Integrated Natural Resources Management Plan
Naval Support Activity Panama City
Panama City, Florida

2017
Update

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NAVAL SUPPORT ACTIVITY
PANAMA CITY

2017 Update

NAVAL SUPPORT ACTIVITY PANAMA CITY, FLORIDA
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
2017 OPERATIONS AND EFFECT CONCURRENCE

The Sikes Act and Department of Defense instruction require that annual and 5-year operation and effect reviews of Integrated Natural Resources Management Plans (INRMPs) occur with federal and state partners. Representatives of the Navy, U.S. Fish & Wildlife Service, Florida Fish and Wildlife Conservation Commission, and National Marine Fisheries Service participate annually in the Naval Support Activity Panama City INRMP and Natural Resources Metric review. The Navy has revised the installation INRMP with input from the signatory partners as part of the required 5-year review process. By signing below, the partners concur that the management actions prescribed in the INRMP and implemented will contribute to the conservation and rehabilitation of installation natural resources.

Approving Officials:

Commanding Officer, NSA Panama City	**(Date)**
Natural Resources Manager, NSA Panama City	**(Date)**
U.S. Navy Regional Environmental Coordinator	**(Date)**
Natural Resources Manager, Commander Navy Region SE	**(Date)**
U. S. Fish and Wildlife Service	**(Date)**
Florida Fish and Wildlife Conservation Commission	**(Date)**
National Marine Fisheries Service	**(Date)**

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List of Acronyms

AOC	Area of Concern
ASN	Assistant Secretary of the Navy
BEST	Bay Environmental Study Team
BMPs	Best Management Practices
CFR	Code of Federal Regulations
CO	Commanding Officer; also carbon monoxide
CNO	Chief of Naval Operations
CRM	Cultural Resource Manager
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CZMA	Coastal Zone Management Act
DCA	Department of Community Affairs
DoD	United States Department of Defense
DoDINST	Department of Defense Instruction
DoD-PARC	Department of Defense Partners in Amphibian and Reptile Conservation
DoN	Department of the Navy
EFD	Engineering Field Division
EFH	Essential Fish Habitat
EO	Executive Order
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESQD	Explosive Safety Quantity Distance
^{o}F	Degrees Fahrenheit
FAC	Florida Administrative Code
FCMP	Florida Coastal Management Program
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection

FDNR	Florida Department of Natural Resources
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FMU	Fishery Management Unit
FWC	Florida Fish and Wildlife Conservation Commission
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FIRM	Flood Insurance Rate Map
FNAI	Florida Natural Areas Inventory
GIS	Geographic Information Systems
GMFMC	Gulf of Mexico Fisheries Management Council
GRX	GeoReadiness Exchange
ICRMP	Integrated Cultural Resource Management Plan
INRMP	Integrated Natural Resource Management Plan
MMPA	Marine Mammal Protection Act
MRSG	Marine Resources Support Group
MSA	Magnusson-Stevens Fisheries Conservation Act
msl	Mean Sea Level
MWR	Morale, Welfare, and Recreation
MU	Mixed-Use Area
NAAQS	National Ambient Air Quality Standards
NAVFAC	Naval Facilities Engineering Command
NAVFAC SE	Naval Facilities Engineering Command, Southeast
NDAA	National Defense Authorization Act
NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NRM	Natural Resources Manager
NSA	Naval Support Activity
NSWC PC	Naval Surface Warfare Center Panama City Division
NWFWMD	North Florida Water Management District
O_3	Ground-Level Ozone
OFW	Outstanding Florida Water

OP	Operational Protected Area
OPNAVINST	Office of the Chief of Naval Operations Instruction
P	Protected Area
Pb	Lead
PIF	Partners in Flight
PM_{10}	Particulate Matter
PMP	Pest Management Plan
RCRA	Resource Conservation Recovery Act
RDT&E	Research, Development, Testing, and Evaluation
SAIA	Sikes Act Improvement Act
SCS	Soil Conservation Service
SFP	Strategic Facility Plan
SJRWMD	St. Johns River Water Management District
SO_2	Sulfur Dioxide
SWMU	Solid Waste Management Units
SWPPP	Stormwater Pollution Prevention Plan
T/A	Timber /Agricultural Areas
TNC	The Nature Conservancy
TSI	Timber Stand Improvement
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFS	United States Forestry Service
USFWS	United States Fish and Wildlife Service
WRAP	Wetland Rapid Assessment Procedure

Executive Summary

ES.1 Type of Document

This document is an Integrated Natural Resources Management Plan (INRMP).

ES.2 Purpose of Document

The purpose of this document is to meet statutory requirements under the Sikes Act Improvement Act (SAIA), Public Law 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022. In November 1997, the Sikes Act, 16 United States Code (U.S.C.) § 670a et seq., was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement INRMPs for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for the installation inappropriate. The Act mandates that all military installations prepare and implement an INRMP by November 17, 2001. The United States Department of the Navy (DoN; the Navy) has prepared this Naval Support Activity (NSA) Panama City.

ES.3 Goals and Objectives of the INRMP

The goal of the INRMP is to implement an ecosystem-based conservation program that provides for conservation and rehabilitation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources; provides for sustainable multi-purpose uses of natural resources; and provides public access for use of natural resources subject to safety and military security considerations. The INRMP covers a period of ten years. A ten-year planning period was selected by Naval Facilities Engineering Command Southeast for preparation of INRMPs for all Naval installations in the southeastern United States as a cost savings measure. In accordance with OPNAVINST 5090.1D 12-3.4(c), the INRMP will be

reviewed annually, and updated at least every five years. A major re-write has been budgeted for 2016.

Four Installation-wide ecosystem management goals have been identified for NSA Panama City:

Goal 1 Preserve, protect, and conserve the ecological value and diversity of natural resources through fostering knowledge of and participation in adaptive ecosystem management.

Goal 2 Protect and maintain the NSA Panama City ecosystem through the continuation and enhancement of ecologically appropriate and beneficial land management practices, while ensuring the expansion and continuation of the military mission.

Goal 3 Protect, maintain, and restore native vegetative communities and plant and wildlife populations.

Goal 4 Provide facilities and develop policies that allow for passive, recreational uses and environmental education activities that will not adversely affect the natural areas.

ES.4 Functional Areas and Management Focuses

To achieve Installation-wide goals and objectives, the Installation has been divided into functional areas. Functional areas are established in the plan to acknowledge the use of the area for its military purpose and for considering the opportunities to achieve natural resources management goals and objectives. Within each functional area, natural resources management focuses are identified. The focus of natural resources management within a functional area provides geographic emphasis for the primary management practices necessary to achieve the long-term goals and objectives of the INRMP. The management focus for an area may include land management, forestry, fish and wildlife, and outdoor recreation.

The INRMP divides NSA Panama City into three functional areas: two Operational Protected area (OP) and one Protected areas (P).

- **Operational Protected (OP) areas** include areas vital to the continuance of the military mission that are intensively utilized.
- **Protected (P) areas** include land protected due to the unique natural, cultural, or aesthetic value.

ES.5 Species Management

The natural resource actions described in this INRMP are for the benefit of the plants, animals and ecosystems occurring on this installation. Special attention is given to the rare,

threatened and endangered species (RTE) and their habitats through management actions referenced in Table ES-1. These actions are long-term conservation measures that provide measures that provide benefits for terrestrial and aquatic habitats on the installation. Management actions such as soil conservation and storm water management, for example, control sediment and pollutant runoff to protect near shore water quality for species such as shorebirds, fish and aquatic plants. Forestry actions, such as prescribed burning, thinning and reforestation help to establish longleaf pine (*Pinus palustris*) stands, providing ideal habitat for large-leaved jointweed (*Polygonella macrphylla*), for example.

Table ES-1. Habitat Management Actions at NSA Panama City

Natural Resource Management Action	Section
Wetland Management	5.1.1
Invasive and Exotic Species Management	5.1.2
Soil Conservation and Erosion Control	5.1.3
Stormwater and Water Quality Control	5.1.4
Landscaping and Grounds Maintenance	5.1.5
Floodplain Management	5.1.6
Timber Stand Improvement	5.2.1
Reforestation	5.2.2
Urban Forestry	5.2.3
Habitat Enhancement, and Threatened and Endangered Species	5.3.1
Wildlife Damage and Wildlife Disease Prevention and Control	5.3.2

The "Habitat Enhancement, and Threatened and Endangered Species" section of this INRMP (Section 5.3.1) includes goals, objectives, strategies, and projects for the benefit and long term conservation of RTE species found, or potentially found, on the installation and at the Beach Sites. Animal and plant species accounted for in this INRMP are:

American Alligator
Bald eagle
Choctawhatchee Beach Mouse
Dwarf Seahorse
Eastern Diamondback Rattlesnake
Florida Manatee
Giant Manta Ray (fish)
Godfrey's Golden Aster (plant)
Gulf Sturgeon (fish)
Large-leaved Jointweed (plant)
Least Tern (bird)
Little Blue Heron (bird)
Monarch Butterfly
Piping Plover (bird)
Red Knot (bird)
Sea Turtles
- Green Sea Turtle
- Hawksbill Sea Turtle
- Kemp's Ridley Sea Turtle
- Leatherback Sea Turtle
- Loggerhead Sea Turtle

Snowy Egret (bird)
Snowy Plover (bird)

ES.6 Projects of the INRMP

Projects are discrete actions for fulfilling a particular strategy (strategies implement objectives). Projects may be required in order for NSA Panama City to fulfill regulatory requirements regarding natural resources management, or to enhance existing measures for ensuring compliance. Projects of the INRMP are shown in Table A-1.

