration of both forest and ornamental trees in all planning decisions. An urban forest survey was conducted in 2002 as an appendix to the NDW Regional Landscape Management Plan (DoN 2003). The survey effort focused on identifying hazard trees and assessing forest health and condition. The survey found that the urban forest at NRC Solomons is relatively diverse with more than 20 tree and shrub species occurring. Because of the high level of maintenance and mowing, natural tree regeneration is unlikely to occur; tree age ranges from sapling to about 75 years old; and overall, the trees are in good health. Individual trees were identified and mapped as hazardous or in need of routine pruning.

No specific diseases or pests were identified as the causes of tree mortality at NRC Solomons; instead, poor pruning and maintenance practices were cited as the primary issues causing injury and death of the urban forest. The lack of follow-up care; such as removal of guy wires, stakes, tree guards, and planting tubes; was observed to be a major problem.

Implementing standard grounds maintenance practices that address protection of existing trees and shrubs would improve the appearance, longevity, and overall health of the urban forest trees at NRC Solomons. The International Society of Arboriculture (ISA) offers certification, training, and resources relating to standard practices for tree, shrub, and other woody plant maintenance and removal. Tree pruning should only be performed by trained NRC Solomons personnel or qualified tree care professionals. Additional urban forestry information and pruning guidelines can be found in Appendix F.

G. Invasive Species Management

1. Program Description

Invasive species are any species that are not native to a given ecosystem, and whose introduction causes or is likely to cause economic or environmental harm and/or harm to human health (EO 13112 on Invasive Species, February 1999). Because of their ability to alter natural ecosystems and diminish the abundance or survival of native species, invasive species are recognized as a leading threat to natural ecosystems and biodiversity, as well as a leading cause of species becoming threatened and endangered. It is estimated that 42 percent of the species protected by the ESA are at risk primarily because of non-native, invasive species (Pimentel et al. 2005).

EOs 13112 and 13751, Invasive Species, were issued to identify actions which may affect the status of invasive species. Subject to the availability of appropriations and to the extent practicable and permitted by law, each federal agency shall use relevant programs and authorities to prevent the introduction of invasive species, detect and control such species in a cost-effective manner, monitor invasive species populations, provide for restoration of native habitats that have been invaded, conduct research on invasive species to prevent introduction and for sound control, and promote public education on invasive species.

The Noxious Weed Act of 1974 provides for the control of noxious plants on lands under the control or jurisdiction of the federal government. The law allows poisonous plants and noxious weeds to be controlled or destroyed in an approved manner when the plants interfere with the safe and efficient use of the land, endanger the health and welfare of personnel, or infest adjacent property. Of the eight listed noxious weeds in Maryland (MDA 2020), three have been documented at NRC Solomons: Canada Thistle (*Cirsium arvense*), Plumeless Thistle (*Carduus acanthoides*), and Bull Thistle (*Cirsium vulgare*) (DoN 2019).

The control of invasive species is a primary natural resources management issue on military installations because of the potential impacts invasive species have on military training and readiness and the degradation they can cause to the natural environment. The Invasive Plant Species Survey and Management plan for Naval Air Station Patuxent River, Webster Field Annex, and Naval Recreation Center Solomons, prepared in 2019, provides detailed descriptions and management recommendations for each of the invasive plant species found at NRC Solomons as well as site maps identifying locations with concentrations of these species (DoN 2019). Figure 4-1 shows invasive plant species locations at NRC Solomons.

2. Management Objectives

The overall objective of invasive species management is to protect ecosystems and native plant and animal species from invasive species through compliance with EO 13112 and EO 13751. The EOs require that federal agencies coordinate complimentary, cost-effective activities concerning invasive species with existing organizations addressing invasive species. The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), The Nature Conservancy, and the Maryland Natural Heritage Program may provide guidance on invasive species management issues and projects. FICMNEW offers guidelines for coordinated management and implementation of a national early detection and rapid response system for combatting invasive species (<https://my.usgs.gov/confluence/display/ficmnew>).

3. Inventory

Twenty-four exotic and invasive plant species (Appendix B) were located on NRC Solomons during a 2019 field survey (DoN 2019). Many of these species were planted as ornamental plantings, and have subsequently spread throughout the natural portions of the installation. Continued monitoring for new populations of invasive and noxious weed species would allow for early control of new infestations as well as assessment of control efforts as they are implemented.

4. Invasive Plant Control

In accordance with EOs 13112 and 13751, NAS Patuxent River will control populations of invasive plants at NRC Solomons in a cost-effective and environmentally sound manner, although funding for such programs has historically been limited. When practicable, control efforts will be coordinated with other local or regional control programs. A variety of control measures will be employed based on species-specific and site-specific requirements. In some cases, a combination of measures may be appropriate. Various options for invasive plant control include avoidance, mechanical controls, biological controls, and chemical controls, all of which are discussed below.

a) *Avoidance*

Avoidance measures include prohibiting the use of invasive plants for landscaping or other purposes, implementing BMPs to minimize land disturbances that promote invasion, and revegetating disturbed areas with native species. Avoidance is the preferred measure of invasive species control at NRC Solomons. A list of appropriate native plant species and their landscape uses is in Appendix F. A native plant list should be incorporated into grounds maintenance contracts to help ensure non-native species are avoided in newly planted areas.

b) *Mechanical Controls*

Mechanical controls include mowing, cutting, pulling, and prescribed burning to manage and eradicate invasive species. Small infestations may often be controlled by hand pulling, grubbing with a hoe, or by using a shrub-pulling device. However, such methods may cause soil disturbance, which can encourage reinvasion and intrusion by other pests. These methods are also generally not effective in eradicating large infestations unless combined with chemical controls. Controlled burning is unlikely to present a viable option at NRC Solomons due to the nature of the military mission, the urban setting, and the developed nature of the installation. Using a combination of mowing/cutting and selective application of herbicide on targeted invasive plant species is often the most effective approach.

c) *Biological Controls*

Biological controls typically involve the introduction of a species (biological control agent) that feeds on or impedes the growth of the target invasive plant. The science of biological controls has made significant advances in recent years, but effective and approved methods are currently limited. Where applicable, this method can be very cost-effective and avoids potential impacts associated with chemical and mechanical controls; however, many biological control agents are non-native species, which raises additional concerns. Biological control measures may be used at NRC Solomons when they are determined to be the most appropriate measure available. Use of biological controls will be limited to those agents that are USDA-approved and for which NEPA documentation already exists. This method of invasive species control has not been attempted at NRC Solomons and is unlikely to present a viable option in the future.

Figure 4-1. Invasive Species at NRC Solomons



Note: For data source information and most accurate data, access GRX directly, since paper maps are static forms of information. Do not reproduce or distribute without U.S. Navy permission (see Document Disclaimer under Section I-1.0 Purpose).

Date: 2019

d) *Chemical Controls*

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

All herbicide use will be conducted in accordance with the NAS Patuxent River Pest Management Plan (DoN 2016b) and a DoD-certified applicator (or equivalent) will perform all applications. Only licensed herbicides will be utilized in accordance with their approved uses. Herbicides used to control wetland or aquatic plants must be licensed for use in wetlands.

H. Land Management

1. Program Description

The Land Management Program provides the foundation for the conservation of all other natural resources components at NRC Solomons and helps ensure compliance with federal and state regulations regarding water quality and watershed protection. The program is applicable to the entire installation and has significant interaction with Wetlands Management, Fish and Wildlife Management, Forest Management, Vegetative Management, and other environmental compliance program elements.

The Maryland Natural Resources Conservation Service (NRCS), Calvert County Soil Conservation District, USACE, and EPA provide guidance on watershed protection issues and projects. Primary requirements driving this program include CWA, DoD/Chesapeake Bay Program MOAs and initiatives, EO 12088 (Federal Compliance with Pollution Control Standards), EO 13148 (Greening the Government Through Leadership in Environmental Management), and EO 13508 (Chesapeake Bay Protection and Restoration).

2. Management Objectives

Land management objectives at NRC Solomons are to protect and enhance water quality on the installation, in the Patuxent River, and within the Chesapeake Bay Watershed using an ecosystem management approach to land management.

3. Land Use Planning

Land management practices that limit sprawl through the redevelopment of previously disturbed sites are encouraged wherever practicable. Principles of sustainable development, including minimizing impacts to natural areas, increasing density in previously developed areas, and utilizing energy-efficient design, are promoted in the installation's Area Development Plan. Redevelopment of additional recreational facilities should be focused in areas in which facilities demolition has taken place.

4. Watershed Protection

NRC Solomons lies within the Lower Patuxent Watershed, which is a major contributor to the Chesapeake Bay Watershed. The Chesapeake Bay Watershed is recognized as one of the most important and productive estuaries in the world and is protected by federal, state, and local regulations. The Navy is a signatory to a number of agreements designed to restore the Chesapeake Bay. Included are the 1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay, the 1998 Federal Agencies' Chesapeake Ecosystem Unified Plan (FACEUP), and the 2014 Chesapeake Watershed Agreement. These agreements identify goals and commitments aimed at the preservation and restoration of the Chesapeake Bay. Major goals of the Chesapeake Bay agreements are to reduce nutrients and toxins entering the Bay, protect stream corridors, enhance and protect wetlands, protect priority watersheds, identify and control invasive species on priority sites, and expand conservation landscaping on federal facilities. As specific DoD guidance is generated under EO 13508, those BMPs will be added to the INRMP and appropriate projects will be defined.

5. Riparian Forest Buffer Restoration

A primary initiative of the Chesapeake Bay Program (CBP) is the restoration of riparian forest buffers on at least 70 percent of all streams and shorelines in the Chesapeake Bay Watershed. In support of this goal, the Calvert County Soil Conservation District supported the Navy in planting approximately 700 trees along the bulkheaded shoreline at Pier 1 and various other locations at the installation between 1997 and 1999. A site assessment was also conducted in 1999 to identify other potential sites for riparian forest buffer restoration (DoN 2000). One additional site was identified: a 650-foot stretch of shoreline east of Second Cove that serves as a waste disposal site for yard debris and other materials. Following the environmental remediation of this area, shoreline restoration was initiated in 2013. That project is further described in the section below.

6. Shoreline Stabilization

Historically, NRC Solomons has suffered from shoreline erosion and loss of property along much of the shoreline. Various protection measures such as bulkheading and armoring have been implemented in the past. In 1999, a shoreline stabilization project along the northern portion of the facility was completed to prevent shoreline erosion and protect the cottages and facilities. The project included recontouring a portion of the shoreline to create a 3:1 slope, constructing a series of stone breakwaters, fortifying the area behind the breakwaters with sand, and planting beach grasses to stabilize the newly developed beach. Future management of the stabilized area must include keeping portions of the site with steep slopes free of woody vegetation, which, if blow-down occurs, can cause soil loss and destabilization. Foot paths and vehicular traffic must also be managed to prevent further soil erosion.

Repairs to the Point Patients Marina, which were completed in 2005, stabilized shoreline at the marina while improving access and recreational opportunities. The project involved the repair of the 2,200-foot long by 6-foot wide recreational pier, replacement of 100 feet of wooden bulkhead with vinyl sheet piles, and the addition of a stone revetment 325 feet long by 20 feet wide. Ongoing

management issues at the marina include invasive species and nuisance wildlife control. Periodic removal of woody species from the stone revetment is another management requirement.

In 2013, stabilization was conducted along approximately 764 linear feet of eroding shoreline with the use of stone containment sills, deposition of clean sand fill, and planting of roughly 35,280 square feet of *Spartina* wetlands plants. Living shorelines like the one created under this project are important habitat for Diamondback Terrapins, which are known to nest on the beaches behind similar stone breakwaters elsewhere on the Patuxent River and, therefore, may do so on the NRC Solomons beaches in the future. Future shoreline erosion control projects will continue to incorporate features suitable for enhancing wildlife habitat, as practicable, such as living shorelines and beaches. The installation should also consult with Diamondback Terrapin experts when designing shoreline features. As shoreline restoration is completed, the installation should monitor the health of project plantings and also survey for and control any invasive species or woody vegetation that attempts to colonize the sites.

The most recent shoreline restoration project was completed in 2016. Approximately 820 linear feet of Patuxent River shoreline along the northern/western face of NRC Solomons was enhanced with stone revetment and sand fill. The project also included reduction and stabilization of an eroding cliff that was causing safety concerns at several recreational sites above it.

I. Outdoor Recreation

1. Program Description

It is Navy policy to provide environmental awareness and recreational opportunities appropriate to the mission and the resources of each installation. Outdoor recreation is defined by OPNAVINST 5090.1 (series) as recreational programs, activities, or opportunities dependent on the natural environment. Developed or constructed facilities such as golf courses, tennis courts, riding stables, and lodging facilities are generally not included in this definition of outdoor recreation. Approximately 85 percent (252 acres) of the NRC Solomons serves as a DoD recreational facility. Fishing, bird watching, and nature observation are the primary natural resources-based recreational opportunities supported by the installation. Because of the developed nature of the property, hunting is not permitted. NRC Solomons is not accessible to the general public. See Section 2.A.(4) for access information.

Most of the recreational facilities at NRC Solomons are administered by MWR. Coordination and cooperation between MWR and the NR Program, however, are necessary for protection and management of natural resources. In addition to managing sales of station fishing permits to MWR patrons, natural resources personnel provide guidance and/or assistance on such issues as the prevention of non-point source pollution, nuisance wildlife control, tree care, and other aspects of urban forest management.

2. Management Objectives

The objective of outdoor recreation management at NRC Solomons is to enhance quality of life for the DoD community by providing recreational opportunities that are sustainable, consistent with the military mission and established carrying capacities, and in balance with the natural resources upon which they are based.

3. Fishing

Saltwater fishing and crabbing are popular consumptive, natural resources-based activities at NRC Solomons. Fishing activities require either a Complex or NRC Solomons fishing permit for persons over 12 years of age and a Maryland, Virginia, or Potomac River Fisheries Commission Recreational Fishing License for persons over 16 years of age. Recreational crabbing only requires a station fishing permit. In 2021, the NR Program issued nearly 640 fishing permits for NRC Solomons, and another 1,690 Complex fishing permits that cover NRC Solomons, NAS Patuxent River and Webster Outlying Field (Hall 2022). NRC Solomons does not manage offshore boat-fishing and does not require a base permit for this activity. Specific license and permit requirements are outlined in the NAS Patuxent River fishing instruction (NASPAXRIVINST 11015.7.N) (Appendix D).

The NRC Solomons fishing program is administered in compliance with all state regulations regarding minimum fish size, time of year restrictions, creel limits, and special considerations for all regulated species. Popular sport fish such as Rockfish, Bluefish, Spot, flounder, and Blue Crab are most frequently caught. Shellfishing is not authorized at NRC Solomons.

The installation provides fishing opportunities via the Point Patience Marina and Sunset Pier. All fishing piers and docks are handicapped accessible and are fully compliant with Americans with Disabilities Act requirements. Wheelchair accessibility is also provided for MWR rental boats by a portable wheelchair lift. There is a fish-cleaning station located at the pier for use during normal operating hours. MWR sells frozen bait, tackle and ice at these locations. Bloodworms and night crawlers are the only live bait allowed for use at NRC Solomons.