Funding for implementation of the INRMP will come from the Commander Naval Installation or Naval Facilities Engineering Command natural resources fund sources. The natural resources programs and projects described in this INRMP are divided into mandatory and stewardship categories to reflect implementation priorities. Every effort will be made to acquire Operations and Maintenance, Navy (O&M[N]) Environmental, or other funding to implement Department of Defense (DoD) mandatory projects in the most timely manner possible. Stewardship-type projects will be funded through forestry, agriculture outlease, fish and wildlife, Legacy, or other fund sources as funding and personnel resources become available.

ES.7 Mission Sustainability

The goal at NSA Panama City is to maintain and enhance the capability of military lands to support the training mission, while conserving the area's natural resources. Implementation of the INRMP will primarily focus on enhancing and sustaining the military mission but, at the same time, the resource managers will implement projects designed to enhance and protect the natural resources at NSA Panama City since the natural habitat is necessary for success of the military mission. Issues such as uncontrolled erosion and downstream public sedimentation, inappropriate use of herbicides, and unplanned public use of aquatic resources must be addressed to ensure that enforcement actions by regulatory agencies do not affect the military training mission.

Table ES-2 provides a cross reference of the discussions presented in this INRMP and the April 2006 Navy Guidance for INRMPs. Sections that are not applicable for NSA Panama City are also identified.

Table ES-2. Cross-Reference of OSD Format to Format Used in this INRMP

OSD recommended INRMP format	Cross reference to required information in this document
Cover Page	Cover Page
Signature Page	Signature Page
Executive Summary	Executive Summary
Table of Contents	Table of Contents
Chapter 1 - Overview	Chapter 1.0 – Introduction
1.a – Purpose	1.1 – Purpose and Organization
1.b – Scope	1.4 – Scope
1.c – Goals and Objectives Summary	5.0 – Natural Resources Goals, Objectives, and Strategies
1.d – Responsibilities of Stakeholders	2.4 – Stakeholders and Partnerships
1.e – Commitment of Regulatory Agencies	1.8.1 – Commitment of Regulatory Agencies
1.f – Authority	1.2 – Authority
1.g – Stewardship and Compliance Statement	1.7 – Stewardship and Compliance
1.h – Review and Revision Process	1.8.4 – Revision Process
1.i – Management Strategies	1.5 – Ecosystem Management
1.j – Integration with other Plans	2.7 – Plans, Programs, and Studies
Chapter 2 – Current Conditions and Use	4.0 – Existing Environment
2.0 – Installation Information	2.0 – History and Organization
2.a.1 – Location Statement (concise)	2.1 – Location and History
2.a.2 – Regional Land Use	2.1.3 – Regional Land Use
2.a.3 – History and Pre-Military Land Use (abbreviated)	2.2 – History
2.a.4 – Military Mission (concise)	2.3 – Military Mission
2.a.5 – Operations and Activities	2.4 – Organization and Structure
2.a.6 – Constraints Map	2.1.1 – Constraints Map
2.a.7 – Opportunities Map	2.1.2 – Opportunities Map
2.b – General Physical Environment and Ecosystems	4.1 – Existing Environment
2.c – General Biotic Environment	4.5 – Plants and Wildlife
2.c.1 – Threatened and Endangered Species and Species of Concern	4.5 – Plants and Wildlife
2.c.2 – Wetlands and Deep Water Habitats	4.3 - Hydrology
2.c.3 – Fauna	4.5.2 – Federally and State-Protected Wildlife
2.c.4 - Flora	4.5.1 – State-Protected Plants
Chapter 3 – Environmental Management Strategy and Mission Sustainability	3.0 – Environmental Management and Mission Sustainability

Table ES-2. Cross-Reference of OSD Format to Format Used in this INRMP

OSD recommended INRMP format	Cross reference to required information in this document
3.a – Supporting Sustainability of the Military Mission and the Natural Environment	3.1 – Supporting Sustainability of the Military Mission and the Natural Environment
3.a.1 – Integrate Military Mission and Sustainability Land Use	3.1.1 – Military Mission and Sustainability Land Use
3.a.2 – Define Impact to the Military Mission	3.1.2 – Defining Impact on the Military Mission
3.a.3 – Describe Relationship to Range Complex Management Plan or other Operational Area Plans	3.1.3 – Relationship to the Gulf of Mexico Range Complex and Panama City
3.b – Natural Resources Consultation Requirements (Section 7, EFH)	3.5 – Plants and Wildlife
3.c – NEPA Compliance	3.2 – Natural Resources Consultation Requirements
3.d – Opportunities for Beneficial Partnerships and Collaborative Resource Planning	3.4 – Beneficial Partnerships and Collaborative Resource Planning
3.e – Public Access and Outreach	3.5 – Public Access and Outreach
3.e.1 – Public Access and Outdoor Recreation	3.5 – Public Access and Outreach
3.e.2 – Public Outreach	3.5 – Public Access and Outreach
3.e.3 – Encroachment Partnering	2.1.2 – Opportunities Map
3.e.4 – State Comprehensive Wildlife Plans (SCWP) Integration	3.6 – Florida's State Wildlife Action Plan
Chapter 4 – Program Elements	6.0 – Natural Resources Management
4.a – Threatened and Endangered Species and Species Benefit, Critical Habitat, Species of Concern Management	6.3.1 –Threatened and Endangered Species, and Habitat Enhancement
4.b – Wetlands and Deep Water Habitats	6.1.1 – Wetlands
4.c – Law Enforcement	Not Applicable
4.d – Fish and Wildlife	6.3 – Fish and Wildlife
4.e – Forestry	6.2 – Forest Management
4.f – Vegetation	6.3.1.1 – Habitat Enhancement
4.g – Migratory Birds	6.3.2 – Migratory Bird Management
4.h – Invasive Species	6.1.2 – Invasive and Exotic Species
4.i – Pest Management	6.3.3 – Prevention and Control of Wildlife Damage and Wildlife Disease
4.j – Land Management	6.1 – Land Management
4.k – Agricultural Outleasing	Not Applicable
4.l – GIS Management, Data Integration, Access, and Reporting	6.5 – Land Impact Guidelines

Table ES-2. Cross-Reference of OSD Format to Format Used in this INRMP

OSD recommended INRMP format	Cross reference to required information in this document
4.m – Outdoor Recreation	6.4 – Outdoor Recreation
4.n – Bird Aircraft Strike Hazard	6.3.3 – Prevention and Control of Wildlife Damage and Wildlife Disease
4.o – Wildland Fire	6.2 – Forest Management
4.p – Training of Natural Resource Personnel	6.0 – Natural Resource Management
4.q – Coastal/Marine	4.6.3 – Coastal Zone Management
4.r – Floodplains	6.1.6 – Floodplain Management
4.s – Other Leases	Not Applicable
Chapter 5 - Implementation	1.6 – Implementation of the INRMP
5.a – Summary of Project Prescription Development Process	Appendix A – INRMP Projects
5.b – Achieving No Net Loss	6.0 – Natural Resources Management
5.c – Use of Cooperative Agreements	3.4 – Beneficial Partnerships and Collaborative Resource Planning
5.d – Funding Process	1.6 – Implementation of the INRMP
Appendix 1. Acronyms	List of Acronyms
Appendix 2. Detailed Natural Resources Prescriptions	6.0 – Natural Resources Management
Appendix 3. List of Projects	Appendix A – INRMP Projects
Appendix 4. Surveys: Results of Planning Level Surveys	Appendix A – INRMP Projects
Appendix 5. Research Requirements	Not Applicable
Appendix 6. Migratory Bird Management	4.5.3 – Migratory Birds
Appendix 7. Benefits for Endangered Species	6.3.1.2 – Threatened and Endangered Species
Appendix 8. Critical Habitat	6.3.1.2.1 – Federally-listed Species

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1 Introduction

1.1 Purpose and Organization

The purpose of this document is to meet statutory requirements under the Sikes Act Improvement Act (SAIA), Public Law 105-85, Div. B. Title XXIX, November 18, 1997, 111 Stat 2017-2019, 2020-2022. In November 1997, the Sikes Act, 16 U.S.C. § 670a et seq., was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installation. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement integrated natural resources management plans for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for the installation inappropriate. The Act mandates that all military installations prepare and implement an Integrated Natural Resource Management Plan (INRMP) by November 17, 2001.

The United States Department of the Navy (DoN) is preparing this INRMP for the Naval Support Activity (NSA) Panama City, to comply with the SAIA and with DoD Instruction (DoDINST 4715.3). This INRMP also complies with the Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1D, Chapter 12, ASN (I&E) Memorandum of 1 January 2014.

The INRMP is a management planning document that establishes a guideline for the use and conservation of natural resources on lands and water under DoD control. Currently, DoD is one of the largest landholders in the United States, with over 20 million acres. Some of the most environmentally sensitive properties, including sensitive species and/or sensitive vegetative communities, occur within these lands.

The development and implementation of the INRMP is a dynamic, multidisciplinary planning process that incorporates as its primary goal the support and maintenance of the military mission while managing, protecting, and enhancing the biological integrity of military

lands and waters. The military's use of land and water resources must comply with legal mandates and will, to the extent practicable, be integrated with ecosystem-level goals, plans, and use of lands and waters inside and outside the boundaries of military installations.

Because the function of the land that the Navy uses and owns is to support the military mission of the installation which occupies it, it is essential for the INRMP to be consistent with the activities and requirements that support the military mission. The mission statement of NSA Panama City is:

"We exist to enable and sustain warfighter readiness."

Other than the mandated requirement, the primary purpose of the INRMP is to provide the NSA Panama City with a foundation from which to manage the installation's natural resources. The INRMP will outline the management of the installation's natural resources for the next ten years. A ten-year planning period was selected by Naval Facilities Engineering Command Southeast (NAVAFC SE) for preparation of INRMPs for all Naval installations in the southeastern United States as a cost savings measure. In accordance with OPNAVINST 5090.1D, 12-3.4(c)(10) and 12-3.4(c)(12), the INRMP will be reviewed on a yearly basis and re-approved every five years. A comprehensive re-write of the INRMP will occur every ten years. The INRMP will account for the goals of the natural resources program within those ten years, while not interfering with the mission of the installation. The INRMP will also consider the surrounding natural resources through implementation of an integrated approach to management.