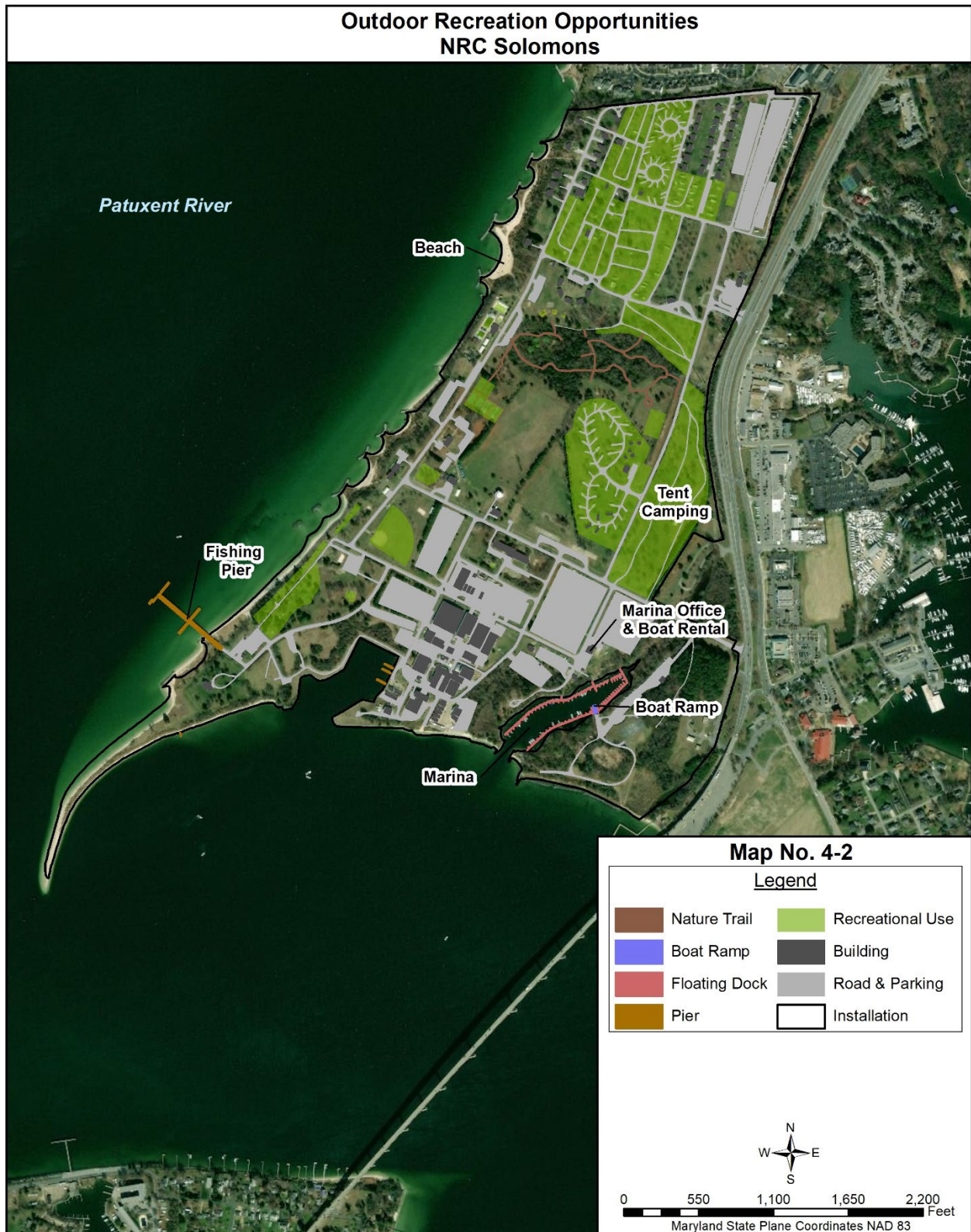
4. Environmental Awareness

Environmental awareness is another primary focus of NRC Solomons. A 1-mile interpretive nature trail provides installation visitors the opportunity to learn about natural and cultural resources while walking, jogging, or bike riding. The trail passes through forested upland and wetland habitats with boardwalks and a viewing platform. A gazebo was built in the center of the nature trail complex in 2005. A series of informative signs posted along the trail relate information on the natural and cultural history of the installation (Figure 4-2). The majority of the trail, however, is comprised of a tangle of invasive, non-native species, which does not provide for a pleasant outdoor learning experience. Long-term invasive species control is the major natural resources management issue along the nature trail.

J. Wildland Fire Management

Wildfires are not a significant problem at NRC Solomons; however, fire management remains a concern. The local fire department is responsible for all structural and wildfire control at the installation. Evaluating, monitoring, and, where necessary, reducing the potential fire hazard are important components of wildfire management. Specific fire protection procedures include vegetation maintenance in and around forested areas, ERP sites, and developed areas. The primary objectives of wildfire management at NRC Solomons are to minimize the potential for wildfire and reduce its impacts to the greatest extent practicable.

Figure 4-2. Outdoor Recreation Opportunities at NRC Solomons



Note: For data source information and most accurate data, access GRX directly, since paper maps are static forms of information. Do not reproduce or distribute without U.S. Navy permission (see Document Disclaimer under Section I-1.0 Purpose).

Date: 2019

K. Conservation Law Enforcement

NAS Patuxent River Police Department personnel, who maintain a presence at NRC Solomons, have arrest authority for conservation law enforcement. Law enforcement is solely the responsibility of the Navy; however, Navy law enforcement personnel cooperate with state and federal game wardens to enforce state and federal wildlife laws.

L. Coastal Zone Management

CZMA provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Section 307 of the Act stipulates that, where a federal action results in reasonably foreseeable effects on any coastal use or resource (land, water use, or natural resource), the action must be consistent to the maximum extent practicable with the enforceable policies of the affected state's federally approved Coastal Zone Management Program (CZMP).

The Maryland CZMP is based on federal laws, such as Section 404 of the Clean Water Act, and incorporates a number of state laws and authorities, including the Chesapeake Bay Critical Area Law and Program, Tidal Wetlands Act, Nontidal Wetlands Protection Act, Stormwater Management Act, and state erosion and sediment control and laws. Enforceable policies are given legal effect by state law and do not apply to Federal lands, waters or agencies, or other areas or entities outside of a state's jurisdiction, unless authorized by Federal law (CZMA does not confer such authority).

The Chesapeake Bay Critical Area Act, an enforceable policy of the Maryland CZMP, is a joint effort by state and local governments to address the impacts of land development on habitat and aquatic resources in the Bay. Land-use development standards and requirements established for the Chesapeake Bay Critical Area are intended to foster more sensitive development and land-use activity for shoreline areas and minimize adverse impacts on water quality and natural resources. The state Critical Area includes all non-federal land within 1000' of the Bay and its tidal tributaries (MDE 2021).

While there is technically and legally no Critical Area on the NAS Complex, the spirit of the law is captured by designation of 1000-foot shoreline protection areas and 100-foot shoreline buffers. A significant portion (207 acres) of NRC Solomons falls within the designated shoreline protection area (Figure 2-3).

Any actions within these areas are reviewed for impacts to state coastal resources such as wetlands, tidal waters and state-listed species. In an effort to streamline these reviews, the DoD Regional Environmental Counsel worked with the state and application installations to complete a Memorandum of Understanding (MOU) between DoD and Maryland concerning CZMA requirements and implementation of enforceable policies of Maryland's CZMP. Additionally, lists of *de minimis* and environmentally beneficial activities were prepared; as agreed to by both parties, activities on these lists may generally be carried out without further CZMA reviews or consultations. The CZMA MOU was signed by DoD and state representatives in May of 2013.

More information on Maryland's Chesapeake Coastal Services (which is responsible for maintaining and updating the state's enforceable coastal policies) is located at <http://www.dnr.state.me.us/ccs/index.asp>. The enforceable policies themselves can be found at http://www.dnr.state.md.us/ccs/coastal_policies.asp.

Shoreline restoration projects are the primary projects at NRC Solomons that impact coastal resources. These and other activities at the installation with potential to impact tidal or nontidal wetlands or other coastal resources are fully coordinated as required by CZMA and the CZMA MOU.

M. Floodplains Management

USACE regulates construction and discharges of dredged or fill materials within 100-year tidal floodplains. Few Nationwide Permits are available for this purpose and almost all of these require notification to the District Engineer. Floodplains receive additional protection through EO 11988, Floodplain Management, which instructs federal agencies to restore and preserve floodplains and to reduce the risk of flood-related loss by not building there. If tidal floodplain disturbance is unavoidable, appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken.

N. Cultural Resources Management

Under Section 110 of the National Historic Preservation Act (NHPA), federal agencies are required to identify all cultural resources within their landholdings that are eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and allow the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) an opportunity to comment on proposed actions. Implementing regulations for Section 106 of the NHPA are contained in 36 CFR Part 800.

A region-wide Integrated Cultural Resources Management Plan (ICRMP) which included NRC Solomons was completed in 2004. The NAS Patuxent River Complex ICRMP which now includes NRC Solomons was updated in 2018 (DoN 2018c).

One historic district, which encompasses the NAS Patuxent River Admiral's Quarters (Quarters A Solomons) and its surrounding ground, has been designated by the SHPO as National Register of Historic Places (NRHP) eligible. In addition, twelve archaeological sites have been identified at NRC Solomons; two of the sites have been determined to be NRHP eligible, six have been determined to be ineligible, one has no determination, two sites have been destroyed, and one site is partially NRHP eligible (DoN 2018). Any proposed activity with potential to impact the historic district or eligible archaeological sites will be coordinated through the SHPO. Contact the installation Cultural Resources Program Manager for more information on this program.

5. IMPLEMENTATION

A. Preparing Prescriptions

During development (and subsequent update) of this INRMP, the working group members have defined goals, identified legal drivers, and collaborated to develop natural resources management objectives for NRC Solomons. A list of projects necessary to meet these goals and objectives was also developed. Detailed prescriptions including management actions, cost estimates, funding classification, and an implementation schedule are in Appendix A. In addition, there is a summary list of proposed Natural Resources Program projects (Table A-1) as well as a list of projects proposed for the installations Environmental Compliance Branch and MWR (Table A-2).

The INRMP is considered implemented if the installation:

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

B. Achieving No Net Loss

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

C. Use of Cooperative Agreements

A cooperative agreement is used to acquire goods or services or stimulate an activity authorized by Federal statute. Use of cooperative agreements requires substantial involvement between the federal agency and recipient during performance of the activity. Sikes Act cooperative agreements may be used to accomplish work identified in the INRMP and may be entered into with states, local governments, non-governmental organizations, and individuals to provide for the maintenance and improvement of natural resources or to benefit natural resources research on DoD installations. Cooperative agreements authorized by the Sikes Act are not subject to the provisions of the Federal Grant and Cooperative Agreement Act, but must comply with the procedural requirements of the DoD Grant and Cooperative Agreement Regulations. In accordance with the Sikes Act, funds approved for a particular fiscal year may be obligated to cover the costs of goods and services provided under a Cooperative Agreement during any 18-month period beginning in that fiscal year. Using cooperative agreements to accomplish projects is an efficient means to implement INRMPs and can be administered through the NAVFAC Washington regional office.

D. Funding

The Office of Management and Budget (OMB) and the EPA require federal agencies to classify natural resources projects based in part on compliance requirements. DoDI 4715.03, Enclosure 4,

provides detailed guidance on programming and budgeting for natural resources projects. The priority classifications (highest to lowest) are summarized below.

Recurring Natural Resources Conservation Management Requirements. Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing the DoD natural resources conservation program. Recurring costs consist of manpower, training, supplies, permits, fees, testing and monitoring, sampling and analysis, reporting and record keeping, maintenance of natural resources conservation equipment, and compliance self-assessments.

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

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

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

An additional Navy funding classification consists of four Environmental Readiness Levels (ERLs):

Environmental Readiness Level 4. Includes “must fund” conservation requirements that are required to meet recurring natural resources conservation management requirements or current legal compliance needs, including EOs.

Environmental Readiness Level 3. Includes requirements of DoD and DoN policies, proactive efforts towards future compliance, or initiatives that could result in a positive return on investments for the Navy. ERL 3 projects could also support critical readiness activities by decreasing encumbrances of statutory compliance requirements.

Environmental Readiness Level 2. Includes requirements derived from pending federal, state or local legal requirements, laws, regulations, or EOs that could aid in future compliance but provide less certainty with respect to returns on investments for or benefits to the Navy.

Environmental Readiness Level 1. Is for investments in conservation leadership and general proactive natural resources stewardship.

All conservation, compliance, and stewardship projects must be entered into EPRWeb and receive approval up the chain of command prior to soliciting any signatures on the INRMP. CNO N45 is the final authority for designating the appropriate ERL for each project. A list of proposed projects necessary to implement this INRMP, implementation schedule, funding level, and proposed funding source are in Appendices A. All actions contemplated in this INRMP are subject to the

availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341 et seq.).

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APPENDIX A
Project Lists and Descriptions

Table A-1. Natural Resources Projects

Project #	Project Description	Implementation Schedule (FY)	Prime Legal Driver/ Initiative	OMB ERL Navy Level	Cost Estimate (\$)	Funding Source ¹	FY(s) Completed
<i>RT&E Species</i>							
61145 RTE01 ²	RT&E Species Monitoring	2023, 2028, 2033	A, H, I, J, L	4, 1		O&MN	2010
<i>Wetlands Management</i>							
61145 JCS06	Wetlands Delineation	2029	A, B, D, E	3, 1		O&MN	2014
<i>Fish and Wildlife Management</i>							
61145 WL001 ²	Faunal Surveys	2028, 2038	A, H, I, J	3, 2		O&MN	2008
<i>Migratory Bird Management</i>							
61145 WL002 ²	Habitat Management for Cavity Nesters	2023, 2028	A, C, H, I, J	1, 5		O&MN	2012
<i>Invasive Species Management</i>							
61145 INV01 ²	Invasive Species Control	Annual	A, F, G, H, I, J	4, 1		O&MN	
61145 INV02 ²	Invasive Species Surveys	2028	A, F, G, H, I, J	4, 1		O&MN	2007
<i>Land Management</i>							
61145 WL003 ²	Pollinator Habitat Management	2028	I, J, L	4, 1		O&MN, Legacy	
61145 SV001 ²	Control Woody Vegetation on Stabilized Shoreline	2024, 2027, 2030	B, D, K	4, 1		O&MN	

A – Sikes Act, as amended

B – Clean Water Act, as amended

C – Migratory Bird Treaty Act, as amended

D – Coastal Zone Management Act, as amended

E – EO 11990 (Protection of Wetlands)

F – EO 13112 (Invasive Species)

G – EO 13751 (Invasive Species)

H – 32 CFR Part 190

I – OPNAVINST 5090.1

J – DoDI 4715.03

K – Chesapeake Bay Agreements

L – Endangered Species Act, as amended

¹OM&N – Operations and Maintenance, Navy

²Previously included in NASPAXRIV funding; new projects to be created in POM-18

Table A-2. Projects Recommended for Other Programs

Project Description	Prime Legal Driver/ Initiative	OMB ERL Navy Level	Cost Estimate (\$)	Funding Source¹	FY(s) Completed
<i>Land Management</i>					
1 – Erosion Control on Beach Access Road	B, D, K	1, 5		O&MN (EC)	
2 – Beach Access Stairs	B, D, K	1, 5		MWR NAF	
3 – Fence and Signage	B, D, K	1, 5		MWR NAF, NAVFAC	

B – Clean Water Act, as amended

D – Coastal Zone Management Act, as amended

K – Chesapeake Bay Agreements

EC – Environmental Compliance

NAF – Non-appropriated Funds

RARE, THREATENED, AND ENDANGERED SPECIES MANAGEMENT

Project Title

Rare, Threatened and Endangered Species Surveys and Monitoring

Project Description

Conduct periodic RT&E monitoring of populations or individuals of protected species determined to be present during the initial survey project at NRC Solomons. Seasonal plant surveys should be conducted at least every ten years. Project should include surveys for RT&E species documented in Calvert or St. Mary's County that could potentially occur at NRC Solomons.

Objective

Monitor the occurrence, population size, and relative health of RT&E species at NRC Solomons. In addition, document new RT&E species occurrences and/or new listings of known species.

Background/Justification

An RT&E survey conducted in 2007 identified a state-endangered bird species, Royal Tern (*Thalasseus maximus*), and one state-threatened plant species, White Spikerush (*Eleocharis albida*). White Spikerush was also documented in 2010 and 2014 follow-up surveys. The state-endangered Nashville Warbler (*Leiothlypis ruficapilla*) has been seen at the installation, with the earliest confirmed sighting in 2008. The Monarch, a candidate species, has been documented at PAX and is probable at NRC Solomons. Monitoring of known species can be performed by SCA interns (programmed for and budgeted under the NAS Patuxent River INRMP). Additional, periodic surveys are required to ensure compliance with ESA, Maryland State conservation laws, and Navy policy on RT&E species.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management, and potential noncompliance with ESA and state laws.

Regulatory Drivers

Sikes Act, CZMA, ESA, 32 CFR 190 (Natural Resources Management Program), DoDI 4715.03, OPNAVINST 5090.1 (series)

Implementation Schedule:	Every 5 years (2023, 2028, 2033)
Priority:	ERL 4, Navy Level 1
Funding Sources:	O&MN
Cost Estimate:	---

WETLANDS MANAGEMENT

Project Title

Wetlands Delineation

Project Description

Conduct follow-up wetlands delineation at NRC Solomons and update existing wetlands GIS layer approximately every 15 years.

Objective

Update information and mapping for the occurrence of wetlands for planning/project review purposes.

Background/Justification

The original NWI wetlands assessment was conducted with little/no ground-truthing and overstated the occurrence of wetlands on the installation. A jurisdictional delineation was conducted in 2014 to provide valuable wetland information to site planners.

Impact to Mission

A lack of up-to-date wetlands delineation and GIS data can impede planning activities and may result in wetlands violations.

Regulatory Drivers

CWA, CZMA, EO 11990 (Protection of Wetlands), 32 CFR 190, DoDI 4715.03, OPNAVINST 5090.1 (series)

Implementation Schedule:	2029
Priority:	ERL 3, Navy Level 1
Funding Sources:	O&MN
Cost Estimate:	---

FISH AND WILDLIFE MANAGEMENT

Project Title

Faunal Surveys

Project Description

Conduct follow-up faunal surveys at NRC Solomons to assess the occurrence of wildlife species utilizing the installation. Seasonal surveys should be conducted for small mammals, furbearers, herpetofauna, and breeding and migratory bird species.

Objective

Assess the occurrence of wildlife populations utilizing the installation to better manage for all wildlife species.

Background/Justification

The Sikes Act, 32 CFR 190 and Navy policy require current inventories on Navy-managed lands. While no full-spectrum surveys have been conducted at NRC Solomons, field surveys have been performed by NR Program staff and SCA interns, and incidental observations of wildlife occurring have been reported. Specific follow-up surveys can be performed annually by SCA interns (programmed for and budgeted under the NAS Patuxent River INRMP). Additional, periodic surveys are required to ensure compliance with the Sikes Act and Navy policy.

Impact to Mission

Failure to implement this project would result in noncompliance with the Sikes Act and Navy policy on natural resources management.

Regulatory Drivers

Sikes Act, 32 CFR 190, DoDI 4715.03, OPNAVINST 5090.1 (series)

Implementation Schedule: Every 10 years (2028, 2038)

Priority: ERL 3, Navy Level 2

Funding Sources: O&MN

Cost Estimate: ---

MIGRATORY BIRD MANAGEMENT

Project Title

Habitat Management for Cavity Nesters

Project Description

Periodically repair/replace Eastern Bluebird nest boxes and Purple Martin houses. Relocate boxes/houses that have been unproductive. GPS all existing and new nest boxes/houses.

Objective

Enhance nesting habitat for migratory birds.

Background/Justification

Appropriate habitat for nesting and brooding has declined for many bird species world-wide. Nesting habitat can be created or enhanced for a number of species including Eastern Bluebirds and Purple Martins, whose populations have been in decline, by the use of artificial nest boxes/houses. Annual nesting surveys can be performed by SCA interns (programmed for and budgeted under the NAS Patuxent River INRMP).

Impact to Mission

Failure to implement this project would demonstrate a lack of commitment to management and would fall short of stewardship responsibilities under MBTA and other regulatory drivers.

Regulatory Drivers

Sikes Act, MBTA, 32 CFR 190, DoDI 4715.03, OPNAVINST 5090.1 (series)

Implementation Schedule:	2023, 2028
Priority:	ERL 1, Navy Level 5
Funding Sources:	O&MN
Cost Estimate:	---

INVASIVE SPECIES MANAGEMENT

Project Title

Invasive Species Management (Survey and Control)

Project Description

Develop priorities and implement management recommendations for controlling invasive species identified in the 2019 invasive plant inventory (DoN 2019). Conduct follow-up monitoring to assess treatment effectiveness, update boundaries of known invasive species, and survey for new invasive species.

Objective

Control target invasive species and prevent the further spread and degradation of natural habitats at NRC Solomons.

Background/Justification

EOs 13112 and 13751 restrict the introduction of harmful exotic species into native ecosystems and, to the extent practicable and permitted by law, detect and control such species; accurately monitor invasive species populations; provide for restoration of native species and habitats that have been invaded; promote public education on invasive species, and conduct research on invasive species to prevent their introduction and provide for environmentally sound control.

Impact to Mission

Absence of an active control program results in degradation of habitat that supports the mission and disregards Navy stewardship responsibilities.

Regulatory Drivers

Sikes Act, EO 11987 (Exotic Organisms), EO 13112 (Invasive Species), EO 13751 (Invasive Species), 32 CFR 190, DoDI 4715.03, OPNAVINST 5090.1 (series)

Implementation Schedule:

Annual

Priority:

ERL 4, Navy Level 1

Funding Sources:

O&MN, Installation fish and wildlife permit sales

Cost Estimate:

LAND MANAGEMENT

Project Title

Pollinator Habitat Creation

Project Description

Convert old field/early successional habitat to native flowering plants. Plantings should include herbaceous and shrub layers. Milkweed (*Asclepias syriaca* L) should be planted to benefit Monarch Butterflies. Project site could be an abandoned utility right-of-way.

Objective

Provide habitat for the purpose of conserving, protecting and restoring pollinators.

Background/Justification

Pollinator habitats are increasing in scarcity due to developing, vegetation succession and increased use of pesticides. Creation and management of pollinator-friendly landscapes could be essential in preventing the listing of some pollinator species.

Impact to Mission

Failure to implement this project would demonstrate a lack of commitment to management and would fall short of stewardship responsibilities under new DoD policy, EOs and other regulatory drivers.

Regulatory Drivers

EO 13508, EO 13514 (Federal Leadership in Environmental, Energy, and Economic Performance), EO 13112, EO 13751, 32 CFR 190, DoDI 4715.03, OPNAVINST 5090.1 (series), Chesapeake Bay Agreements

Implementation Schedule:	2028
Priority:	ERL 4, Navy Level 1
Funding Sources:	O&MN, Legacy
Cost Estimate:	---

LAND MANAGEMENT

Project Title

Control Woody Vegetation on Stabilized Shoreline

Project Description

Control woody vegetation along restored shorelines through manual cutting and/or herbicide application. Avoid disturbance of native herbaceous vegetation on steep slopes.

Objective

Protect water quality and shoreline stability by controlling the growth of woody vegetation on the contoured slopes of the restored shoreline.

Background/Justification

A large portion of the NRC Solomons shoreline has been stabilized by recontouring and establishing native grasses and other herbaceous vegetation. Growth of large woody vegetation can threaten shoreline stability on steep slopes by falling and removing large areas of soil with their root balls. Controlling woody species and promoting herbaceous vegetation will help maintain current shoreline conditions.

Impact to Mission

Failure to implement this project could result in loss of real property and infrastructure.

Regulatory Drivers

CWA CZMA, Chesapeake Bay Agreements

Implementation Schedule: Every 3 years (2024, 2027, 2030)

Priority: ERL 4, Navy Level 1

Funding Sources: O&MN, Legacy

Cost Estimate: ---

RECOMMENDED PROJECTS

1 – Project Title and Description

Erosion Control on Beach Access Road - Regrade road, install water bars, and revegetate road shoulder on the main beach access road in order to protect water quality by preventing further degradation of road condition and erosion.

Background/Justification

Gullying and loss of vegetation along this road are contributing to habitat degradation and reduction in water quality.

Cost Estimate and Funding Source

-- O&MN (Environmental Compliance)

2 - Project Title and Description

Beach Access Stairs - Install Stairs on Steep Slope for Beach Access behind gazebo in order to protect water quality and shoreline stability by providing alternative beach access.

Background/Justification

Currently a foot path connects a paved path at the top of the slope with the beach area west of the gazebo. Loss of vegetation and disturbance are contributing to soil loss on this slope.

Cost Estimate and Funding Source

-- MWR Non-appropriated Funds (NAF)

3 - Project Title and Description

Fence and Signage - Install fence and signage to control foot traffic on the steep slopes along 300 feet of the stabilized portions of shoreline in order to protect water quality and shoreline stability by providing alternative beach access.

Background/Justification

Frequent foot traffic crossing the grassy slopes to the beach area are contributing to the formation of foot paths and loss of vegetation along portions of the stabilized shoreline.

Cost Estimate and Funding Source

-- MWR NAF or PW Project Management Engineering Branch

APPENDIX B
Naval Recreation Center Solomons Species Lists

Table B-1. Bird Species Known or Expected to Occur at Naval Recreation Center Solomons.

Common Name	Scientific Name	Global Rank	State Rank	State Status	Federal Status	DOD PIF SOC ¹	Breeding
Common Loon	<i>Gavia immer</i>	G5	-	-	-	X	-
Horned Grebe	<i>Podiceps auritus</i>	G5	-	-	-	X	-
Pied-billed Grebe	<i>Podilymbus podiceps</i>	G5	S2S3B		-	-	-
Brown Pelican	<i>Pelecanus occidentalis</i>	G4	S1B	-	-	X	-
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	G5	-	-	-	-	-
Great Cormorant	<i>Phalacrocorax carbo</i>	G5	-	-	-	-	-
Great Blue Heron	<i>Ardea herodias</i>	G5	-	-	-	-	-
Great Egret	<i>Ardea alba</i>	G5	S3S4B	-	-	-	-
Snowy Egret	<i>Egretta thula</i>	G5	S3B	-	-	X	-
Green Heron	<i>Butorides virescens</i>	G5	-	-	-	-	Po
Mute Swan	<i>Cygnus olor</i>	G5	-	-	-	X	-
Tundra Swan	<i>Cygnus columbianus</i>	G5	-	-	-	X	-
Canada Goose	<i>Branta canadensis</i>	G5	-	-	-	X	Po
Wood Duck	<i>Aix sponsa</i>	G5	-	-	-	X	-
Mallard	<i>Anas platyrhynchos</i>	G5	-	-	-	X	Co
American Black Duck	<i>Anas rubripes</i>	G5	-	-	-	X	-
Canvasback	<i>Aythya valisineria</i>	G5	-	-	-	X	-
Greater Scaup	<i>Aythya marila</i>	G5	-	-	-	X	-
Lesser Scaup	<i>Aythya affinis</i>	G5	-	-	-	-	-
Long-tailed Duck	<i>Clangula hyemalis</i>	G5	-	-	-	X	-
Surf Scoter	<i>Melanitta perspicillata</i>	G5	-	-	-	X	-
Black Scoter	<i>Melanitta americana</i>	G5	-	-	-	X	-
White-winged Scoter	<i>Melanitta deglandi</i>	G5	-	-	-	X	-
Common Goldeneye	<i>Bucephala clangula</i>	G5	-	-	-	X	-
Bufflehead	<i>Bucephala albeola</i>	G5	-	-	-	X	-
Hooded Merganser	<i>Lophodytes cucullatus</i>	G5	S3B	-	-	-	-
Red-breasted Merganser	<i>Mergus serrator</i>	G5	-	-	-	-	-
Ruddy Duck	<i>Oxyura jamaicensis</i>	G5	-	-	-	-	-
Turkey Vulture	<i>Cathartes aura</i>	G5	-	-	-	-	-
Black Vulture	<i>Coragyps astratus</i>	G5	-	-	-	-	Pr
Northern Harrier	<i>Circus hudsonius</i>	G5	S2B	I	-	X	-

Common Name	Scientific Name	Global Rank	State Rank	State Status	Federal Status	DOD PIF SOC ¹	Breeding
Sharp-shinned Hawk	<i>Accipiter striatus</i>	G5	S2S3B	-	-	-	-
Cooper's Hawk	<i>Accipiter cooperii</i>	G5	-	-	-	-	-
Red-shouldered Hawk	<i>Buteo lineatus</i>	G5	-	-	-	-	Co
Red-tailed Hawk	<i>Buteo jamaicensis</i>	G5	-	-	-	-	Po
Bald Eagle	<i>Haliaeetus leucocephalus</i>	G5	S3S4	-	-	X	Co
Osprey	<i>Pandion haliaetus</i>	G5	-	-	-	-	Co
Merlin	<i>Falco columbarius</i>	G5	-	-	-	-	-
American Kestrel	<i>Falco sparverius</i>	G5	-	-	-	-	-
Peregrine Falcon	<i>Falco peregrinus</i>	G4T4	S2B	I	-	X	Po
American Coot	<i>Fulica americana</i>	G5	S1B	-	-	-	-
Clapper Rail	<i>Rallus crepitans</i>	G5	-	-	-	X	-
Virginia Rail	<i>Rallus limicola</i>	G5	-	-	-	X	-
Killdeer	<i>Charadrius vociferus</i>	G5	-	-	-	-	Co
Solitary Sandpiper	<i>Tringa solitaria</i>	G5	-	-	-	-	-
Spotted Sandpiper	<i>Actitis macularius</i>	G5	S3S4B	-	-	-	-
Sanderling	<i>Calidris alba</i>	G5	-	-	-	X	-
Western Sandpiper	<i>Calidris mauri</i>	G5	-	-	-	X	-
Semipalmated Sandpiper	<i>Calidris pusilla</i>	G5	-	-	-	-	-
Least Sandpiper	<i>Calidris minutilla</i>	G5	-	-	-	-	-
American Woodcock	<i>Scolopax minor</i>	G5	-	-	-	-	-
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	G5	-	-	-	X	-
Laughing Gull	<i>Leucophaeus atricilla</i>	G5	S1B	-	-	X	-
Ring-billed Gull	<i>Larus delawarensis</i>	G5	-	-	-	-	-
Herring Gull	<i>Larus argentatus</i>	G5	-	-	-	-	-
Great Black-backed Gull	<i>Larus marinus</i>	G5	-	-	-	-	-
Caspian Tern	<i>Hydroprogne caspia</i>	G5	-	-	-	-	-
Royal Tern	<i>Thalasseus maximus</i>	G5	S1B	E	-	-	-
Common Tern	<i>Sterna hirundo</i>	G5	S1B	E	-	-	-
Forster's Tern	<i>Sterna forsteri</i>	G5	S2B	I	-	X	-
Mourning Dove	<i>Zenaida macroura</i>	G5	-	-	-	X	Pr
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	G5	-	-	-	-	Co
Great Horned Owl	<i>Bubo virginianus</i>	G5	-	-	-	-	-