The first three sections of this INRMP establish the existing conditions at the NSA Panama City installation. Section 1 provides a general overview of the purpose and intent of the INRMP and the processes for review, implementation, and revision of the plan. Section 2 establishes the importance of the military mission within the DoN: discusses the organization of the installation; provides a brief overview of the natural resources program; and identifies installation partnerships and stakeholders with a particular interest in the protection of installation and regional natural resources. Section 3 discusses the existing physical and biological characteristics of the local and regional environment. Physical characteristics include climate, topography, geology, soils, hydrology, groundwater, and land use. Biological characteristics include wetlands, threatened and endangered species, coastal zone issues, and natural vegetative communities.

The remaining sections of the INRMP identify issues pertaining to the long-term management of NSA Panama City's natural resources and land management programs and practices for achieving desired conditions. Section 4 discusses ecosystem management goals, objectives, strategies, initiatives, and/or projects that comprise a logical sequence of actions for achieving the long-range aim of ecosystem management.

Section 5 discusses ecosystem management at NSA Panama City by dividing ecosystem management into four focuses: land management, forestry, fish and wildlife, and outdoor recreation. These focuses are further divided into subunits; for example, the land management discussion addresses wetlands, invasive and exotic species, soil conservation and erosion control, stormwater/water quality control, landscaping and maintenance, and floodplain management. For each subunit, Section 5 discusses the issue(s), long-term management of the issue(s), the relationship of issues to ecosystem management, the relationships among ecosystem management subunits, legal requirements, and sources for additional management information. This section also correlates the goals, objectives, strategies, initiatives, and/or projects presented in Section 4 with the subunits defined in Section 5 (the issues identified in Section 5 for each subunit were used to develop the ecosystem management goals and objectives presented in Section 4).

Section 6 discusses the natural resources management focus areas, including land management, forestry management, fish and wildlife management, and outdoor recreation. Management focus areas were developed for no net loss in capability of lands to support the military mission and to achieve the goals, objections, and strategies discussed in Section 4. The management focus for an area provides the geographic emphasis for the primary management practices necessary to achieve the long-term goals and objectives of the INRMP. All other long-term management practices will be implemented in support of the primary purpose.

Appendix A describes the projects that will be implemented by NSA Panama City. Projects were identified by the NSA Panama City Natural Resources Manager in consultation with foresters, fish and wildlife biologists, and soil conservationists with the Land Management Department of NAVFAC SE, as well as with federal, state, and county wildlife biologists, foresters, and land managers. For each project, Appendix A discusses the purpose, location, description, cost, relevance to the goals and objectives listed in Section 4, baselines, and monitoring and legal requirements. It is the intent of NSA Panama City to implement the projects as described in Appendix A to the greatest extent possible. The

implementation of projects is largely dependent upon availability of funds. Recognizing the uncertainties in funding and the possibility of changes to NSA Panama City's military mission and its civilian and military staffing, the implementation of projects will proceed as directly and completely as possible.

1.2 Authority

The NSA Panama City INRMP is written to meet the requirements of the SAIA of 1997 (16 U.S.C. § 670a et seq.), and the requirements of the DoD Environmental Conservation Program (DoDINST 4715.3). It also incorporates guidance given in OPNAVINST 5090.1D, the Navy Environmental Protection and Natural Resources Manual, and the NAVFAC Real Estate Procedural Manual (NAVFAC P-73).

1.3 Responsibilities

The Commander, Navy Region Southeast (CNRSE) is responsible for ensuring the NSA Panama City INRMP complies with DoD, Navy, and CNO policy on the INRMP and associated NEPA document preparation, revision, and implementation; ensuring the NSA Panama City INRMP undergoes annual and formal 5-year reviews; ensuring the programming of resources necessary to maintain and implement the NSA Panama City INRMP; and participating in the development and revision of the NSA Panama City INRMP.

The NSA Panama City Commanding Officer (CO) is responsible for the preparation, completion, and implementation of this INRMP and associated NEPA documents for NSA Panama City and systematically applying the conservation practices set forth in this INRMP. The CO's role is to act as the steward of natural resources under his or her jurisdiction and integrate natural resources management requirements into the daily decision making process; ensure natural resources management and this INRMP comply with all natural resource-related legislation, Executive Orders (EO) and Executive Memorandums, and DoD, Secretary of the Navy (SECNAV), Navy, and CNO directives, instructions and policies; involve appropriate tenant, operational, training, or research and development (R&D) commands in the INRMP review process to ensure no net loss of military mission; designating a Natural Resources Manager (NRM) that is responsible for the management efforts related to the preparation, revision, implementation and funding for this INRMP, as well as coordination with installation trainers, subordinate commands and installations; involve appropriate Navy Judge Advocate General (JAG) or Office of the General Counsel

(OGC) Legal Counsel to provide advice and counsel with respect to legal matters related to natural resources management and this INRMP; and, endorse this INRMP via CO signature.

1.4 Scope

The scope of this INRMP includes all lands currently managed by NSA Panama City, including the main installation and four beach sites, creating the framework for the implementation of a natural resources management program to conserve and rehabilitate natural resources. Appropriate and effective management of natural resources on Navy lands will be achieved in accordance with the principles and practices of ecosystem management. Ecosystem management initiatives include the following steps, which do not necessarily take place in a particular sequence and often occur in parallel with each other and can be repeated as the process evolves:

- Recognizing and defining the problems or opportunities;
- Delineating boundaries;
- Identifying and involving participants;
- Establishing a common vision;
- Assessing ecological, economical, and social constraints and opportunities;
- Acquiring funding;
- Making decisions and implementing solutions; and
- Monitoring progress, evaluating impacts, and adapting based on new information.

This INRMP does not substitute for a pest management plan, hazardous waste plan, stormwater retention plan, or integrated cultural resources management plan (ICRMP). It has the dual purpose of complying with various natural resources related laws while supporting the military mission of NSA Panama City.

1.5 Ecosystem Management

Ecosystems are important components of environmental systems (Levine 1991). Ecosystem components, living and non-living, are linked together by numerous, dynamic flows of matter and energy (Levine 1991). Ecosystems are dynamic and involve repetitive or cyclic phenomena. Ecosystems typically contain a great diversity and number of species, individual organisms, and abiotic components. The living members of ecosystems exhibit a wide array of behaviors, and intra- and interspecies interactions are varied and often subtle.

Recognizing that crucial interdependencies exist within and between ecosystem components is important in establishing successful environmental management policies.

The DoD takes an ecosystem approach to natural resources management. Ecosystem management is a goal-driven approach to managing natural resources that support present and future mission requirements, preserves ecosystem integrity, is at a scale compatible with natural processes, is cognizant of nature's time frames, recognizes social and economic viability within functioning ecosystems, is adaptable to complex and changing requirements, and is realized through effective partnerships among private, local, state, tribal, and Federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole. The INRMP and the implementation of its management plans and projects provides for ecosystem management at NSA Panama City. The INRMP takes into account specific projects and management techniques that serve to manage the ecosystem and maintain biological diversity at a landscape scale.

Ecosystem management at NSA Panama City is achieved through adaptive and cooperative management strategies. Adaptive management is a systematic approach for continually improving management practices by learning from the outcome of projects, programs and other experiences. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices. The Metrics Builder provides the means to evaluate performance in INRMP reviews and updates for NSA Panama City. The Metrics Builder can be applied to completed and ongoing projects, natural resource practices, and new proposals.

1.6 Implementation of the INRMP

Implementation of the INRMP will follow an annual strategy that addresses legal requirements, funding, implementation responsibilities, technical assistance, labor resources, and technological enhancements.

Legal Requirements

Legal requirements are laws, executive orders, regulations, directives, and memoranda regarding the protection and management of natural resources. The INRMP will

be updated as legal requirements change. Relevant legal requirements for natural resources management are presented throughout Section 5.

Funding

Funding for implementation of the INRMP will come from the Commander Navy Installations or Naval Facilities Engineering Command natural resources fund sources. The natural resources programs and projects described in this INRMP are divided into mandatory and stewardship categories to reflect implementation priorities. Every effort will be made to acquire O & M(N) Environmental, or other funding to implement DoD mandatory projects, in the most timely manner possible. Stewardship-type projects will be funded through forestry, agricultural outlease, fish and wildlife, Legacy, or other fund sources as funding and personnel resources become available.

Implementation Responsibilities

NSA Panama City's Commanding Officer (CO) is responsible for managing all aspects of the installation's natural resources. The CO has delegated to an Installation Environmental Program Manager (IEPM) within the Public Works Department, the authority to implement natural resources management activities. Other installation personnel, such as Security; Morale, Welfare and Recreation (MWR); Housing; and Safety, have functions overlapping the natural resources program and coordinate with the IEPM on natural resources related issues.

Technical Assistance

Technical assistance from organizations outside the DoN will include:

- The United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC), under a Cooperative Agreement among the DoN, the United States Department of the Interior, and the State of Florida;
- The Nature Conservancy (TNC), under a Cooperative Agreement between DoD and TNC; and
- Other government agencies, such as the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), USDA Forest Service (USFS); Florida Department of Agriculture and Consumer Services (FDACS), Division of Forestry; Florida Department of Environmental Protection (FDEP); and Bay County foresters and land management professionals.

Technical assistance from within DoN will be provided by:

- The NSA Panama City's Natural Resources and Public Works managers;
- Foresters, fish and wildlife biologists, and soil conservationists from the Natural Resources Section of NAVFAC SE; and
- The NSA Panama City Command will hire additional staff, subject to funding, to complete the continuous work necessary for successful implementation of the INRMP.