Common Name	Scientific Name	Global Rank	State Rank	State Status	Federal Status	DOD PIF SOC ¹	Breeding
Eastern Screech Owl	<i>Megascops asio</i>	G5	-	-	-	-	-
Chimney Swift	<i>Chaetura pelagica</i>	G4	-	-	-	-	Po
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	G5	-	-	-	-	Po
Belted Kingfisher	<i>Megaceryle alcyon</i>	G5	-	-	-	-	Pr
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	G5	-	-	-	-	Co
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	G5	S1B	-	-	-	-
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	G5	-	-	-	-	-
Downy Woodpecker	<i>Dryobates pubescens</i>	G5	-	-	-	-	Co
Northern Flicker	<i>Colaptes auratus</i>	G5	-	-	-	X	Pr
Eastern Phoebe	<i>Sayornis phoebe</i>	G5	-	-	-	-	Pr
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	G5	-	-	-	-	Co
Willow Flycatcher	<i>Empidonax traillii</i>	G5	-	-	-	-	-
Eastern Kingbird	<i>Tyrannus tyrannus</i>	G5	-	-	-	X	Pr
Red-eyed Vireo	<i>Vireo olivaceus</i>	G5	-	-	-	X	Co
White-eyed Vireo	<i>Vireo griseus</i>	G5	-	-	-	X	Co
Warbling Vireo	<i>Vireo gilvus</i>	G5	-	-	-	-	-
Blue Jay	<i>Cyanocitta cristata</i>	G5	-	-	-	X	Co
American Crow	<i>Corvus branchyrhynchos</i>	G5	-	-	-	-	Pr
Fish Crow	<i>Corvus ossifragus</i>	G5	-	-	-	X	Co
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	G5	-	-	-	-	-
Bank Swallow	<i>Riparia riparia</i>	G5	S3B	-	-	-	-
Tree Swallow	<i>Tachycineta bicolor</i>	G5	-	-	-	-	-
Barn Swallow	<i>Hirundo rustica</i>	G5	-	-	-	-	Co
Tufted Titmouse	<i>Baeolophus bicolor</i>	G5	-	-	-	-	Co
Carolina Chickadee	<i>Poecile carolinensis</i>	G5	-	-	-	X	Co
White-breasted Nuthatch	<i>Sitta carolinensis</i>	G5	-	-	-	-	Po
Brown Creeper	<i>Certhia americana</i>	G5	S3B	-	-	-	-
Carolina Wren	<i>Thryothorus ludovicianus</i>	G5	-	-	-	-	Co
House Wren	<i>Troglodytes aedon</i>	G5	-	-	-	-	Pr
Winter Wren	<i>Troglodytes hiemalis</i>	G5	S2B	-	-	-	-
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	G5	-	-	-	-	-
Eastern Bluebird	<i>Sialia sialis</i>	G5	-	-	-	-	Co

Common Name	Scientific Name	Global Rank	State Rank	State Status	Federal Status	DOD PIF SOC ¹	Breeding
American Robin	<i>Turdus migratorius</i>	G5	-	-	-	-	Co
Hermit Thrush	<i>Catharus guttatus</i>	G5	S4B	-	-	-	-
Gray Catbird	<i>Dumetella carolinensis</i>	G5	-	-	-	-	Pr
Northern Mockingbird	<i>Mimus polyglottos</i>	G5	-	-	-	-	Co
Brown Thrasher	<i>Toxostoma rufum</i>	G5	-	-	-	X	Co
European Starling	<i>Sturnus vulgaris</i>	G5	-	-	-	-	Co
Cedar Waxwing	<i>Bombycilla cedrorum</i>	G5	-	-	-	-	Co
Northern Parula	<i>Setophaga americana</i>	G5	-	-	-	-	Pr
Nashville Warbler	<i>Leiothlypis ruficapilla</i>	G5	S1B	-	T	-	-
Yellow Warbler	<i>Setophaga petechia</i>	G5	S2B-	-	-	-	-
Magnolia Warbler	<i>Setophaga magnolia</i>	G5	S3S4B	-	-	-	-
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	G5	S3S4B	-	-	X	-
Yellow-rumped (Myrtle) Warbler	<i>Setophaga coronata</i>	G5	S2B	-	-	-	-
Black-throated Green Warbler	<i>Setophaga virens</i>	G5	-	-	-	-	-
Palm Warbler	<i>Setophaga palmarum</i>	G5	-	-	-	-	-
Pine Warbler	<i>Setophaga pinus</i>	G5	-	-	-	-	Co
Bay-breasted Warbler	<i>Setophaga castanea</i>	G5	-	-	-	-	-
Blackpoll Warbler	<i>Setophaga striata</i>	G5	-	-	-	-	-
Black-and-White Warbler	<i>Mniotilta varia</i>	G5	-	-	-	X	-
American Redstart	<i>Setophaga ruticilla</i>	G5	-	-	-	-	-
Northern Waterthrush	<i>Parkesia noveboracensis</i>	G5	S2B	I	-	-	-
Common Yellowthroat	<i>Geothlypis trichas</i>	G5	-	-	-	-	Co
Yellow-breasted Chat	<i>Icteria virens</i>	G5	-	-	-	-	-
Summer Tanager	<i>Piranga rubra</i>	G5	-	-	-	-	Pr
Scarlet Tanager	<i>Piranga olivacea</i>	G5	-	-	-	X	Co
Northern Cardinal	<i>Cardinalis cardinalis</i>	G5	-	-	-	-	Co
Indigo Bunting	<i>Passerina cyanea</i>	G5	-	-	-	-	-
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	G5	-	-	-	X	Pr
Field Sparrow	<i>Spizella pusilla</i>	G5	-	-	-	X	-
Chipping Sparrow	<i>Spizella passerina</i>	G5	-	-	-	-	Co
Savannah Sparrow	<i>Passerculus sandwichensis</i>	G5	S4	-	-	-	-
White-throated Sparrow	<i>Zonotrichia albicollis</i>	G5	-	-	-	-	-

Common Name	Scientific Name	Global Rank	State Rank	State Status	Federal Status	DOD PIF SOC ¹	Breeding
Fox Sparrow	<i>Passerella iliaca</i>	G5	-	-	-	-	-
Song Sparrow	<i>Melospiza melodia</i>	G5	-	-	-	-	Pr
Swamp Sparrow	<i>Melospiza georgiana</i>	G5	-	-	-	-	-
Dark-eyed Junco	<i>Junco hyemalis</i>	G5	S3B	-	-	-	-
Eastern Meadowlark	<i>Sturnella magna</i>	G5	-	-	-	-	Pr
Brown-headed Cowbird	<i>Molothrus ater</i>	G5	-	-	-	-	Co
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	G5	-	-	-	-	Co
Common Grackle	<i>Quiscalus quiscula</i>	G5	-	-	-	-	Pr
Baltimore Oriole	<i>Icterus galbula</i>	G5	-	-	-	-	-
Orchard Oriole	<i>Icterus spurius</i>	G5	-	-	-	X	Pr
House Finch	<i>Haemorhous mexicanus</i>	G5	-	-	-	-	Co
American Goldfinch	<i>Spinus tristis</i>	G5	-	-	-	-	Pr
House Sparrow	<i>Passer domesticus</i>	G5	--	-	-	-	Co

¹These birds are on the DoD Partners in Flight's Bird Species of Concern list for the NAS region. (Details and further SOC break-outs are found at <http://www.denix.osd.mil/dodpif/>)

Sources: DoN 2001, 2022; MDNR 2003, 2009; Rambo 2014; NatureServe 2022.

Table B-2. Mammals Known or Expected to Occur at NRC Solomons.

Common Name	Scientific Name	Found at NRC SOL ¹	Global Rank	State Rank	State Status	Federal Status
Virginia Opossum	<i>Didelphis virginiana</i>	X	G5	S5	-	-
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	X	G5	S5	-	-
Eastern Mole	<i>Scalopus aquaticus</i>	X	G5	S5	-	-
Little Brown Bat	<i>Myotis lucifugus</i>	PR	G3	S1	-	-
Big Brown Bat	<i>Eptesicus fuscus</i>	PR	G5	S4S5	-	-
Eastern Red Bat	<i>Lasiurus borealis</i>	X	G3	S3S4	-	-
Raccoon	<i>Procyon lotor</i>	X	G5	S5	-	-
River Otter	<i>Lontra canadensis</i>	X	G5	S5	-	-
Striped Skunk	<i>Mephitis mephitis</i>	X	G5	S5	-	-
Gray Fox	<i>Urocyon cinereoargenteus</i>	X	G5	S5	-	-
Groundhog/Woodchuck	<i>Marmota monax</i>	X	G5	S5	-	-
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	X	G5	S5	-	-
Southern Flying Squirrel	<i>Glaucomys volans</i>	X	G5	S5	-	-
American Beaver	<i>Castor canadensis</i>	X	G5	S5	-	-
White-footed Deermouse	<i>Peromyscus leucopus</i>	X	G5	S5	-	-
Meadow Vole	<i>Microtus pennsylvanicus</i>	X	G5	S5	-	-
Pine/Woodland Vole	<i>Microtus pinetorum</i>	X	G5	S5	-	-
Common Muskrat	<i>Ondatra zibethicus</i>	X	G5	S5	-	-
House Mouse	<i>Mus musculus</i>	X	G5		-	-
Eastern Cottontail	<i>Sylvilagus floridanus</i>	X	G5	S5	-	-
White-tailed Deer	<i>Odocoileus virginianus</i>	X	G5	S5	-	-

Sources: DoN 2001, MDNR 2003, Geo-Marine, Inc. 2007, MDNR 2009, Rambo 2014, NatureServe 2022

Table B-3. Herpetofauna Known or Expected to Occur at NRC Solomons.

Common Name	Scientific Name	Found at NRC SOL ¹	Global Rank	State Rank	Federal Status	State Status
Reptiles						
Common Eastern Snapping Turtle	<i>Chelydra s. serpentina</i>	X	G5	S5	-	-
Eastern Mud Turtle	<i>Kinosternon s. subrubrum</i>	X	G5	S5	-	-
Eastern Box Turtle	<i>Terrapene c. carolina</i>	X	G5	S5	-	-
Northern Diamondback Terrapin	<i>Malaclemys t. terrapin</i>	X	G4	S4	-	-
Northern Red-bellied Cooter	<i>Pseudemys rubriventris</i>	X	G5	S5	-	-
Eastern Painted Turtle	<i>Chrysemys p. picta</i>	X	G5	S5	-	-
Loggerhead Sea Turtle	<i>Caretta caretta</i>	PR	G3	S1B	LT	T
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	PR	G1	S1N	LE	E
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>	X	G5	S5	-	-
Eastern Six-lined Racerunner	<i>Aspidoscelis s. sexlineata</i>	X	G5	S3	-	-
Common Five-lined Skink	<i>Plastiodon fasciatus</i>	X	G5	S5	-	-
Broadhead Skink	<i>Plestiodon laticeps</i>	X	G5	S5	-	-
Northern Ring-necked Snake	<i>Diadophis punctatus edwardsii</i>	X	G5	S5	-	-
Northern Watersnake	<i>Nerodia s. sipedon</i>	X	G5	S5	-	-
Dekay's Brownsnake	<i>Storeria dekayi</i>	X	G5	S5	-	-
Eastern Garter Snake	<i>Thamnophis s. sirtalis</i>	X	G5	S5	-	-
Eastern Hognose Snake	<i>Heterodon platirhinos</i>	X	G5	S5	-	-
Eastern Worm Snake	<i>Carphophis a. amoenus</i>	X	G5	S5	-	-
Northern Black Racer	<i>Coluber c. constrictor</i>	PR	G5	S5	-	-
Northern Rough Green Snake	<i>Opheodrys a. aestivus</i>	X	G5	S5	-	-
Eastern Rat Snake	<i>Pantherophis alleghaniensis</i>	X	G5	S5	-	-
Eastern Kingsnake	<i>Lampropeltis g. getula</i>	X	G5	S5	-	-
Smooth Earth Snake	<i>Virginia v. valeriae</i>	X	G5	S4	-	-
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>	X	G5	S5	-	-
Amphibians						
Marbled Salamander	<i>Ambystoma opacum</i>	X	G5	S5	-	-
Spotted Salamander	<i>Ambystoma maculatum</i>	X	G5	S5	-	-
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>	X	G5	S5	-	-
American Toad	<i>Anaxyrus americanus</i>	X	G5	S5	-	-
Fowler's Toad	<i>Anaxyrus fowleri</i>	X	G5	S5	-	-
Northern Cricket Frog	<i>Acris c. crepitans</i>	X	G5	S5	-	-
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	X	G5	S5	-	-
Green Treefrog	<i>Hyla cinerea</i>	X	G5	S5	-	-
Northern Spring Peeper	<i>Pseudacris c. crucifer</i>	X	G5	S5	-	-
American Bullfrog	<i>Lithobates catesbeiana</i>	X	G5	S5	-	-
Northern Green Frog	<i>Lithobates clamitans melanota</i>	X	G5	S5	-	-
Pickerel Frog	<i>Lithobates palustris</i>	X	G5	S5	-	-
Southern Leopard Frog	<i>Lithobates sphenocephalus</i>	X	G5	S4	-	-
Wood Frog	<i>Lithobates sylvaticus</i>	X	G5	S5	-	-

Sources: DoN 2001, MDNR 2003, Geo-Marine, Inc. 2007, MDNR 2009, Rambo 2014, NatureServe 2022

Table B-4. Invertebrate Species Known or Expected to Occur at NRC Solomons.

Common Name	Scientific Name	Found at NRC SOL ¹	Global Rank	State Rank	Federal Status	State Status
Butterflies						
Silver-spotted Skipper	<i>Epargyreus c. clarus</i>	X	G5	-	-	-
Juvenal's Duskywing	<i>Erynnis b. brizo</i>	X	G5	-	-	-
Horace's Duskywing	<i>Erynnis horatius</i>	X	G5	-	-	-
Least Skipper	<i>Ancyloxypha numitor</i>	X	G5	-	-	-
Sachem	<i>Atalopedes c. campestris</i>	X	G5	-	-	-
Black Swallowtail	<i>Papilio polyxenes asterius</i>	X	G5	-	-	-
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	X	G5	-	-	-
Cabbage White	<i>Pieris rapae</i>	X	G5	-	-	-
Clouded Sulphur	<i>Colias p. philodice</i>	X	G5	-	-	-
Orange Sulphur	<i>Colias eurytheme</i>	X	G5	-	-	-
Red-banded Hairstreak	<i>Calycopis cecrops</i>	X	G5	-	-	-
Gray Hairstreak	<i>Strymon melinus humuli</i>	X	G5	-	-	-
Eastern Tailed Blue	<i>Everes c. comyntas</i>	X	G5	-	-	-
Spring Azure	<i>Celastrina i. iadon</i>	X	G5	-	-	-
Pearl Crescent	<i>Phyciodes t. tharos</i>	X	G5	-	-	-
Question Mark	<i>Polygonia interrogationis</i>	X	G5	-	-	-
Mourning Cloak	<i>Nymphalis a. antiopa</i>	X	G5	-	-	-
Painted Lady	<i>Vanessa cardui</i>	X	G5	-	-	-
Common Buckeye	<i>Junonia coenia</i>	X	G5	-	-	-
Red-spotted Purple	<i>Limenitis arthemis astyanax</i>	X	G5	-	-	-
Common Wood-nymph	<i>Cercyonis pegala</i>	X	G5	-	-	-
Common Green Darner	<i>Anax junius</i>	X	G5	-	-	-
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	X	G5	-	-	-
Seaside Dragonlet	<i>Erythrodiplax berenice</i>	X	G5	-	-	-
Golden-winged Skimmer	<i>Libellula auripennis</i>	X	G5	-	-	-
Common Whitetail	<i>Libellula lydia</i>	X	G5	-	-	-
Blue Dasher	<i>Pachydiplax longipennis</i>	X	G5	-	-	-
Damselflies						
Familiar Bluet	<i>Enallagma traviatum</i>	X	G5	-	-	-
Fragile Forktail	<i>Ischnura posita</i>	X	G5	-	-	-
Crustaceans						
Blue Crab	<i>Callinectes sapidus</i>	X	GNR	-	-	-
Grass Shrimp	<i>Palaemonetes</i> spp.	PR	-	-	-	-
Fiddler Crab	<i>Uca pugnax</i>	PR	GNR	-	-	-
Mollusks						
American Oyster	<i>Crassostrea virginica</i>	X	G5	-	-	-
Softshell Clam	<i>Mya arenaria</i>	X	GNR	-	-	-

Sources: DoN 2001; MDNR 2003, 2009; Geo-Marine, Inc. 2007; NatureServe 2022; Rambo 2014.

Table B-5. Fish Species Known or Expected to Occur at NRC Solomons.

Common Name	Scientific Name	Found at NRC SOL ¹	Global Rank	State Rank	Federal Status	State Status
Bull Shark	<i>Carcharhinus leucas</i>	PR	G5	-	-	-
Clearnose Skate	<i>Raja eglanteria</i>	X	GNR	-	-	-
Little Skate	<i>Leucoraja erinacea</i>	X	GNR	-	-	-
Winter Skate	<i>Leucoraja ocellata</i>	X	GNR	-	-	-
Cownose Ray	<i>Rhinoptera bonasus</i>	PR	GNR	-	-	-
Atlantic Sturgeon	<i>Acipenser oxyrhyncus</i>	PR	G3	S1	LE	-
American Eel	<i>Anguilla rostrata</i>	X	G4	-	-	-
Blueback Herring	<i>Alosa aestivalis</i>	X	G3G4	-	-	-
Alewife	<i>Alosa pseudoharengus</i>	X	G5	-	-	-
Hickory Shad	<i>Alosa mediocris</i>	X	G4	-	-	-
American Shad	<i>Alosa sapidissima</i>	X	G5	-	-	-
Atlantic Menhaden	<i>Brevoortia tyrannus</i>	X	G5	-	-	-
Bay Anchovy	<i>Anchoa mitchilli</i>	X	G5	-	-	-
Oyster Toadfish	<i>Opsanus tau</i>	PR	GNR	-	-	-
Skilletfish	<i>Gobiesox strumosus</i>	PR	G5	-	-	-
Sheepshead Minnow	<i>Cyprinodon variegatus</i>	PR	G5	-	-	-
Mummichog	<i>Fundulus heteroclitus</i>	PR	G5	-	-	-
Striped Killifish	<i>Fundulus majalis</i>	PR	G5	-	-	-
Atlantic Silverside	<i>Menidia menidia</i>	PR	G5	-	-	-
Striped Bass	<i>Morone saxatilis</i>	X	G5	-	-	-
White Perch	<i>Morone americana</i>	X	G5	-	-	-
Yellow Perch	<i>Perca flavescens</i>	X	G5	-	-	-
Bluefish	<i>Pomatomus saltatrix</i>	X	G5	-	-	-
Cobia	<i>Rachycentron canadum</i>	X	GNR	-	-	-
Atlantic Croaker	<i>Micropogonias undulatus</i>	X	G5	-	-	-
Spot	<i>Leiostomus xanthurus</i>	X	G5	-	-	-
Red Drum	<i>Sciaenops ocellatus</i>	X	G5	-	-	-
Spotted Seatrout	<i>Cynoscion nebulosus</i>	PR	G5	-	-	-
Harvestfish	<i>Peprilus alepidotus</i>	PR	G5	-	-	-
Northern Seabrook	<i>Prionotus carolinus</i>	PR	G5	-	-	-
Summer Flounder	<i>Paralichthys dentatus</i>	X	GNR	-	-	-
Windowpane Flounder	<i>Scophthalmus aquosus</i>	X	G5	-	-	-
Winter Flounder	<i>Pseudopleuronectes americanus</i>	PR	G5	-	-	-
Hogchoker	<i>Trinectes maculatus</i>	PR	G5	-	-	-
Spanish Mackerel	<i>Scomberomorus maculatus</i>	X	G5	-	-	-
King Mackerel	<i>Scomberomorus cavalla</i>	X	GNR	-	-	-

Sources: DoN 2001; MDNR 2003, 2009; Geo-Marine, Inc. 2007; NatureServe 2022; Rambo 2014.

Table B-6. Plant Species Known or Expected to Occur at NRC Solomons.

Common Name	Scientific Name	Origin ¹	Global Rank	State Rank	Federal Status	State Status
Graminoids						
Broomsedge	<i>Andropogon virginicus</i>	N	G5	-	-	-
Bermuda Grass	<i>Cynodon dactylon</i>	I	GNR	-	-	-
Japanese Stiltgrass	<i>Microstigium vimineum</i>	I	GNR	-	-	-
Silver Grass	<i>Miscanthus</i> sp.	I	GNR	-	-	-
Switchgrass	<i>Panicum virgatum</i>	N	G5	-	-	-
Dallisgrass	<i>Paspalum dilatatum</i>	I	GNR	-	-	-
Common Reed	<i>Phragmites australis</i>	N/I	G5	-	-	-
Salt Marsh Cordgrass	<i>Spartina alterniflora</i>	N	-	-	-	-
Herbs/Forbs						
Wild Garlic	<i>Allium vineale</i>	I	GNR	-	-	-
Spotted Knapweed	<i>Centaurea stoebe</i>	I	GNR	-	-	-
Mexican Tea	<i>Chenopodium ambrosioides</i>	I	GNR	-	-	-
Tall Thistel	<i>Cirsium altissimum</i>	I	G5	-	-	-
Deptford Pink	<i>Dianthus armeria</i>	I	GNR	-	-	-
White Spikerush	<i>Eleocharis albida</i>	N	G4G5	S2	-	T
Japanese Clover	<i>Kummerowia striata</i>	I	GNR	-	-	-
Sericea Lespedeza	<i>Lespedeza cuniata</i>	I	GNR	-	-	-
American Pokeweed	<i>Phytolacca americana</i>	N	G5	-	-	-
Japanese Knotweed	<i>Polygonum cuspidatum</i>	I	GNR	-	-	-
Curley Dock	<i>Rumex crispus</i>	I	GNR	-	-	-
Crown Vetch	<i>Coronilla varia</i>	I	GNR	-	-	-
Showy Goldenrod	<i>Solidago speciosa</i>	N	G5	S2	-	-
Periwinkle	<i>Vinca minor</i>	I	GNR	-	-	-
Shrubs						
Groundsel Tree	<i>Baccharis halimifolia</i>	N	G5	-	-	-
Swamp Dogwood	<i>Cornus amomum</i>	N	G5T5	-	-	-
Japanese Privet	<i>Ligustrum japonicum</i>	I	GNR	-	-	-
Chinese Privet	<i>Ligustrum sinense</i>	I	GNR	-	-	-
Tartarian Honeysuckle	<i>Lonicera tatarica</i>	I	GNR	-	-	-
Nandina	<i>Nandina domestica</i>	I	GNR	-	-	-
Winged Sumac	<i>Rhus copallinum</i>	N	G5	-	-	-
Dog Rose	<i>Rosa canina</i>	I	GNR	-	-	-
Multiflora Rose	<i>Rosa multiflora</i>	I	GNR	-	-	-
Wineberry	<i>Rubus phoenicolasius</i>	I	G5	-	-	-
Trees						
Red Maple	<i>Acer rubrum</i>	N	G5	-	-	-
Silver Maple	<i>Acer saccharinum</i>	N	G5	-	-	-
Tree Of Heaven	<i>Ailanthus altissima</i>	I	GNR	-	-	-
Mimosa/Silk Tree	<i>Albizia julibrissin</i>	I	GNR	-	-	-

Common Name	Scientific Name	Origin ¹	Global Rank	State Rank	Federal Status	State Status
Paper Mulberry	<i>Broussonetia papyrifera</i>	I	GNR	-	-	-
Common Hackberry	<i>Celtis occidentalis</i>	N	G5	-	-	-
Eastern Redbud	<i>Cercis canadensis</i>	N	G5	-	-	-
Pumpkin Ash	<i>Fraxinus profunda</i>	N	G4	-	-	-
Flowering Dogwood	<i>Cornus florida</i>	N	G5	-	-	-
Ash	<i>Fraxinus</i> spp.	N	-	-	-	-
American Holly	<i>Ilex opaca</i>	N	G5	-	-	-
Eastern Red-cedar	<i>Juniperus virginiana</i>	N	G5	-	-	-
Tulip Poplar	<i>Liriodendron tulipifera</i>	N	G5	-	-	-
Sweetgum	<i>Liquidambar styraciflua</i>	N	G5	-	-	-
White Mulberry	<i>Morus alba</i>	I	GNR	-	-	-
Black Gum	<i>Nyssa sylvatica</i>	N	G5	-	-	-
American Sycamore	<i>Platanus occidentalis</i>	N	G5	-	-	-
Eastern White Pine	<i>Pinus strobus</i>	N	G5	-	-	-
Loblolly Pine	<i>Pinus taeda</i>	N	G5	-	-	-
Virginia Pine	<i>Pinus virginiana</i>	N	G5	-	-	-
White Poplar	<i>Populus alba</i>	I	G5	-	-	-
Black Cherry	<i>Prunus serotina</i>	N	G5	-	-	-
Bradford Pear	<i>Pyrus calleryana</i>	I	GNR	-	-	-
White Oak	<i>Quercus alba</i>	N	G5	-	-	-
Bur/Mossy-cup Oak	<i>Quercus macrocarpa</i>	N	G5	S1	-	-
Willow Oak	<i>Quercus phellos</i>	N	G5	-	-	-
Common sumac	<i>Rhus glabra</i>	N	G5	-	-	-
Black Locust	<i>Robinia pseudoacacia</i>	N	G5	-	-	-
Black Willow	<i>Salix nigra</i>	N	G5	-	-	-
Sassafras	<i>Sassafras albidum</i>	N	G5	-	-	-
Bald Cypress	<i>Taxodium distichum</i>	N	G5	-	-	-
Eastern Hemlock	<i>Tsuga canadensis</i>	N	G5	-	-	-
Slippery Elm	<i>Ulmus rubra</i>	N	G5	-	-	-
Vines						
Trumpet Creeper	<i>Campsis radicans</i>	N	G5	-	-	-
English Ivy	<i>Hedera helix</i>	I	GNR	-	-	-
Japanese Honeysuckle	<i>Lonicera japonica</i>	I	GNR	-	-	-
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	N	G5	-	-	-
Mile-a-minute	<i>Polygonum perfoliatum</i>	I	GNR	-	-	-
Kudzu	<i>Pueraria lobata</i>	I	GNR	-	-	-
Catbrier	<i>Smilax rotundifolia</i>	N	G5	-	-	-
Eastern Poison-ivy	<i>Toxicodendron radicans</i>	N	G5	-	-	-
Grape	<i>Vitis</i> spp.	N	-	-	-	-

¹I=Introduced; N=Native

Sources: DoN 2001, 2003, 2007, 2009; Geo-Marine, Inc. 2007

FOR ALL TABLES

X = Known to occur (seen or heard)

PR = Probably occurs (not yet seen or heard; however, occurrence is likely)

Federal/State Status:

LE/E = Endangered

LT/T = Threatened

I = In need of conservation

Global Rank:

G1 = Highly globally rare G2 = Globally rare

G3 = Very rare and local throughout its range or distributed locally in a restricted range

G4 = Apparently secure globally, may be rare in some parts of its range

G5 = Demonstrably secure globally, may be rare in some parts of its range

UR = Under review GNR or G? = Unranked

State Rank:

S1 = Highly state rare S2 = State rare

S3 = Rare to uncommon

SU = Possibly rare, status uncertain

-B = Migratory species; rank refers only to breeding status of the species

-N = Migratory species; rank refers only to non-breeding status of the species

UR = Under review S? = Unranked

APPENDIX C
RESEARCH REQUIREMENTS

Installation Natural Resources Manager will provide information as necessary.

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APPENDIX D
FISHING INSTRUCTION



DEPARTMENT OF THE NAVY
NAVAL AIR STATION
22268 CEDAR POINT ROAD
PATUXENT RIVER, MARYLAND 20670-1154

NASPAXRIVINST 110157.M
MAR 2 2007

NAS PATUXENT RIVER INSTRUCTION 11015.7M

From: Commanding Officer

Subj: FISHING, SHELLFISHING, AND CRABBING REGULATIONS

Ref: (a) NAVFAC P-73, Volume 2
(b) Guides to Freshwater and Saltwater Sportfishing in Maryland (Annual)

Encl: (1) Map of Station Fishing, Crabbing, and Shellfishing Areas, Naval Air Station (NAS) Map of Station Fishing, Crabbing, and Shellfishing Areas, Webster Field Annex (WFA) Map of Station Fishing and Crabbing Areas, Solomon's Recreation Center (SRC) Trophy Largemouth Bass Program

1. Purpose. To publish regulations and procedures governing fishing, shellfishing, and crabbing on the NAS Patuxent River, Maryland, NAS Webster Field Annex (WFA), ST. Inigoes, Maryland, and (SRC), Solomon's, Maryland, and to implement applicable provisions of references (a) and (b).
2. Cancellation. NASPAXRIVINST 11015.7L. This instruction has been revised and should be read in its entirety.
3. Policy. The Commanding Officer (CO) in accordance with all Federal and State of Maryland laws and regulations will control fishing, shellfishing, and crabbing on NAS, WFA, and SRC.
4. Regulations and Procedures.
 - a. Definitions. The following definitions shall apply to fishing, shellfishing, and crabbing in NAS, WFA, and SRC waters:
 - (1) NAS. For the purposes of authorization under this instruction, NAS includes only the NAS Patuxent River property located near Lexington Park, Maryland.
 - (2) WFA. For the purposes of authorization under this instruction, WFA includes the NAS Patuxent River property at St. Inigoes, Maryland, known as Webster Field Annex.

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NASPAXRIVINST 110157.M

of authorization under this instruction, SRC includes the Naval Recreation Center at Solomon's, Maryland.

(4) Non-tidal Waters. Non-tidal waters on NAS include freshwater streams and the five ponds identified in enclosure (1). Non-tidal waters on WFA include Finger Pond and fishing Ponds. Non-tidal waters at SRC do not exist. Non-tidal waters are also referred to as freshwater.

(5) Tidal waters. Tidal waters on NAS include the Chesapeake Bay, Patuxent River, Goose Creek, Harper Creek, Pearson Creek, and Pine Hill Run (upstream to the hunter check station, Building 2497). Tidal waters on WFA include those portions of the St. Mary's River and St. Inigoes Creek shoreline, Chapel cove, Priest's Inlet, Langley Inlet, and Fort Point Cove as indicated in enclosure (2). Tidal fishing opportunities at SRC are available from the fishing pier only. Tidal waters are also referred to as saltwater.

(6) Fishing. Fishing refers to the harvest or attempted harvest of finfish species.

(7) Shellfishing. Shellfishing refers to the harvest or attempted harvest of clams, oysters, and mussels.

(8) Crabbing. Crabbing refers to the harvest or attempted harvest of the species known as blue crab.

b. Authorized personnel. Authorization to enter NAS, WFA, or SRC for business purposes does not necessarily authorize access for recreational purposes. Authorization for fishing, shellfishing, and crabbing on NAS, WFA, and SRC is as follows. Proper credentials must be presented to the permit-issuing clerk.

(1) NAS. The following personnel are authorized to fish, shellfish, or crab on NAS:

(a) Active duty military personnel with DD Form 2
(Active)

(b) Dependents of active duty military with DD Form

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- (Retired)
- (c) Retired military personnel with DD Form 2
 - (d) Dependents of retired military personnel with DD Form 1173
 - (e) Reservists with appropriate identification card with DD Form 2 (Reserve)
 - (f) Active federal civil service employees assigned on board NAS or WFA with NAS ID badge or USCSC Optional Form 55 Dependents of civilian personnel described in (f) above. Sponsors must accompany dependents to permit-issuing clerk.
 - (g) Retired civil service personnel with valid Officer's Club or Civilian Recreation Association (CRA) ID badge. NAS fishing permit fees are separate from Officer's Club and CRA membership fees.
 - (h) Long term contractors, with NAS picture ID badge, may fish or crab only in tidal waters of the station. Due to the limited nature of the resource, contractors may not fish in non-tidal waters or harvest shellfish.
 - (i) Dependents of contractors described in (i) may fish or crab only in tidal waters of the station.
 - (j) Maryland Department of Natural Resources (DNR) Police with DNR uniform or DNR badge and U.S. Fish and Wildlife Service special agents with badge and credentials.