Labor Resources

Options for supplemental labor resources from outside the DoN for implementation of the INRMP include volunteers from local organizations and groups such as:

- Scout troops;
- Elementary, middle, or high school students;
- College students;
- Ecology clubs and conservation programs/groups (e.g., the Student Conservation Association);
- Businesses/Homeowners associations; and
- Retired/senior citizens.

Options for supplemental labor resources from within the installation include the Natural Resources Manager, public works staff, and volunteer civilian and military personnel and their dependents.

Technological Enhancements

For technological enhancement, the NSA Panama City Command will consider purchasing a Geographic Information System (GIS) or, at a minimum, contracting for GIS services. Either of these actions would reduce the expected work load for INRMP implementation. GIS systems use computer technology, mapping methods, and geography to blend spatial data from various sources; GIS systems will provide spatial data of the installation. Today, GIS systems are widely used for planning, decision-making, and ecosystem monitoring. GIS offers an effective tool for processing large amounts of ecosystem-level monitoring data, especially when data are related at varying temporal and geographic scales. GIS offers much needed assistance to installations in implementing ecosystem management.

1.7 Stewardship and Compliance

The responsibilities of the natural resources management program at NSA Panama City can be classified as either meeting stewardship needs or mandatory requirements. Stewardship projects (i.e., watchable wildlife projects) are based upon the land management responsibility of the Navy, and are not required to be implemented to meet regulatory needs. Mandatory projects (i.e., endangered and threatened species surveys) are required to be implemented to meet legal requirements that apply to the operations of NSA Panama City.

Legal requirements are laws, executive orders, regulations, and memoranda regarding the protection and management of natural resources (see Table 1-1). This INRMP will be updated as legal requirements change. Relevant legal requirements for natural resources management are also presented throughout Section 5.

Funding for implementation of the INRMP will come from the installation, CNIC, and NAVFAC natural resources stewardship. The natural resources programs and projects described in this INRMP are divided into stewardship and mandatory categories to reflect implementation priorities. Stewardship projects will be funded through forestry, agricultural outlease, fish and wildlife, Legacy, installation funds, and other fund sources as funding and personnel resources become available. Every effort will be made to fund mandatory projects through Navy Operations and Maintenance (O&M[N]) Environmental.

1.8 Approval, Function, Use, and Revision Process of the INRMP

1.8.1 Commitment of Regulatory Agencies

The U.S Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC) are integral partners in the INRMP development, review, and revision process for NSA Panama City under a cooperative agreement with the DON as outlined in the Sikes Act. The USFWS and FWC cooperate in the development of the INRMP and participate in the annual reviews and revisions, as well as the formal 5-year review of the NSA Panama City INRMP.

Other government agencies outside the DON that have provided technical support to natural resources management at NSA Panama City include The Nature Conservancy (TNC), with which the DON also has a cooperative agreement, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), United

Table 1-1. Legal Drivers for Natural Resources Management

Name/Description	**Citation**
Bald Eagle Protection Act of 1940	16 U.S.C. 668
Clean Air Act	42 U.S.C. 7401
Clean Water Act	33 U.S.C. 1251, 33 USC 1341
Coastal Zone Management Act	16 U.S.C. 1456
Coral Reef Protection	Executive Order 13089
Endangered Species Act	16 U.S.C. 1531 & 1536
Environmental Conservation Program	DODINST 4715.3
Erosion Protection Act	33 U.S.C. 426
Estuary Protection Act of 1968	16 U.S.C. 1221
Federal Insecticide, Fungicide, and Rodenticide Act	7 U.S.C. 136
Federal Land Policy and Management Act of 1976	43 U.S.C. 1701
Federal Leadership in Environmental, Energy, and Economic Performance	Executive Order 13514
Federal Noxious Weed Act of 1974	7 U.S.C. 2801
Federal Pest Plant Act	7 U.S.C. 150
Fish and Wildlife Conservation Act	16 U.S.C. 2901
Fish and Wildlife Coordination Act, as amended	16 U.S.C. 661-666c
Floodplain Management	Executive Order 11988
Greening the Government through Environmental Management	Executive Order 13148
Invasive Species	Executive Order 13112
Magnuson-Stevens Fisheries Conservation and Management Act, as amended	Public Law 94-265
Management of Undesirable Plants of Federal lands	7 U.S.C. 2814
Marine Mammal Protection Act of 1972	16 U.S.C. 1361
Migratory Bird Treaty Act	16 U.S.C. 703
Military Construction and Authorization Act – Leases, Non-excess property	10 U.S.C. 2667
Military Reservations and Facilities – Hunting, Fishing, and Trapping	10 U.S.C. 2671
National Environmental Policy Act of 1969	42 U.S.C. 4321
Natural Resources Management Program	32 CFR 190
North American Wetland Conservation Act	16 U.S.C. 2912, 4401, 4808
Outdoor Recreation – Federal/State Program Act	16 U.S.C. 460 P-3
Protection and Enhancement of Environmental Quality	Executive Order 11514
Protection of Wetlands	Executive Order 11990
Recreational Fisheries	Executive Order 12962
Rivers and Harbors Act of 1899	33 U.S.C. 401
Sikes Act Improvement Act of 1997	16 U.S.C. 670
Soil and Water Conservation Act of 1977	16 U.S.C. 2001
Soil Conservation Act	16 U.S.C. 590
Use of Off-Road Vehicles on DOD Lands	Executive Order 11989
Water Resources Planning Act	42 U.S.C. 1962
Watershed Protection and Flood Prevention Act	16 U.S.C. 1001, 33 USC 701

States Forest Service (USFS), Gulf Coastal Plain Ecosystem Partnership (GCPEP), Florida Department of Agriculture and Consumer Services (FDACS), Florida Forest Service, Florida Department of Environment Protection (FDEP), and Bay County land management professionals.

1.8.2 Approval of the INRMP

The INRMP is required to be signature-endorsed by the subject installation's CO, the installation's Natural Resources Manager and the NAVFAC SE Natural Resources Manager. According to the SAIA, the INRMP must reflect mutual agreement with the USFWS and the FWC. Mutual agreement will concern conservation, protection, and management of fish and wildlife resources, and will be indicated by the signatures of the appropriate agency representatives.

1.8.3 Function and Use of the INRMP

The INRMP will outline the management of the installation's natural resources for the next ten years. To accomplish this, the INRMP presents long-term management concepts for the installation that are consistent with both the management of natural resources and fulfillment of the installation's military mission. The long-term management concepts do not represent any incremental or specific approach to management, but rather provide a philosophy and direction for the Natural Resources Manager and DoN decision-makers to ensure long-term sustainability of natural resources.

It is not necessarily the function of the INRMP to define specific projects for specific locations, nor to define specific practices or schedules for the individual components of natural resources management, which include land management, forestry, fish and wildlife, and outdoor recreation. Specific practices and schedules are addressed in existing management plans and programs developed for the installation, including, but not limited to, grounds maintenance, hazardous waste, facilities development, and stormwater pollution and prevention. These plans and programs adhere to federal and state regulatory requirements and will be used as tools for implementing this plan. These plans are dynamic, updated periodically, and will be inclusive of the goals and objectives identified in this INRMP.

1.8.4 Revision Process

In accordance with OPNAVINST 5090.1D, 12-3.4(c)(10) and 12-3.4(c)(12), the INRMP will be reviewed on a yearly basis and re-approved every five years. The review process will take into account changes in military mission requirements and legal mandates,

as well as information obtained from monitoring programs and surveys. Revisions to the goals, objectives, and/or projects of the INRMP will be reviewed for consistency with the military mission, federal and state laws, and the ecosystem management goals and objectives of the INRMP.

The revision process will be conducted under the direction of the installation CO; revisions will require consultation with, and approval by, the installation CO, the installation Natural Resources Manager, the Natural Resources Manager NAVAFC SE, the USFWS and the FWC.

1.9 Necessary Elements of the INRMP Addressed

1.9.1 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 requires the regional Fishery Management Councils and the Secretary of Commerce to describe and identify Essential Fish Habitat (EFH) for species under federal Fishery Management Plans. EFH is defined in the Magnuson-Stevens Act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The word “fish” in the previous sentence includes finfish, crabs, shrimp, and lobsters.

Estuarine and marine habitats found near NSA Panama City, such as seagrass beds, soft mud substrates, and oyster-encrusted infrastructure, are considered EFHs for certain species of fish. Therefore, in accordance with the consultation requirements of §305(b) of the Magnuson-Stevens Act (16 U.S.C. 1855(b)), NSA Panama City (as a federal entity) must consult with the Secretary on all actions, or proposed actions, authorized, funded, or undertaken that may adversely affect EFH. Implementation of the INRMP would not adversely affect EFH.

1.9.2 Coral Reefs

In accordance with EO 13089, Coral Reef Protection of 11 June 1998, which requires federal agencies to protect and enhance coral reefs and coral reef systems, the DoN recognizes that coral reefs and related endemic mangrove and sea grass ecosystems are biologically rich and diverse habitats. There are no coral reef systems within the area of influence of this INRMP.

1.9.3 Clean Water Action Plan

The Clean Water Action Plan (CWAP) was announced in 1998 on the 25th anniversary of the federal Clean Water Act. The CWAP focuses on watersheds with the

most critical water quality problems and takes a cooperative approach to developing and implementing effective strategies to solve those problems. NSA Panama City is not designated as a watershed with a critical water quality problem. Therefore, it is not subject to the action of the CWAP. However, the actions of the INRMP will have an overall positive effect on water quality.

1.9.4 Bird Aircraft Strike Hazard Reduction

A Bird Aircraft Strike Hazard Reduction management plan is not required for NSA Panama City because tenant air operations have not identified the need for a management program.