(2) WFA. All personnel listed in paragraph 4.b(1) that have a valid NAS Patuxent River badge and a valid NAS fishing permit are authorized to fish, shellfish, and crab aboard WFA. Long term contractors with NAS Patuxent River picture ID badge and a valid NAS fishing permit are authorized to fish in salt-water only.

(3) SRC. Persons authorized to fish and crab aboard Solomon's Rec. Center include:

- (Active)
- (a) Active duty military personnel with DD Form 2

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- (b) Dependents of active duty military with DD Form 1173
- (c) Retired military personnel with DD Form 2 (Active)
- (d) Dependents of retired military personnel with DD Form 1173
- (e) Reservists with appropriate identification card with DD Form 2 (Reserve)
- (f) Active DoD federal civilian employees
- (g) Persons with a valid SCR *Leisure Pass*
- (h) Dependents of civilian personnel described above. Sponsors must accompany dependents to permit-issuing clerk.

(4) Guests. Active duty military, retired military, civil service employees of NAS or WFA, or civil service employees that retired from either NAS or WFA may sponsor a guest(s). Persons authorized to fish at SRC may sponsor a guest(s). A sponsor must accompany their guest(s) at all times and shall assume responsibility for their actions. Guests may not shellfish.

(5) Exceptions to the above will be handled on a case-by-case-basis. Requests shall be submitted in writing to the Commanding Officer via the Natural Resources Manager.

c. Licenses and permits. All fishing activities require **both** a state license **and** either an NAS fishing permit or an SRC permit. NAS fishing permits are valid at NAS, WFA, and SRC. An SRC fishing permit is only valid at the Solomon's Recreation Center. Recreational crabbing requires only a base permit for the base where crabbing. Specific license and permit requirements are detailed in the chart which follows. During working hours, fishing permits may be obtained from the Morale, Welfare, and Recreation Department, Building 458, Supervisory Recreation Specialist's Office, Room 12 of the Drill Hall. After working hours, permits may be obtained from the Command Duty Office in Building 409. Fishing permits may also be purchased at the SRC Registration Desk and the information shack

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at the fishing pier. All persons, including guests, 12 years old and older must obtain a Station fishing permit to fish in tidal water (including crabbing) or freshwater at NAS, WFA, and SRC. Permits must be in possession while fishing. Persons, including guests, between the age of 12 and 15 (inclusive) will be issued a permit free of charge. Under a reciprocal agreement between Maryland, Virginia, and the Potomac River Fisheries Commission, the following licenses are acceptable for fishing in Maryland tidal waters (saltwater): Maryland State Recreational License, Virginia State Recreational Tidal Fishing License, or Potomac River Fisheries Commission Recreational Fishing License. Licenses and base permits are valid for a calendar year. License and base permit requirements are as follows:

Table 1. Maryland State license and Station fishing permit requirements

Age	Tidal Water		Freshwater		Crabbing		Shellfishing	
	State License	Station Permit	State License	Station Permit	State License	Station Permit	State License	Station Permit
<12	Not Required	Not required	Not required	Not required	Not Required	Not Required	Not Required	Not Required
12-15	Not required	Fishing permit issued free of charge	Not required	Fishing permit issued free of charge	Not Required	Fishing permit issued free of charge	Not Required	Fishing permit issued free of charge
16-65	Chesapeake Bay Sport Fishing License	Fishing permit required	Freshwater Sport Fishing License	Fishing Permit Required	Not Required	Fishing Permit Required	Not Required	Fishing Permit Required
>65	Consolidated Senior Resident Sport Fishing License	Fishing permit required	Consolidated Senior Resident Sport Fishing License	Fishing permit required	Not Required	Fishing Permit Required	Not Required	Fishing Permit Required

(1) Guests. Guests must obtain all required licenses and permits. Guests are required to purchase a guest permit, valid only for the date(s) specified. Guests may

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purchase either a daily guest permit or a weekly guest permit valid for seven consecutive days. Daily guest permits are valid for 24 hours from the time of purchase. Guests between the ages of 12 and 15 (inclusive) must also obtain a fishing permit, which will be issued free of charge. Multiple fishing days may be specified on a single daily guest permit; however, the guest will pay the daily fee for each date specified. A guest may not purchase more than five (5) seven-day guest permits or fifteen (15) daily permits in a single fishing season. When issuing guest permits for multiple fishing days, MWR will charge only a single permit-handling surcharge (\$1.00).

(2) Scouts. Members of official scout units (including leaders) when registered through the NAS Scouting Liaison Officer, may fish or crab without station permits during the duration of their official stay (not to exceed one week). This privilege extends only to Gardiner Pond (#1) and all tidal waters. All state licensing requirements still apply.

(3) Permit Prices. Permit prices are as follow:

(a) Fishing/Crabbing. Fishing and crabbing permits are issued free of charge to persons between 12 and 15 years of age (inclusive). All authorized personnel purchasing a permit for NAS or WFA will be charged a fee of \$10.00, and authorized personnel purchasing a permit for SRC will be charged a fee of \$5.00, per calendar year.

(b) Shellfishing. NAS shellfishing permits are issued free of charge to persons between 12 and 15 years of age (inclusive). All other authorized personnel will be charged a fee of \$20.00. Shellfishing is not authorized at the SRC.

(c) Guest permits. NAS and SRC guest fishing permits are free to persons between the ages of 12 and 15 (inclusive) years of age. Daily (24 hour) NAS guest fishing permits are issued at the rate of \$5.00 per day. Weekly guest fishing permits (valid for seven consecutive days) are issued at the rate of \$15.00 per week. Daily (24 hour) SRC guest permits are issued at the rate of \$3.00 per day. Weekly guest fishing permits (valid for seven consecutive days) are issued at the rate of \$9.00 per week.

d. Fishing, Shellfishing, and Crabbing Areas.
Freshwater fishing is authorized in the following areas:

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(1) Freshwater fishing on NAS is authorized in all freshwater streams and the five (5) ponds shown in enclosure (1). Richneck Pond (pond 6) is closed to all fishing.

NOTICE: Due to low levels of PCB's and pesticides on NAS, consumption limits are in effect for all NAS ponds. To remain within the acceptable risk range, an average person (70 kg or 154 lbs.) should limit consumption of fish from all NAS ponds to not more than two eight-ounce portions per month, not more than 19 meals (8 oz. each) per year, and not more than 133 meals per lifetime. If you are consuming the maximum recommended meals per year, you should do so for no more than 7 years.

(a) Freshwater fishing on WFA is authorized in Finger Pond and Fishing Pond located on the map in enclosure (2).

(2) Saltwater fishing, shellfishing, and crabbing are authorized in the following areas:

(a) Only those portions of the NAS shoreline indicated on enclosure (1) as well as Harper, Pearson, and Goose Creeks, and Pine Hill Run (upstream to the hunter check station, Building 2497) are authorized areas. Boat fishing beyond 75 yards of the shore is subject only to State sportfishing regulations. Boat ramps at Harper's Creek and West Basin are authorized for use.

(b) The State of Maryland defines the Patuxent River as a line drawn from Drum Point in Calvert County to Hog Point in St. Mary's County. The Patuxent River is a tributary to the Chesapeake Bay and all associated State sportfishing regulations will be enforced.

(c) Residents of Quarters A, Quarters B, and Gold Coast housing units may fish, shellfish, and crab in front of their quarters with purchase of state licenses and base permit. These areas are off limits to all other recreational fishing, shellfishing, and crabbing.

(d) Special area restrictions for recreational fishing, crabbing, and shellfishing on NAS and WFA are as follows:

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1. Fishing and crabbing will not be permitted along the eastern section of the West Basin sea wall when surface effect ship launching or active docking operations are in progress. This area will be open to fishing or crabbing when ships are moored or absent.

2. All waters of Harper and Pearson Creeks north of the Harper's Creek Bridge are closed to shellfishing.

3. The large pier at WFA may be used for fishing and crabbing during periods when the airfield is inactive. Persons wishing to fish or crab from the pier should contact flight planning at (301) 342-3836 for airfield status. The boat ramp and pier at the WFA Coast Guard (CG) Facility is for official use only. Under no circumstances may vehicles be parked near the boat ramp or Coast Guard facility.

4. The fishing pier at SRC is the only place fishing is allowed on the facility.

e. Camping. Camping, occupying RV's, or erecting temporary shelters while fishing is permitted in many areas, but may require additional permits and fees. Contact the MWR permit issuing clerk for details.

f. Regulations. All fishing, shellfishing, and crabbing at NAS, WFA, or SRC will be conducted per the State of Maryland regulations. There will be no open season on any fish, shellfish, crustacean, reptile, or amphibian, except as specified in reference (b). Many of the following regulations are derived directly from state laws or regulations, and are subject to change. Station regulations may be more restrictive, but not more permissive, than state regulations. In cases of apparent regulatory conflict or contradiction, the state law or regulation shall take precedence.

(1) Freshwater Fishing.

(a) An angler is limited to not more than three fishing rods at any one time.

(b) Creel and size limits:

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1. A person may possess two (2) largemouth bass per day between 9 and 11 inches total length from 16 June to 28 February only.

2. A person may not possess largemouth bass between 11 and 15 inches total length at any time.

3. A person may possess one (1) largemouth bass per day over 15 inches total length from 16 June to 28 February only.

4. Largemouth bass of any size may not be possessed from 01 March to 15 June. Fish may be caught, but they must be released.

5. Station ponds are managed on a trophy bass fishery as detailed in enclosure (3).

6. A person may not possess a catfish under ten (10) inches total length. There is a daily limit of five (5) catfish per person.

7. A person may not possess more than 15 bluegill per day; 30 possession, in aggregate. There is no minimum size limit for bluegill.

8. A person may not possess more than 15 crappie (black or white) per day; 30 possession, in aggregate. There is no minimum size limit for crappie.

(c) Gasoline engines may not be operated on the ponds. Electric trolling motors are permitted.

(d) Digging for bait in the vicinity of the ponds is prohibited to prevent erosion and siltation.

(e) In order to prevent the harmful introduction of exotic fish species, the use of live baitfish is restricted. Fishermen may use only native species caught from the body of water they are fishing. No other live fish may be released to any station waters without written permission from the NRB.

(f) No trotlines, fish traps, or chemicals may be placed in the ponds except under the direction of the Station

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Environmental Department Conservation Division. Bush-bobs, bank-bobs, and jug rigs are not permitted.

(g) Vehicles may not be driven onto or across pond dams.

(h) Bullfrogs may be taken by hand from any station waters with gigs, rods, dip nets, etc. Shooting is prohibited. Frogs may not be taken from 01 May to 31 July. There is no limit on the number of bullfrogs that may be taken.

(i) It is lawful to shoot carp with a bow and arrow.

(j) Snapping turtles may be taken for personal consumption subject to the following methods. A person may not catch snapping turtles by the use of hook and line, trotline, bow and arrow, spear, gig or gig iron, or any other device capable of piercing any part of a turtle. Turtles may be taken with turtle traps, turtle nets, or by hand.

(2) Saltwater Fishing and Crabbing.

(a) Wanton Waste: Fish, such as skates and stingrays (including the locally common Cownose Ray), may not be deliberately killed and left in the field. Skates and rays that are incidentally caught must be released by cutting the line or removing the hook. Fishermen are encouraged to utilize as much of their catch as possible.

(b) An angler may use up to, but not more than three (3) fishing rods, except on the Goose Creek and SRC fishing pier where only two (2) rods are permitted.

(c) Defacing (or any other abuse of any government property) and littering, including the discarding of monofilament line, are expressly forbidden.

(d) Fish, crabs, and shellfish harvested on NAS, WFA, or SRC may not be sold.

(e) Crabbing season follows State of Maryland regulations (usually open from 01 April through 15 December). A recreational crabber, without a license, may possess two (2) dozen hard crabs per person and one dozen peeler and soft crabs per person.

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(f) A recreational crabber, with a license, may possess one (1) dozen hard crabs per person and one dozen peeler and soft crabs per person.

(g) A recreational crabber, with a license, may possess one (1) bushel of hard crabs and two (2) dozen peeler or soft crabs.

(h) Crab minimum size requirements, from shell tip to tip, are as follows:

1. Male hard crabs five (5) inches, 01 April - 14 July

2. Male hard crabs five (5) and one quarter (1/4) inches, 15 July - 15 December

3. Mature female crabs no minimum size limit

4. Soft crabs - three and one half (3 ½) inches, 01 April - 15 December

5. Peeler crabs - three and one quarter inches (3 ¼), 01 April - 14 July

6. Peeler crabs - three and one half (3 ½) inches, 15 July - 15 December.

(i) recreational crabbers may not use crab traps or baskets on Wednesdays. Only dip nets, hand lines, and pots at private piers are permitted on Wednesdays.

(j) An individual may use a maximum of five (5) collapsible crab traps.

(k) One trotline, measuring a total length of 600 feet, may be used per boat to catch crabs. However, an individual may not set or fish a trotline within 100 feet of another person's trotline.

(l) No crab pots may be used on Station except for residents of coastal housing areas, who may set up to two (2) crab pots, attached by rope or line to a pier, dock, or shoreline without a crab pot license.

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(m) Monofilament cast nets may be used to catch baitfish.

(n) It is unlawful to possess an egg bearing female (sponge) crab.

(o) An individual may catch crabs with a crab seine not exceeding 50 feet in total length, which must be hauled up in the water and not on shore.

(p) Baitfish collection: The collection of baitfish from all Station waters shall be subject to the following limits:

1. A seine up to 50 feet in total length and five (5) feet wide may be used to obtain bait minnows.

2. Baitfish is defined as non-game fish that are used whole or in part as bait for other game fish. Non-game fish are those without established seasons, size or creel limits. The only baitfish that may be harvested on Station include minnow, spot, alewives, menhaden, and herring.

3. Minnows including killifish (otherwise know as bullminnows), mummichogs, sheepshead, shiners, anchovies, and silversides may be caught with nets or minnow traps. A combined total of 25 minnows may be caught per licensed/permitted fisherman per day. The possession limit - the total of which may be kept on hand at any one time shall be 25 minnows.

4. Spot may be caught by net, trap, or hook and line. A total of 50 spot may be caught per licensed/permitted fisherman per day. The possession limit (the total of which may be kept on hand at any one time) shall also be 50 spot.

5. Alewives, menhaden, or herring may be caught by net or trap. A combined total of 10 gallons (or 100 pounds whichever is less) may be caught per licensed/permitted fisherman per day. The possession limit (the total of which may be kept on hand at any one time) shall also be 10 gallons or 100 pounds.

6. No fish, crab, or shellfish may be caught and sold for commercial purposes from waters of the Naval Air Station or Solomon's Recreation Center.

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Reference (b) contains creel and size limits for saltwater fish.

(3) Shellfishing.

(a) The annual shellfishing season opens on 15 December and closes 28 February. Water and/or oyster quality tests may be conducted by the Station Environmental Department Conservation Division prior to 15 December each year. The season opening date may be delayed if these tests indicate the need. There is no shellfishing authorized at SRC.

(b) Shellfish harvested on NAS/WFA may not be sold.

(c) The limit of oysters or clams is one (1) bushel each per family per day. A bushel container is not capable of holding more than 6,237 cubic inches.

(d) Oysters may be taken only by hand with tongs, nippers, rakes, or by diving without tanks. Dredging is prohibited.

(e) Per State law, oysters may be harvested only from sunrise to 1500 hours on Monday through Friday and from sunrise to noon on Saturday. Shellfish may not be harvested on Sunday.