1.9.5 Critical Habitat

Section 1532 (5) (A) of the Endangered Species Act defines critical habitat for threatened or endangered species. On NSA Panama City, there are no areas designated as critical habitat for threatened or endangered species. Critical habitat has been designated for the Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*) at a leased property, called Beach Site 4, on the western edge of St. Andrews State Park (71 FR 60238). This property is managed by the Florida Park Service.

1.9.6 Public Access

The MWR department of NSA Panama City is the primary entity responsible for maintaining and developing outdoor recreational activities on NSA Panama City. Most of the programs and facilities maintained by MWR have been established for many years. NSA Panama City's environmental office reviews and provides recommendations and guidance for all new projects proposed by MWR.

Outdoor recreation programs and activities on NSA Panama City include the marina, picnic pavilion, campground, and organized outdoor recreation programs, activities, and classes. The installation also offers equipment rental, trips (e.g., rafting, canoeing, hiking, biking, horseback riding), camper rentals, and cabin rentals. Additionally, the NSA Panama City has walking and jogging trail. Saltwater fishing is permitted along the shoreline of St. Andrews Bay from the Marina basin to building 349 and in the housing area for residents. Hunting, freshwater fishing, and the use of off-road vehicles are not authorized on the installation. These activities are not permitted for the following reasons:

- Freshwater fishing is prohibited because the ponds are small and not well suited for recreational fishing.

- Hunting is not permitted because the area on the installation is inadequate, the installation is too close to the civilian urban area, and the numbers of game species are limited. Therefore, at this time, NSA Panama City will not develop a hunting program.
- Off-road vehicle use is not permitted because the area on the installation that could potentially support such a use is inadequate and largely encumbered by ESQD arcs, which necessitate restricted access.

Access to the installation's recreational resources is limited to uniformed military personnel and dependents, retired military personnel, and DoD civilians (hereinafter, this group is referred to as DoD personnel). NSA Panama City currently has no shared recreational opportunities with the public. Public access to the installation is not permitted due to: (1) the lack of transportation infrastructure to support additional traffic; (2) munitions storage and associated ESQD arcs on the southern end of the installation; and (3) mission security concerns. Section 5.4 discusses the long-term management of lands for natural resources-based outdoor recreation for military personnel and the public.

1.9.7 Agricultural Outleasing

NSA Panama City does not engage in agricultural outleasing. Because of the absence of land suitable and available for agricultural outleasing, the conservation of land for agricultural outleasing is not discussed in further detail in this INRMP.

2 History and Organization

2.1 Location and History

NSA Panama City is located on the western/southwestern shoreline of St. Andrew Bay in Panama City, Florida (see Figure 2-1). The city of Panama City is approximately 1 mile east of the NSA Panama City along the eastern shore of St. Andrew Bay. The installation totals 657 acres and houses 221 buildings. The unique conditions in the Gulf of Mexico, coupled with mission synergy, make NSA Panama City an ideal location for fleet training and littoral warfare missions. NSA Panama City employs approximately 3000 civilian and military personnel. NSA Panama City also owns three small (0.25-to-1.00 acres) properties, and leases a fourth, that are used by Naval Surface Warfare Center Panama City Division (NSWC PC) for research, development, testing and evaluation (RDT&E) in the Gulf of Mexico. West-to-east, the sites are called Beach Sites 1, 2, 3, and 4 (Figure 2-2). Beach Sites 1 – 3 are located between condominiums and buildings upland of dunes on the beachfront. Beach Site 1 is fenced and has a concrete slab where a building once stood. Beach Sites 2 and 3 are also fenced and have buildings and paved lots. These are small urban sites with no managed natural resources. Beach Site 4 is located at the western end of St Andrews State Park and has a building and boardwalk. It is not fenced. Natural resources on the leased property are managed by the Florida Park Service.

2.1.1 Constraints Map

The future expansion of properties at NSA Panama City would be restricted or impractical, depending upon the property (see Figure 2-1). Expansion of the main installation is restricted by St. Andrew Bay to the east, Highway 98 to the north, St. Thomas Drive and heavy urban development to the west, and Magnolia Beach Road and heavy urban development to the south. Beach Sites 1, 2, 3, are restricted by public beach to the south and heavy urban development in all other directions. Beach Site 4 is bounded by St. Andrews State Park. Expansion has not been programmed and is not anticipated at any property.

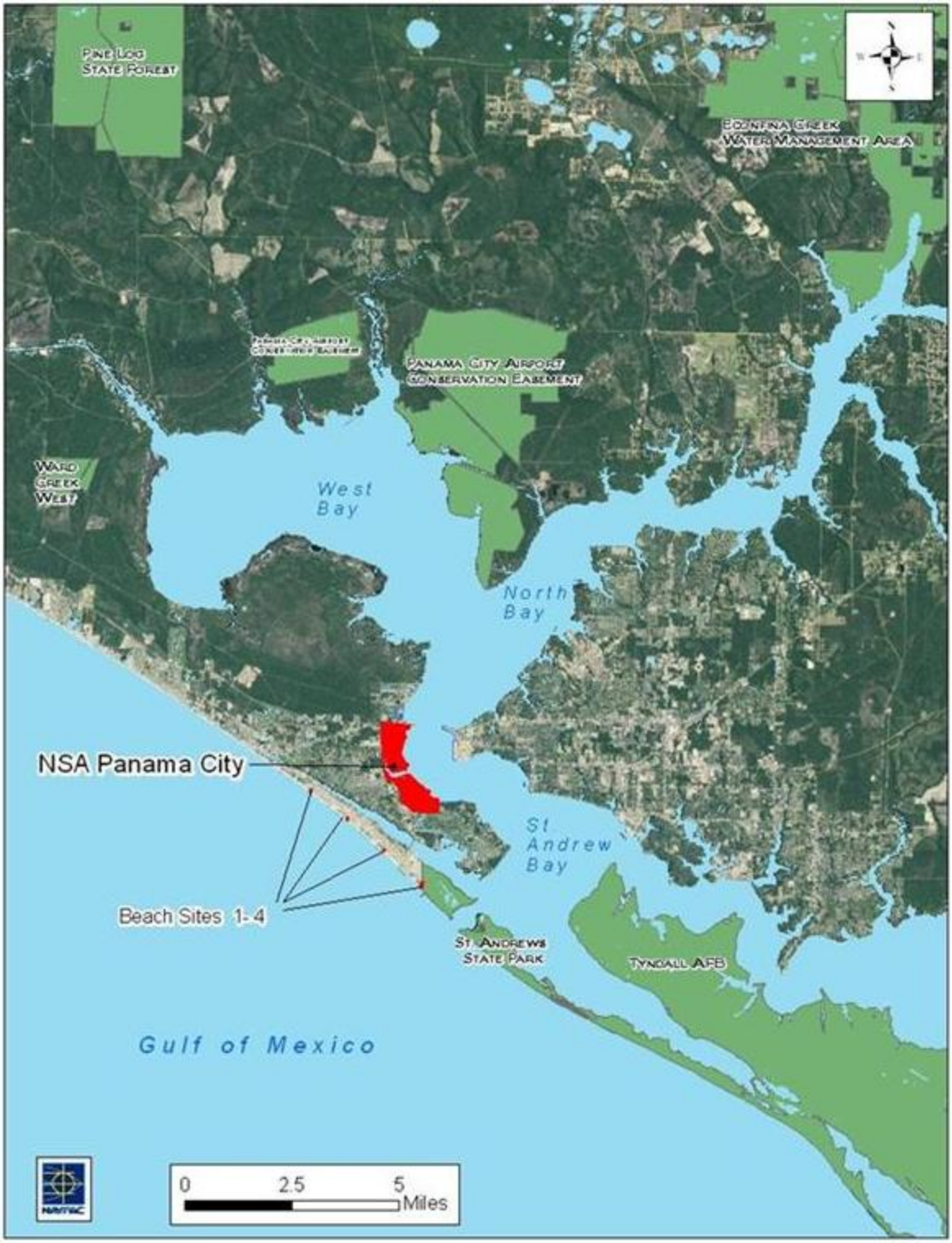

Figure 2-1. Location of NSA Panama City, Florida. Major roadways, waterbodies, and nearby conservation areas are indicated.

Figure 2-2. Photographs of Beach Sites 1, 2, 3, and 4 at NSA Panama City.

2.1.2 Opportunities Map

NSA Panama City will continue partnering with entities such as the St. Andrews State Park and Tyndall Air Force Base (see Figure 2-1) to help maintain conservation areas for species-at-risk in the greater Panama City Beach area. As evidenced in Figure 2-1, urban development has enveloped all the properties except Beach Site 4 to the point that there are no longer opportunities to prevent further encroachment.

2.1.3 Regional Land Use

Regional land uses in Panama City are governed by several local government policies and in accordance with the *Bay County Land Development Regulations* and 2009 *Bay County Comprehensive Plan*. Bay County specifies the desired development pattern through a land use category system that provides for the location, type, density and intensity of development and redevelopment based on natural conditions and dependent on the availability of services. Open space is preserved as necessary by the Conservation Land

Use District to protect water resources, preserve scenic areas, preserve historic sites, provide parklands and wilderness reserves, conserve endemic vegetation, and prevent flood damage and soil erosion. Such areas are protected from development pursuant to site plan review. All development and redevelopment in the coastal area must be consistent with the Coastal Management section of the *Comprehensive Plan* and shall be coordinated with the Bay County Planning Commission to reduce or minimize adverse impacts in the region due to development.