(f) All oysters taken must be at least three (3) inches in length from hinge to mouth. A person may possess a marketable size oyster that has undersize oysters or spat less than one inch in length from hinge to bill attached to them that cannot be separated without destroying the small oyster.

(g) All waters of Harper's and Pearson Creeks, north of the Cedar Point Road bridge, are closed to shellfishing.

g. Violations. Violations of applicable Federal and State of Maryland statutes (Annotated Code of Maryland - Natural Resources) may result in criminal prosecution before States Magistrate for NAS, WFA, and SRC fishing privileges. The following is a list of common violations and administrative actions that may be taken against personnel who violate applicable State statutes and/or provisions of this instruction. Additionally, the sponsor assumes all responsibility for their guest(s) and will receive the suspension for any violations. Permit suspensions may be in addition to criminal prosecution

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and/or prosecution through the Uniform Code of Military Justice. Penalties for the first offense are listed. A repeated violation within 12 months of the first violation will result in a one-year suspension of privileges. Reinstatement of fishing, shellfishing, and crabbing privileges is at the discretion of the Commanding Officer.

<u>MAXIMUM SUSPENSION</u>	<u>VIOLATION</u>
1 year	Fishing with trotlines, fish traps, or chemicals in ponds, Vehicles operated on dam
1-year	Wanton waste
90 Days/permit purchase	Fishing without a permit, if a guest, sponsor receives suspension
90 Days	Fishing with live baitfish
90 Days	Violation of any State statute
90 Days	Defacing or destroying government property and littering
60 Days	Operation of gasoline powered motor in pond
60 Days	Violation of station limit, but not State limit
60 Days	Fishing, shellfishing, or crabbing in an unauthorized area
30 Days	Digging in the vicinity of the ponds

5. Action. The Environmental Department Conservation Division, is assigned the responsibility of controlling fishing, shellfishing, and crabbing on NAS, WFA, and SRC. The Station Police will enforce all applicable Federal, State, and Station regulations. Angler's must show their permits and government identification and/or identify their sponsor upon request of any police officer, Auxiliary Security Force, or Master-at-Arms.

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6. Review Authority. The Conservation Division Director shall review this instruction annually and make changes as necessary.



GLEN IVES

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TROPHY LARGEMOUTH BASS PROGRAM

1. The freshwater ponds on NAS Patuxent River, have been designated "Trophy Bass Fishing Areas" by the State of Maryland Department of Natural Resources, Resources Conservation Service. This designation affects the harvest of largemouth bass from station freshwater ponds. The following size and creel limits for largemouth bass are in effect for NAS freshwater ponds:

a. A person may possess two (2) largemouth bass per day, between 9 and 11 inches total length, from 16 June to 28 February only.

b. A person may not possess largemouth bass between 11 and 15 inches total length, from 16 June to 28 February only.

c. A person may possess one (1) largemouth bass per day, over 15 inches total length, from 16 June to 29 February only.

d. **Largemouth bass of any size may not be possessed from 1 March to 15 June.** Fish may be caught, but they must be released.

2. In a study of NAS fishing ponds, performed jointly by the Natural Resources Branch and the US Fish and Wildlife Service (USFWS), heavy fishing pressure was cited as the apparent cause for development of an unnatural bass age class structure in all ponds. To resolve this problem, the USFWS recommended policy changes that protect the species from overharvest. These changes are reflected in the Station's intensive fisheries management practices.

3. Establishment of new size and creel limits was determined to be the best management plan. In doing so, the resource is offered greater protection while providing the angler ample recreational opportunities. This management plan is evidenced by the Station limit of only three (3) largemouth bass per day during the open seasons, as opposed to the State of Maryland limit of five (5) bass per day during the same season. By protecting individual size classes, the following goals should be met:

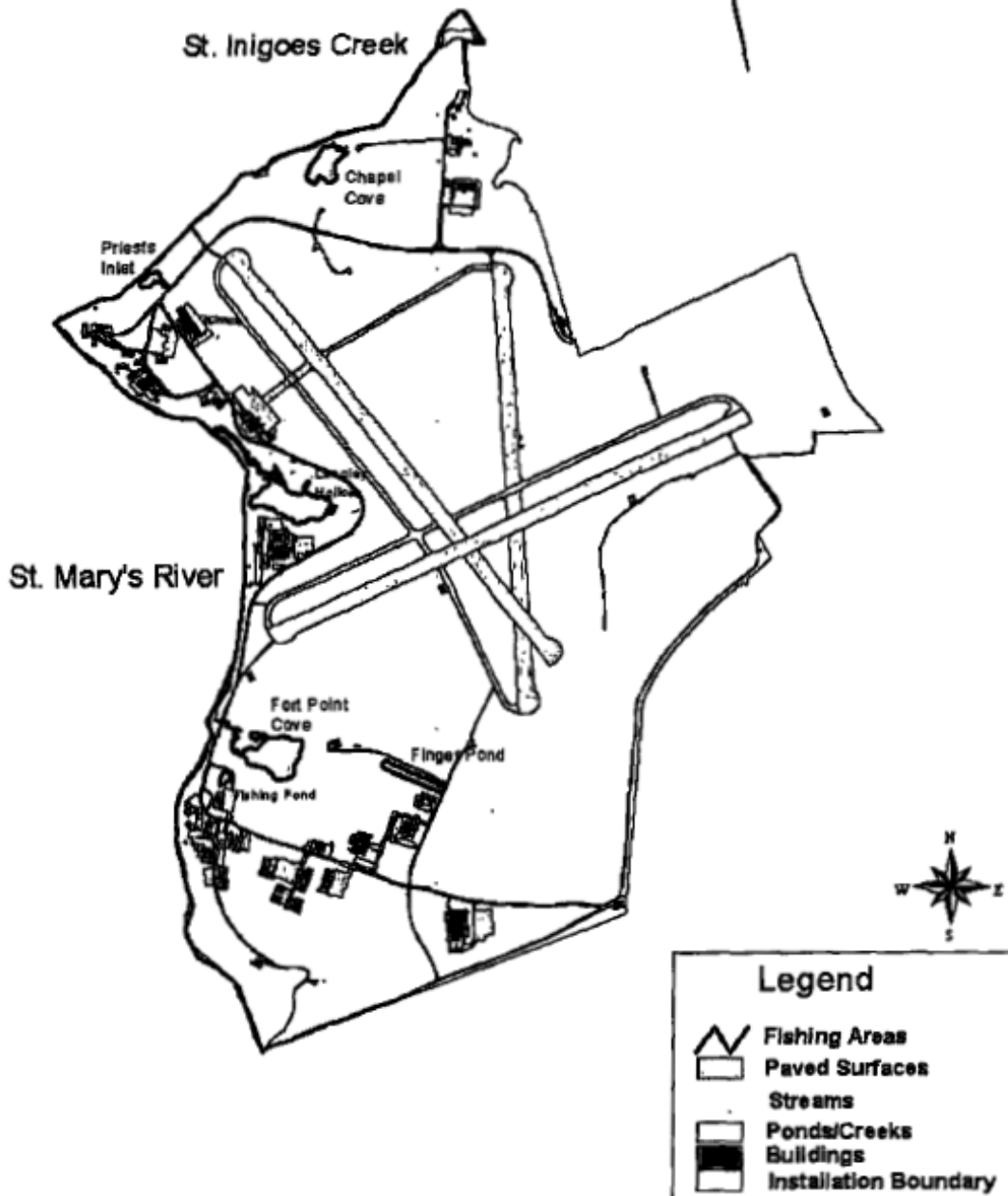
a. Improve the bass-bluegill population structure in each pond.

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- b. Ultimately increase the numbers and size of bass.
 - c. Increase the average size of bluegill and red-eared sunfish available to anglers.
4. Will protecting individual size classes actually help work toward these goals? Extensive research has shown that bass can be much more easily overharvested than once believed. In turn, this leads to depleted bass stocks, reduced bass production, and overabundance of stunted panfish populations. When bass are overharvested the following occurs:
- a. Less bass mean fewer bass preying on panfish. Panfish will overpopulate and become stunted with a majority of fish falling in the 2-5 inch size class. (Fact: Bass can eat panfish no larger than one-third their size. Therefore, with few bass reaching over 12 inches, there is little predation upon panfish in the 3-5 inch size range.) As panfish become crowded, they shut down their own reproductive cycle and as competition increases among themselves, they will inflict heavy losses on bass eggs. (Fact: Panfish are notorious bass egg eaters.) What bass do survive to fingerling size will consequently have insufficient numbers of panfish fry to feed upon. (Fact: The major food of young bass is panfish fry.) This results in poor bass growth and high mortality in the late summer through winter.
 - b. By taking this measure to protect the bass population, the listed goals will hopefully be met. If bass can control panfish populations, there will be less competition among panfish and better growth within panfish species. This should result in more bass eggs hatching. There will be more panfish reproduction and therefore more food for young bass. If you have any questions concerning Trophy Bass Fishing Areas, or the Station regulations pertaining to largemouth bass, please call the Environmental Department's Conservation Division at 301-342-3670.

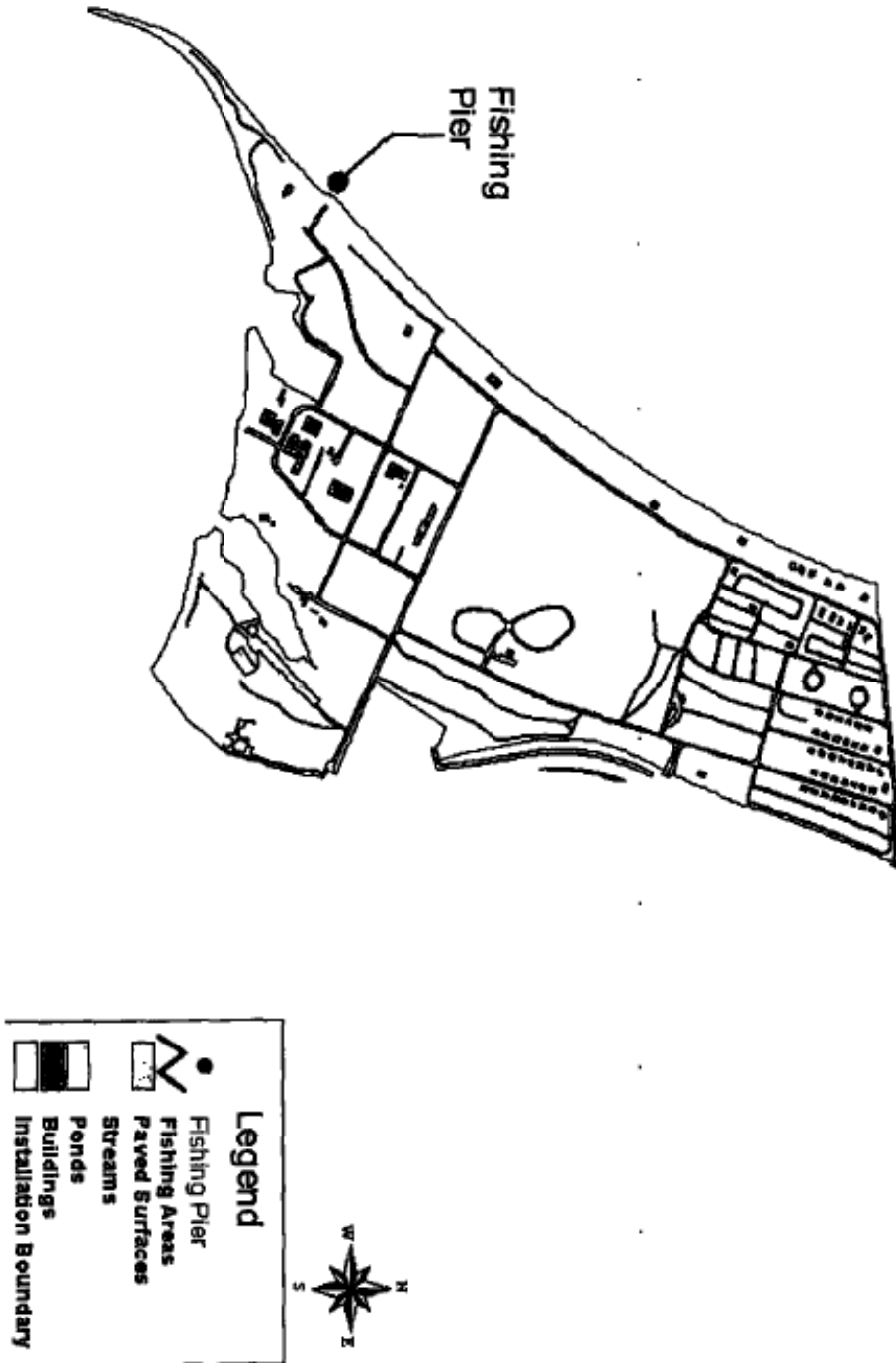
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FISHING AREAS AT NAS PATUXENT RIVER WEBSTER FIELD SEPTEMBER 2006



FISHING AREAS SOLOMON'S RECREATION CENTER SEPTEMBER 2006

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APPENDIX E
DATA CALL STATION REQUIRED INFORMATION

Data Call Information

Property Name and Total Acreage	Naval Recreation Center Solomons (296 total acres, 277 managed acres)
Total Acreage of Developed vs. Non-developed Areas	75 developed acres 221 undeveloped acres
Total Acreage of Wetlands vs. Uplands	6.5 wetlands acres 271.5 upland acres
Total Acreage of Agricultural Outleases	N/A
Total Forest Acres	12
Total Recreation Acres	235
Number of Federal T&E Species	5 animal species known/potentially in <u>adjacent waters</u> 0 potentially occurring on the installation
Number and Terms & Conditions for all Biological Opinions	0
Total Number of Candidate Conservation Agreements	0
Open Tasks in INRMP Implementation Table	8
NEPA Documentation Review CATEXs/ EAs/EISs (List by Project)	0/0/0
NEPA Mitigation Effort	0
BASH Program	N/A
Hunting Program	N/A
Fishing Program	Yes
Conservation Law Enforcement	Not performed
Invasive Species Survey	Yes (DoN 2007)

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APPENDIX F
URBAN FOREST MANAGEMENT GUIDELINES

Native Plants for Landscaping and Site Reclamation at NRC Solomons

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Forbs/Herbs									
Boneset	<i>Eupatorium</i> spp.	1'-4'	√	√	√		√	√	reclamation, wildflower meadow
Butterfly weed	<i>Asclepias tuberosa</i>	1'-3'	√					√	reclamation, wildflower meadow
Common milkweed	<i>Asclepias syriaca</i>	1'-2'		√	√		√	√	reclamation, wildflower meadow
Goat's rue	<i>Tephrosia virginiana</i>	1'-2'	√	√				√	reclamation
Goldenrod	<i>Solidago</i> spp.	2'-6'	√	√	√		√	√	reclamation, wildflower meadow
Late purple aster	<i>Symphyotrichum patens</i>	1'-4'	√	√			√	√	reclamation, wildflower meadow
New York aster	<i>Symphyotrichum novi-belgii</i>	1'-4'		√	√		√	√	reclamation, wildflower meadow
Round-head bushclover	<i>Lespedeza capitata</i>	2'-4'	√					√	reclamation
Sunflower	<i>Helianthus</i> spp.	1'-2'	√	√			√	√	reclamation, wildflower meadow
Threadleaf coreopsis	<i>Coreopsis verticillata</i>	2'	√				√	√	reclamation, wildflower meadow
Wand-like bushclover	<i>Lespedeza intermedia</i>	1'-3'	√	√			√	√	reclamation
Wild bergamot	<i>Monarda fistulosa</i>	<1'-3'	√					√	reclamation, wildflower meadow
Grasses									
Broomsedge	<i>Andropogon virginicus</i>	1'-3'	√	√			√	√	native warm-season grassland
Bushy broomsedge	<i>Andropogon glomeratus</i>	1.5' -5'		√	√		√	√	native warm-season grassland
Switchgrass	<i>Panicum virgatum</i>	3'-5'	√	√	√		√	√	native warm-season grassland