2.2 History

NSA Panama City began its research in mine countermeasures during World War II at the United States Naval Mine Warfare Test Station in Solomons, Maryland. On July 20, 1945, equipment, facilities, and personnel were transferred to Panama City, Florida, to occupy a 373-acre tract in caretaker status, establishing the U.S. Navy Mine Countermeasures Station (http://www.ncsc.navy.mil/css/history.htm). By 1955, the United States Navy Mine Countermeasures Station had achieved laboratory status, which resulted in the expansion of its mission to include torpedo countermeasures, helicopter mine countermeasures, mine hunting, mine watching study projects, and other advanced countermeasures. In 1972, the Station was renamed the Naval Coastal Systems Laboratory, and its mission was expanded into special warfare areas, such as inshore undersea warfare and amphibious operations. In 1978, the name was changed to Naval Coastal Systems Center to more accurately reflect the broad range of products and services. In January 1992, NCSC was re-designated the Coastal Systems Station (CSS), Dahlgren Division, Naval Surface Warfare Center. On October 1 2003, CSS was reorganized as a part of the alignment under the Commander, Navy Installations. During this reorganization, the base was renamed Naval Support Activity, Panama City, reporting to the Commander, Navy Region Southeast.

2.3 Military Mission

NSA Panama City's professional military and civilian personnel deliver an integrated suite of efficient, effective, and responsive shore capabilities to enable and sustain the readiness of tenant activities.

NSA Panama City hosts the Naval Surface Warfare Center Panama City Detachment (NSWC PC), one of the major research, development, test, and evaluation

laboratories of the DoN. NSWC PC has achieved Navy-wide leadership in the areas of Amphibious Warfare, Littoral Warfare, Mine Warfare, Coastal Missions, Special Warfare, and Diving and Life Support. NSWC PC and the other three major tenants, the Navy Experimental Diving Unit, the Naval Diving and Salvage Training Center, and the Center for Navy Ordnance Disposal and Diving, make the Station the consolidated site for all Navy diving and salvage research, development, testing, and training.

Other tenant activities and project offices hosted by NSA Panama City include: Center for Explosive Ordnance Disposal and Diving, Explosive Ordnance Disposal Mobile Unit SIX, Naval Diving and Salvage Training Center; Navy Experimental Diving Unit; Navy Munitions Command Detachments, Deployable Joint Command and Control System, Naval Dental Center Branch Dental Clinic, Navy Exchange Branch, Naval Hospital Pensacola Branch Clinic, Naval Criminal Investigative Service, Navy Publication and Printing Service Office, Naval Special Warfare Training Detachment, Personnel Support Detachment, Veterans Administration Primary Care Clinic, and the Coastal Operations Institute.

In addition to the above military program areas, NSA Panama City also houses the United States Coast Guard (USCG), Eighth District, Panama City Station, which is responsible for enforcing laws on the waters of the Gulf of Mexico. Specifically, the USCG Station is responsible for controlling drug traffic, enhancing the safety of commercial shipping associated with port activities, and maintaining maritime aids to navigation within the area. They are also responsible for protecting coastal waters from the threat of pollution, maintaining fisheries, and enhancing boating safety.

NSA Panama City is also home to a field office of the Fish and Wildlife Conservation Commission (FWC), which mostly is comprised of waterborne law enforcement officers. Its activities include enforcement of state and federal laws, rules, regulations, and ordinances as they apply to Florida's marine resources. The FWC also provides support to the USCG during search and rescue and spill operations.

2.4 Organization and Structure

Major departments at NSA Panama City and their primary functions are:

Fleet Readiness. The Fleet Readiness Department manages the Station's Morale, Welfare, and Recreation, Navy Exchange and the Navy Federal Credit Union. Fleet Readiness also coordinates and integrates its efforts to improve continuously the quality of

life for all military and civilian base personnel through recreation programs, facilities, food and beverage services, retail sales, ticket and cruise sales, a fitness center, athletic programs, youth and liberty programs, and leisure accommodations including campground cabins, campers, and campsites.

Public Works Department. The Public Works Department has responsibilities for overall facility planning and programming and natural resources management; design, construction, and alteration; and for facility and collateral equipment maintenance, repair, and operation. The Public Works Department is also responsible for facility equipment installation, real-estate management, and disposal. Other duties include utility systems operation and maintenance, energy and environmental management, and transportation operations and maintenance.

Security, Fire, and Safety. The Security, Fire, and Safety Departments serve as the principal advisors to the Command for law enforcement, fire protection and prevention, occupational safety and health and explosive safety. These departments are also responsible for the development, implementation, and administration of the Station's security and safety policies.

Family Readiness. The Family Readiness Department staff provides counseling assistance, referral information, and reference resources to help you with services normally found at a Fleet and Family Support Center.

Operations Department. The Operations Department provides safe operation of the NSA Panama City pier facilities, is the coordinating facility for visiting ships to the military port and marine and coastal missions as well as acting as the Oil Spill Response Team for the surrounding areas.

Explosive Ordnance Disposal. The Explosive Ordnance Disposal Detachment is responsible for Station Explosive Ordnance Disposal services, and acts as the independent Explosive Ordnance Disposal manager with complete autonomy and direct access to the CO and Executive Director. The Explosive Ordnance Disposal Detachment also provides technical assistance on the use of explosives in research, development, technology, and engineering projects.

2.5 Overview of Natural Resources Management

NSA Panama City is responsible for funding, preparing, and implementing all aspects of the management of its natural resources. As previously mentioned, NSA Panama City's CO is responsible for the management of natural resources. The NSA Panama City CO delegated implementation authority for natural resources management activities to the Natural Resources Manager in the Environmental Office of the Public Works Department. Other installation personnel such as Security, Recreation, Housing, and Safety have other functions within the overall natural resources program, but coordinate with the Natural Resources Manager on related issues.

2.6 Stakeholders and Partnerships

Stakeholders are those organizations or individuals who have a vested interest in land management on the installation. Identified stakeholders for NSA Panama City include those individuals owning property adjacent to the installation and those organizations, both local and regional, interested in and participating in land management. Because of urban development pressures and the resulting increases in land values, most of the land adjacent to the installation has been subdivided and developed for commercial or residential use. Consequently, there are multiple property owners and few to no meaningful opportunities to integrate the natural resource elements of the installation into adjacent properties. It is expected that implementation of the goals, objectives, and projects of this INRMP will result in long-term beneficial impacts to the owners of adjacent properties.

Over the past several years, NSA Panama City has developed partnerships and cooperative agreements for technical assistance with the local and regional stakeholders and other entities interested in participating in activities at NSA Panama City. NSA Panama City feels that it is important to participate with the surrounding community and to maintain communication between the installation and the community. In addition, these efforts complement NSA Panama City's overall philosophy of actively partnering with and sharing information and resources with other resource management agencies and organizations, including federal, state, or local governmental agencies, or other non-governmental organizations.

Existing partnerships and cooperative arrangements range from localized partnerships with the Boy Scout Troops of America to plant trees, clear brush for nature trails, and participate in overnight camping sessions, to involvement in larger initiatives such

as the Bay Environmental Study Team (BEST). The BEST is a regional initiative by federal landholders, state agencies, local governments, conservation groups, and concerned citizens to protect the interests of St. Andrew Bay. NSA Panama City also participates in a cooperative agreement with fish and wildlife biologists from the USFWS and FWCC. In accordance with this agreement, biologists visit the NSA Panama City installation to review fish and wildlife management practices and to provide written recommendations for future management.

2.7 Plans, Programs, and Studies

2.7.1 Stormwater Plan

Stormwater on NSA Panama City is managed according to the NSA Panama City Stormwater Pollution Prevention Plan (SWPPP; NSAPC 2010). The SWPPP is managed by the Environmental Office of the Public Works Department. The SWPPP manager works in concert with the Natural Resources Manager on related issues. The SWPPP divides the installation into 37 drainage basins, 28 of which contain industrial activities. Stormwater runoff from NSA Panama City drains primarily into St. Andrew Bay and Alligator Bayou; there are approximately 26 direct discharges into these water bodies. The SWPPP has three major components for industrial areas: stormwater monitoring; implementation of best management practices (BMPs); and site compliance evaluation.

The SWPPP does not discuss stormwater management in non-industrial drainage basins on the installation. The SWPPP provides for water quality monitoring and is updated yearly. The SWPPP does not address water quality monitoring for point source discharge for wastewater because NSA Panama City does not operate an independent wastewater treatment facility.

2.7.2 Hazardous Waste

NSA Panama City operates and/or has implemented various hazardous waste management plans and programs.

Oil and Hazardous Substance Spill Contingency Plan. This plan defines responsibilities and procedures for oil spill prevention, control, and countermeasures. NSA Panama City has an established Activity Spill Response Team that operates 24 hours a day.

Hazardous Waste Management Program. This program establishes the policies to control and minimize the generation of hazardous waste. It is managed by the Environmental Office of the Public Works Department. The manager works in concert with

the Natural Resources Manager on related issues. The program consist of three parts: (1) avoiding hazardous waste generation through a hazardous minimization control program that minimizes acquisition and use of hazardous materials; (2) recycling hazardous waste to a ready-for-use state; and (3) treating the hazardous waste to reduce its volume or to reduce it to a non-hazardous state.

Installation Restoration Program. In accordance with the DoD's Installation Restoration Program, NSA Panama City has conducted environmental studies and investigations at more than 15 sites throughout the installation. Eleven of the sites required further investigation under the Resource Conservation and Recovery Act (RCRA). The RCRA investigation indicated that three solid waste management units (SWMUs) and one area of concern (AOC) required engineering evaluations of cleanup options. These areas are: SWMU 3 (Landfill C, Burn and Disposal Area); SWMU 9 (Firefighting Training Area No.2); SWMU 10 (Oil-Water Separator); and AOC 1 (the Firefighting Training Area No.1).

From investigation results, it was determined that SWMU 3 contained no significant human health risks; therefore, no alternative actions were completed at this site. For other sites, contaminated sediments were excavated and monitored by off-site management. These areas will continue to be monitored for potential groundwater contamination.

2.7.3 Lands Use

A Master Plan for NSA Panama City was prepared in 2011. It includes representatives from support and administrative functions, tenant activities, Quality of Life, and Public Works. The Master Plan was developed to guide the growth and change of facilities and infrastructure into the twenty-first century, and addresses tactical (0 to 5 years) and strategic (5 to 20 years) planning horizons.

2.7.4 Pest Management

The objective of NSA Panama City's Pest Management Plan (PMP) is to provide for pest control services within NSA Panama City. These services include:

- Prolonging the life of the structures through subterranean termite and nuisance pest control;
- Maintaining the safety and security of industrial and storage areas through weed control;
- Providing nuisance pest control to all buildings and housing areas to ensure good working and living environments;
- Controlling weeds and insect pests in all recreational and lawn areas;
- Providing control of mosquitoes, flies, and other potential vectors;

- Providing vertebrate pest control, including rodent control, to developed areas of the installation; and
- Providing effective management of invasive/exotic species for the proper functioning of wetlands and for the protection of biodiversity of NSA Panama City.

2.7.5 Grounds Maintenance Program

The grounds maintenance program at NSA Panama City is managed by the installation's Public Works Department, and the work is conducted under a contractual agreement. In accordance with the agreement, the contractor provides all labor, supervision, equipment, and materials necessary to perform all maintenance activities for improved and semi-improved grounds. Maintenance activities include, but are not limited to, grass cutting, edging, and fertilizing; cultivation and mulching of shrubbery, hedgerows and flowerbeds; tree and shrub pruning; raking; pest control; and vacuuming and sweeping of paved areas. The contractor is also responsible for the inspection, operation, and maintenance of all installation surface-drainage systems and the irrigation system, as well as the removal and control if invasive/exotic plant species.

2.7.6 Rare Plant, Rare Vertebrate, and Natural Community Survey

In June 1997, the Florida Natural Areas Inventory (FNAI) completed a rare plant, rare animal, and natural community inventory at NSA Panama City (FNAI 1997). The inventory concluded that NSA Panama City is within or approached by the ranges of at least 58 rare, threatened, endangered, or declining plant species and 53 rare, threatened, endangered, or declining vertebrate species (see Section 3.5).

A Bio-Diversity Study and Inventory of the Biological Resources at the installation was conducted in 2002 which reported that the 1997 FNAI remains valid.

An Inventory of Species of Interest was conducted in 2010 that confirmed the presence and continued sustainment of State threatened and endangered plant species identified in previous reports.

2.7.7 Wetlands Delineation

In July 1997, a formal delineation of the wetland jurisdictional boundaries on NSA Panama City was completed. Wetland jurisdictional lines were delineated using the United States Army Corps of Engineers (USACE) Wetlands Delineation Manual (1987) and the FDEP methods identified in Chapter 62-340, FAC. The findings of the survey are discussed in Section 3.3.2. This original delineation was recertified in 2004.

In June 2010, a new delineation was performed with a formal jurisdictional determination received from USACE. Since this delineation did not contain a certified survey, a formal determination from FDEP was not received. And because of the labor intensive nature of flagging wetland boundaries for projects within 200-feet of a wetland, a decision was made not to apply for an approximate determination from FDEP. Instead, a policy of flagging the USACE wetland boundary for project work within a 50-foot buffer of the boundary was established.

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3 Environmental Management and Mission Sustainability

3.1 Supporting Sustainability of the Military Mission and the Natural Environment

Sustainability is the ability to provide for the needs of the current mission without damaging the ability of future missions to maintain their needs in coordination with natural resources adaptive management. A sustainable process can be carried out over and over without substantial negative environmental impacts, increased operational costs or a decrease in mission readiness and training.

Training and management activities detrimental to the functional values of the natural communities NSA Panama City can affect the Navy's military mission. For example, illegal taking of a federally-protected rare species, such as the Choctawhatchee beach mouse, could result in tighter regulatory restrictions at that species habitat, limiting training activities or greatly increasing the mitigation cost of those activities.

Nuisance wildlife and outbreak of disease on the installation could pose a threat to implementation of the military mission through the infection of military personnel and the consequent limitation of access to areas of the installation to control a problem.

Outdoor recreational use by the public can affect the security and safety of the military mission. Outdoor recreational opportunities must be planned, developed, and used consistently with the constraints of the military mission, so as not to affect security or safety on NSA Panama City. Unplanned and uncontrollable use of natural recreational areas by the general public may also affect the military mission.

Monitoring and measurement is fundamental to adaptive natural resources management and mission sustainability. NSA Panama City will follow legal mandates and requirements to ensure the effectiveness of management, plans, controls, and training is monitored. Furthermore, the use of Best Management Practices (BMPs) and established

monitoring protocols will enable the NSA Panama City natural resources program to identify its progress toward achieving goals and objectives. Without effective monitoring and measurement it would be difficult for natural resources management to continually improve, which is the basis of sustainability.

3.1.1 Military Mission and Sustainable Land Use

The primary military mission on NSA Panama City is to fully support the operational and training missions of assigned tenants, enhancing the readiness of the U.S. Navy, its sister armed services and other customers, especially with regard to research, development, and training. Merging the military mission with sustainable land use can be achieved through the maintenance of undeveloped lands, the shoreline, and waterfront to manage regulatory restrictions and sustain native environments. Maintenance of natural environments also better simulates "real world" conditions for trainees. Sustaining protected species habitat and air and water quality keeps NSA Panama City in compliance with environmental laws, preventing regulatory consequences that can lead to financial penalties and mission delays. This INRMP creates a framework for sustainable land use that is compatible with the military testing, research, and training requirements while encouraging native and natural species conservation.

3.1.2 Defining Impact on the Military Mission

The military mission at NSA Panama City requires safe, natural-state land and environments for the security, use, and training of installation tenants. NSA Panama City will comply with environmental regulations and strive to conserve the natural resources while also conducting effective mission requirements. Through the coordination of the various environmental programs, NSA Panama City ensures the availability of quality training opportunities and the protection of the natural resources on its properties. The NSA Panama City natural resources manager (NRM) and installation mission leadership and operations should coordinate with each other during the planning phase of natural resources projects and training missions to ensure compatibility between the military mission and natural resources management. Resolutions should be established to ensure environmental regulations (i.e., ESA, Clean Water Act [CWA], etc.) are being satisfied while improving land and water resources and meeting the military mission.

3.1.3 Relationship to the Gulf of Mexico Range Complex and Panama City Operational Area Management Plans

The Gulf of Mexico (GOMEX) Range Complex represents an essential combination of air, land, and sea space that provides realistic training areas for Navy personnel. The GOMEX Range Complex includes air, land, and offshore areas Florida, Alabama, Mississippi, Louisiana, and Texas. An Operating Area (OPAREA) is a designated area of the ocean organized and managed to provide a safe and controlled surface and underwater military training and testing environment. The Panama City OPAREA is one of four OPAREAs in the GOMEX Range. Ranges are locations where Navy personnel train and test to accomplish their mission of national defense. The Naval Surface Warfare Center, Panama City Division (NSWCPCD) Testing Range is located off the panhandle of Florida, extending from the shoreline to 120 nm seaward, and includes St. Andrew Bay. An Environmental Impact Statement / Overseas Environmental Impact Statement (EIS/OEIS) was prepared for Navy operations within the GOMEX Range and its associated OPAREAs and Testing Ranges in 2010 and was completed in cooperation with the National Marine Fisheries Service (NMFS) Office of Protected Resources. Potential impacts to the physical, environmental, and manmade environments from vessels that utilize NSA Panama City as part of research and training on the GOMEX Range are evaluated in the GOMEX Range Complex Final EIS/OEIS, Volumes 1 and 2. No natural resources management actions described in this INRMP are compromised to accommodate training on the GOMEX Range or within the Panama City OPAREA or NSWCPCD Testing Range.

3.2 Natural Resources Consultation Requirements

All Federal agencies are required to implement protection programs for designated species and to use their authorities to further the purposes of the Endangered Species Act (ESA). Furthermore, if a Federal action of any kind is found to potentially impact any species protected by the ESA, the responsible Federal agency must enter into Section 7 consultation with the USFWS or NMFS. The USFWS is the primary agency responsible for implementing the ESA, except for actions involving marine animals or anadromous fish, such as the gulf sturgeon, for which the NMFS is the responsible agency. Several federally-listed species have the potential to occur on NSA Panama City and portions of St. Andrew Bay are designated critical habitat for West Indian Manatee, a federally-threatened species.

Section 7 consultation could be required for future military projects that have a potential to impact federally-listed species or designated critical habitat.

The CO of NSA Panama City or his environmental agent coordinates with the appropriate regulatory agency on any actions that have the potential to impact rare, threatened, or endangered (RTE) species. Early informal consultation with the acting ESA agency helps resolve potential problems and address issues in a proactive and positive manner, and is the preferred method of consultation. Informal consultation includes all discussions and correspondence with the regulatory agency, and occurs prior to formal consultation to determine whether a proposed Federal action may affect listed species or critical habitat. A flow chart of the informal consultation process is provided in Figure 3-1.

NSA Panama City may determine, through the informal consultation process or simply by the nature of the proposed action, that formal consultation is required for an action. If NSA Panama City determines an activity may have an adverse effect upon a federally-listed species and/or critical habitat, the installaion will enter into formal consultation with USFWS or NMFS to determine whether a proposed action is likely to jeopardize the continued existence of listed species, destroy or adversely modify designated critical habitats, or potentially result in the incidental take of a species. The formal consultation process begins with a NSA Panama City written request and submittal of a complete initiation package and concludes with USFWS's or NMFS's issuance of a biological opinion and "incidental take" statement, if applicable. A flow chart detailing the steps of the formal consultation process is presented as Figure 3-2.