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Little bluestem	<i>Schizachyrium scoparium</i>	2'-3'	√	√			√	√	native warm-season grassland
Eastern gamma grass	<i>Tripsacum dactyloides</i>		√	√			√	√	native warm-season grassland
Side-oats grama	<i>Bouteloua curtipendula</i>			√			√		native warm-season grassland
Indian grass	<i>Sorghastrum nutans</i>	5'-6'	√	√			√	√	native warm-season grassland
Shrubs									
Blueberry, highbush	<i>Vaccinium corymbosum</i>	2'-12'		√	√	√	√		riparian buffer
Blueberry, lowbush	<i>Vaccinium pallidum</i>	1'-1.5'	√	√		√	√		reclamation, wildlife
Buttonbush	<i>Cephalanthus occidentalis</i>	3'-7'			√	√	√		riparian buffer
Chokeberry, red	<i>Aronia arbutifolia</i>	3'-10'	√	√	√		√	√	riparian buffer, reclamation
Dogwood, graystem	<i>Cornus racemosa</i>	10'-15'	√	√	√	√	√	√	riparian buffer, reclamation
Dogwood, silky	<i>Cornus amomum</i>	6'-10'		√	√		√		riparian buffer
Hazel alder	<i>Alnus serrulata</i>	6'-15'		√	√	√	√		riparian buffer
Hazelnut	<i>Corylus americana</i>	6'-10'		√	√		√	√	reclamation, wildlife
Inkberry	<i>Ilex glabris</i>	2'-10'		√	√	√	√		riparian buffer, landscape
Mountain laurel	<i>Kalmia latifolia</i>	3'-10'	√	√		√	√		landscape
Serviceberry	<i>Amelanchier canadensis</i>	5'-15'		√					landscape, wildlife
Swamp azalea	<i>Rhododendron viscosum</i>	3'-8'		√	√	√	√		riparian buffer
Sweet pepperbush	<i>Clethra alnifolia</i>	3'-8'		√	√	√	√	√	riparian buffer, landscape
Viburnum, arrowwood	<i>Viburnum dentatum</i>	4'-8'		√	√		√	√	riparian buffer, landscape
Viburnum, blackhaw	<i>Viburnum prunifolium</i>	8'-15'	√	√	√	√	√		landscape, reclamation
Virginia sweetspire	<i>Itea virginica</i>	3'-5'		√	√	√	√	√	riparian buffer, landscape
Wax myrtle	<i>Morella (Myrica) cerifera</i>	2'-6'		√	√		√	√	riparian buffer
Winterberry	<i>Ilex verticillata</i>	4'-12'		√	√		√	√	riparian buffer
Small Trees									
Dogwood	<i>Cornus florida</i>	20'-30'		√			√	√	landscape
Hawthorn	<i>Crataegus spp.</i>	10'-20'		√			√	√	landscape
Sassafras	<i>Sassafras albidum</i>	20'-40'		√			√	√	landscape, reclamation

Common Name	Scientific Name	Height	Low Moisture	Moderate Moisture	High Moisture	Full Shade	Partial Sun	Full Sun	Suggested Uses
Serviceberry	<i>Amelanchier arboria</i>	15'-25'		√			√	√	landscape, wildlife
Sweetbay magnolia	<i>Magnolia virginiana</i>	15'-30'		√	√	√	√		riparian buffer, landscape
Medium to Large Trees									
America holly	<i>Ilex opaca</i>	40'-50'		√	√		√	√	landscape, wildlife
Ash, green	<i>Fraxinus americana</i>	50'-80'		√	√			√	riparian buffer, landscape
Ash, White	<i>Fraxinus pennsylvanica</i>	50'-60'		√	√			√	riparian buffer, landscape
Black locust	<i>Robinia pseudoacacia</i>	30'-50'	√	√			√	√	reclamation
Black willow	<i>Salix nigra</i>	30'-50'		√	√	√	√		riparian buffer
Blackgum	<i>Nyssa sylvatica</i>	50'-70'		√	√		√	√	riparian buffer, landscape
Eastern red cedar	<i>Juniperus virginiana</i>	45'-65'	√	√	√		√	√	visual screen
Hackberry	<i>Celtis occidentalis</i>	40'-60'		√	√		√	√	riparian buffer, landscape
Oak, black	<i>Quercus velutina</i>	65'-80'	√	√	√		√	√	landscape, reforestation
Oak, cherrybark	<i>Quercus pagodaefolia</i>	70'-80'		√	√		√	√	landscape, reforestation,
Oak, chestnut	<i>Quercus prinus</i>	65'-80'	√				√	√	reforestation, reclamation
Oak, pin	<i>Quercus palustris</i>	60'-70'		√	√		√	√	riparian buffer, landscape
Oak, southern red	<i>Quercus falcata</i>	70'-80'	√	√			√	√	landscape, reforestation
Oak, white	<i>Quercus alba</i>	70'-80'		√			√	√	landscape, reforestation
Oak, willow	<i>Quercus phellos</i>	40'-60'	√	√	√		√	√	landscape, riparian buffer,
Persimmon	<i>Diospyros virginiana</i>	30'-40'	√	√			√	√	reclamation, wildlife
Pine, loblolly	<i>Pinus taeda</i>	80'-100'	√	√	√		√	√	landscape, reforestation
Pine, shortleaf	<i>Pinus echinata</i>	80'-100'	√	√			√	√	reforestation
Pine, Virginia	<i>Pinus virginiana</i>	30'-50'	√	√			√	√	reclamation
Red maple	<i>Acer rubrum</i>	50'-80'	√	√	√		√	√	riparian buffer, landscape
Red mulberry	<i>Morus rubra</i>	30'-40'		√			√	√	wildlife
River birch	<i>Betula nigra</i>	40'-70'		√	√	√	√		riparian buffer, landscape
Sycamore	<i>Platanus occidentalis</i>	75'-120'		√	√		√	√	riparian buffer, landscape
Yellow poplar	<i>Leriodendron tulipifera</i>	100'-150'		√			√	√	landscape, reforestation

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Selection of Plant Materials

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

A list of plant species native to the NRC Solomons region and suitable for landscaping purposes is in Appendix F. Plant characteristics and site requirements for each species are included in the list. The plant species listed are common commercial plants that may be purchased from the MDNR Forest Service tree nursery (<http://www.dnr.state.md.us/forests/nursery/>) or local nurseries that specialize in native plants. Not all species offered by these nurseries are native, so care must be taken when placing orders.

Soil Amendments

Soil amendments such as lime, fertilizer, and organic matter are often used to improve nutrient availability, reduce soil acidity, and alter the physical characteristics of the soil. The addition of soil amendments is a considerable expense, however, and should not be routinely recommended for all planting sites. Selecting planting stock appropriate to a site's condition, when possible, is a more cost-effective alternative. One or more plant species can usually be found that can tolerate soil texture and nutrient availability of most soils. Soil amendments should not be added directly to planting holes for trees and shrubs. These amendments cause problems with soil moisture and root growth. If fertilizers are applied, it is important to use a slow-release product with low solubility so nutrients are not easily leached away.

New Tree Planting

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

peaks. Groundcovers can be planted at any time, as long as there is adequate rainfall or available supplemental watering. Proper tree planting is another vital element of a healthy urban forest. Using correct planting methods can increase a tree's ability to become established quickly and improve its health and longevity. Planting technique differs somewhat with the type of material being planted, though the goal of each is to provide an environment that encourages root growth. Guidelines that apply to most types of planting stock are that the planting hole should be three to five times greater in diameter than the root ball of the material to be planted and only as deep as the root ball. It is important not to bury the roots too deep or they will not be able to get enough oxygen. To ensure the greatest chance of survival, urban tree and shrub planting should be performed by trained natural resources personnel or qualified tree care professionals.

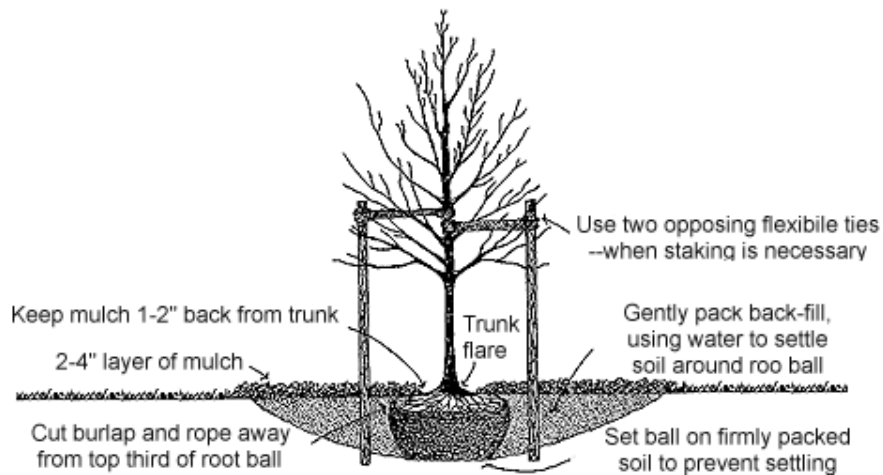
The ideal time to plant trees and shrubs is during the dormant season, in the fall after leafdrop or early spring before bud-break. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. *Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.*

If the tree you are planting is balled and burlapped, or bare rooted, it is important to understand that the tree's root system has been reduced by 90-95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit what is known as transplant shock. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow up care will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish in its new location. Carefully follow eight simple steps and you can significantly reduce the stress placed on the plant at the time of planting.

1. **Dig a shallow, broad planting hole.** Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball. It is important to make the hole wide because the tree roots on the newly establishing tree must push through surrounding soil to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
2. **Identify the trunk flare.** The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.
3. **Place the tree at the proper height.** Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and no more. The majority of the roots on the newly planted tree will develop in the top 12" of soil. If the tree is planted too deep, new roots will have difficulty developing due to a lack of oxygen. It is better to plant the tree a little high, 1-2" above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see diagram). To

avoid damage when setting the tree in the hole, always lift the tree by the root ball, and never by the trunk.

4. **Straighten the tree in the hole.** Before you begin backfilling, have someone view the tree from several directions to confirm the tree is straight. Once you begin backfilling it is difficult to reposition.



5. **Fill the hole, gently but firmly.** Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped, cut and remove the string and wire from around the trunk and top 1/3 of the root ball (see diagram). Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.
6. **Stake the tree, if necessary.** If the tree is grown and dug properly at the nursery, staking for support is not necessary in most home landscape situations. Studies have shown that trees will establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth. Leave protective staking in place as long as necessary.
7. **Mulch the base of the tree.** Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, protect against harsh soil temperatures, both hot and cold, and reduces competition from grass and weeds. Some good choices are leaf litter, pine straw, shredded bark, peat moss, or wood chips. A two to four inch layer is ideal. More than four inches may cause a problem with gas exchange. When placing mulch, care should be taken so that the actual

trunk of the tree is not covered. This may cause decay of the living bark at the base of the tree. A mulch-free area, one to two inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

8. **Follow-up care.** Keep the soil moist but not soaked; overwatering will cause leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less frequent watering. Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting, and wait to begin necessary corrective pruning until after a full season of growth in the new location.

(From International Society Arboriculture at <http://www.isa-arbor.com/consumer/planting.html>)

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

Preventing damage from mowers and string trimmers is a significant problem for landscape managers. Wounds in a tree's bark make it more susceptible to disease and pest infestations and reduce its chance of survival. Several alternatives exist for reducing tree damage. Mulch can be an effective method of protecting trees from mower damage, when used properly. Mulch protects trees by reducing weed growth around the plant's base, which reduces the need to mow near the plant. Mulch should be applied to a weed-free area around the root mat in a layer about 3 to 4 inches thick. Mulch should not be applied too close to the tree trunk or too deeply as this creates an environment that promotes fungal growth and decay.

Placing trunk guards around the base of trees is another method of protecting them from mower damage. Flexible plastic trunk guards can be purchased from forest supply companies or homemade trunk guards can be made from hardware cloth. The plastic guards are more practical because they expand as the tree grows. Care must be taken to remove guards as trees grow as they can cause girdling and suckering when left in place too long.

Prohibiting the attachment of signs, fences, or other materials to trees will also help prevent avoidable damage to urban trees.

Periodic maintenance is an important part of keeping the urban forest in good health. Of critical importance is the removal of hazardous trees or branches, which if left unattended could cause damage to persons or property. Other high priority maintenance practices include the pruning or treatment of large-diameter dead or damaged limbs or limbs infected with disease or pests. As with planting, pruning should only be performed by qualified tree care professionals, as poor pruning may lead to structural damage and excessive wounding.

Pruning Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, it will shorten the tree's life.

Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure.

When to Prune

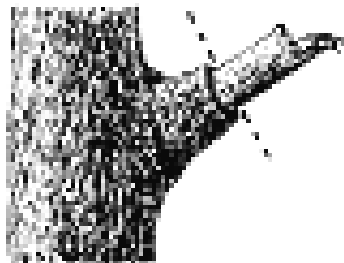
Most routine pruning to remove weak, diseased or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree.

A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.

Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

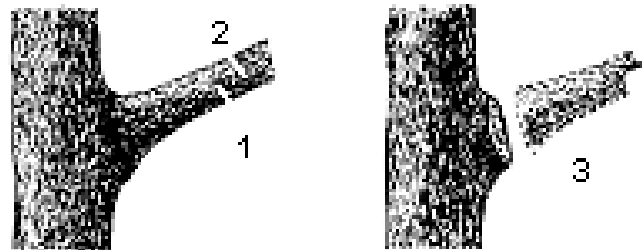
Making Proper Pruning Cuts to Mature Trees

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar (see figure).



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar.

If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12-18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb leaving the 12-18 inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark



Use the 3-cut method to remove a large limb.

How Much Should be Pruned?

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. A widely accepted rule of thumb is never to remove more than one fourth of a tree's leaf bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large, mature trees is usually limited to the removal of dead or potentially hazardous limbs.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure, and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, then only a thin coating of a non-toxic material should be applied.

Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches. Save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances, which stimulate new root production. Unpruned trees establish faster, with a stronger root system than trees pruned at the time of planting.

(From International Society Arboriculture at <http://www.isa-arbor.com/consumer/pruning.html>)

RECOGNIZING HAZARDOUS TREES

Hazardous Trees & Utility Lines. Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages, surges, fires and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

Tree Hazard Checklist

Consider these questions . . .

1. Are there large dead branches in the tree?
2. Are there detached branches hanging in the tree?
3. Does the tree have cavities or rotten wood along the trunk or in major branches?
4. Are mushrooms present at the base of the tree?
5. Are there cracks or splits in the trunk or where branches are attached?
6. Have any branches fallen from the tree?
7. Have adjacent trees fallen over or died?
8. Has the trunk developed a strong lean?
9. Do many of the major branches arise from one point on the trunk?
10. Have the roots been broken off, injured or damaged by lowering the soil level, installing pavement, repairing sidewalks or digging trenches?
11. Has the site recently been changed by construction, raising the soil level or installing lawns?
12. Have the leaves prematurely developed an unusual color or size?
13. Have trees in adjacent wooded areas been removed?
14. Has the tree been topped or otherwise heavily pruned?

Managing Tree Hazards

One of these treatments may help make your tree safer. Reducing the risk associated with hazardous trees can take many forms.

1. **Prune the tree.** Remove the defective branches of the tree. Since in appropriate pruning may also weaken a tree,
2. **Provide routine care.** Mature trees need routine care in the form of water, fertilizer (in some cases), mulch and pruning as dictated by the season and their structure.

A number of treatments are best done by a Certified Arborist

1. **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.
2. **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

(International Society of Arboriculture at <http://www.isa-arbor.com/consumer/hazards.html>)