3.2.1 Migratory Birds

The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, or possessing of migratory birds unless permitted by the USFWS. Section 315 of the 2003 National Defense Authorization Act (NDAA) provides as exemption to the Navy for the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the Navy. However, the Navy must still assess through the NEPA process, or other environmental requirements, the expected impact of proposed or ongoing military readiness activities on migratory bird species likely to occur in the action areas. Military readiness activities are defined under the NDAA as all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. This

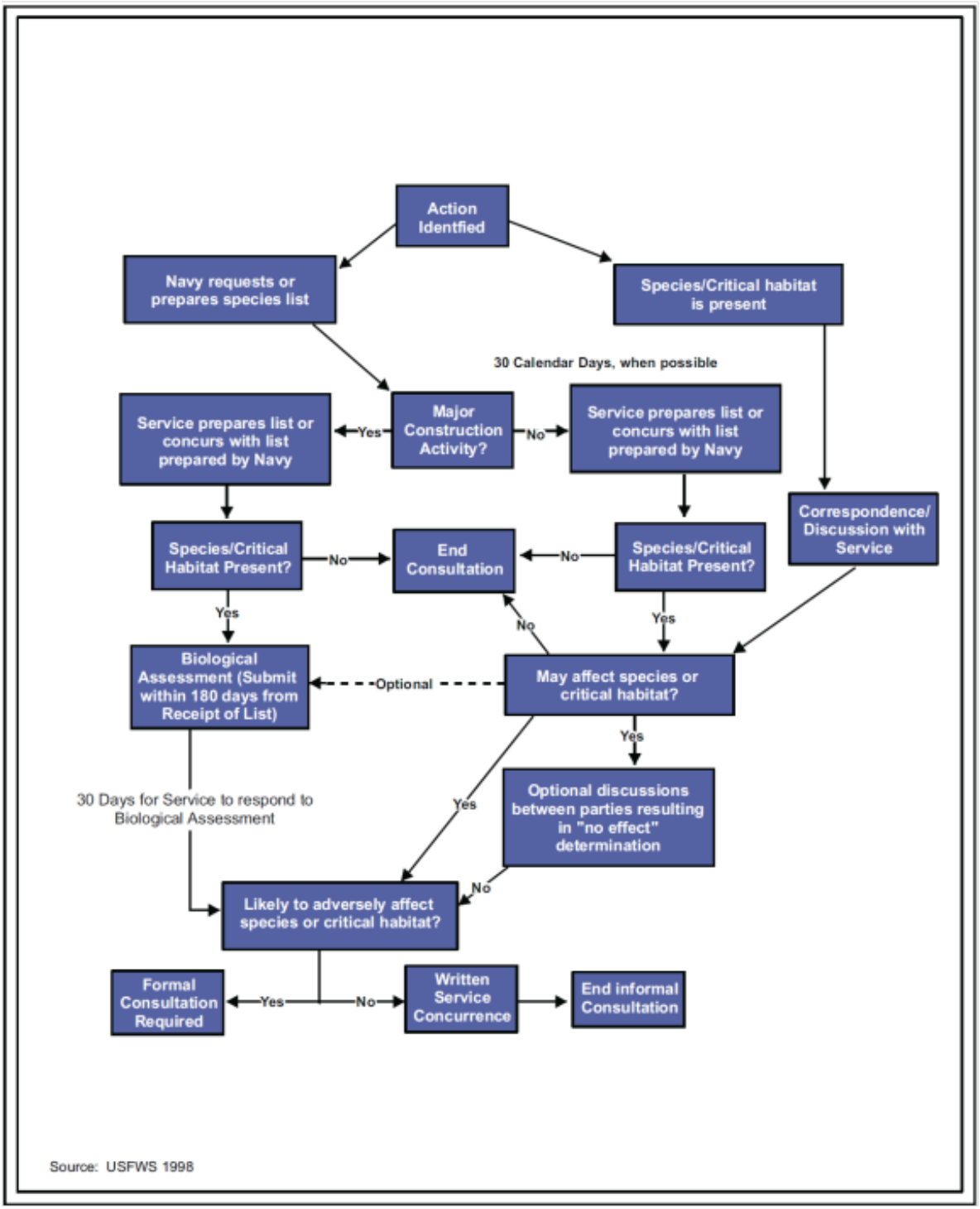

Figure 3-1. Flow Chart for the Informal Consultation Process

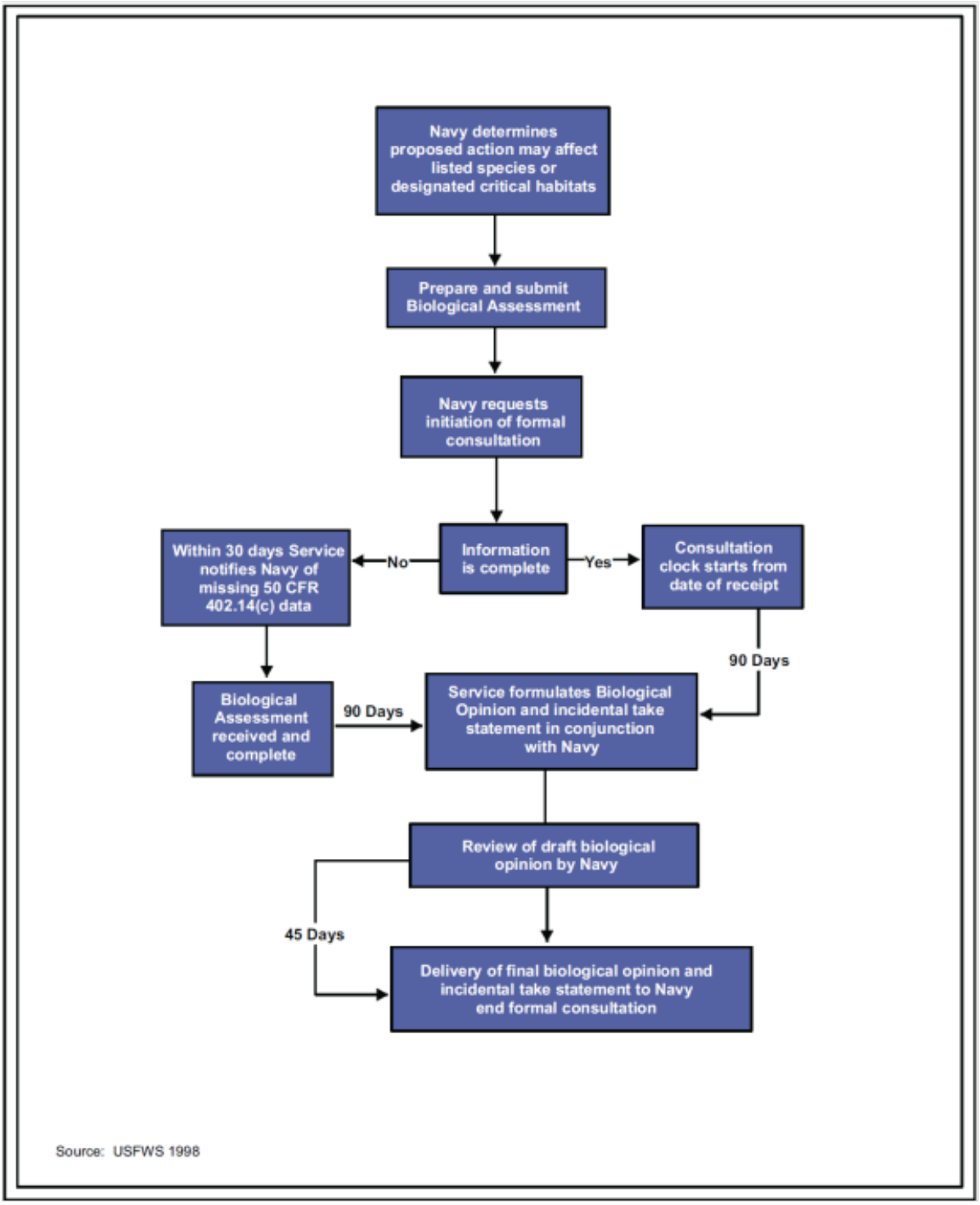

Figure 3-2. Flow Chart for the Formal Consultation Process

does not include the routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, motor pools, morale, welfare, and recreation activities, and mess halls; the operation of industrial activities; or the construction or demolition of facilities listed above.

Current MBTA regulations authorize permits for direct take of migratory birds for activities such as scientific research and depredation control. However, the MBTA does not expressly address the issuance of permits for incidental take, so the Navy is compelled to exercise due diligence for activities requiring NEPA analysis and must develop appropriate and reasonable conservation measures to avoid, minimize, and mitigate identified significant adverse effects to migratory birds and their nests resulting from such activities.

3.2.2 Marine Mammals

Marine mammals, including the ubiquitous bottlenose dolphin (*Tursiops truncatus*), are protected under the Marine Mammal Protection Act (MMPA). Manatees and whales are also protected under the MMPA, but MMPA consultations at NSA Panama City primarily focus on dolphins. There are two levels of "take" under the MMPA: Level A take entails injury to or death of the animal. Level B take includes many forms of harassment, which has been interpreted to include sound-in-the-water from activities such as pile driving. The NMFS has provided criteria for mathematically determining the maximum distance to which sound-in-the-water may travel and constitute a Level B take. The installation may be able to mitigate these takes to zero by implementing a marine mammal observer plan that ensures a shut-down of relevant activities if a marine mammal comes within that distance. Alternatively, the action proponent may pursue an incidental harassment authorization (IHA) for the required number of Level B takes, but an IHA cannot be issued unless an Environmental Assessment (EA) is prepared. A series of four seasonal dolphin surveys was completed at NSA Panama City in 2015-16. Sightings were most frequent in summer, but the greatest density of dolphins actually occurred in fall. Winter was the season of least frequent sightings and lowest density (GSRC 2016)..

3.2.3 Essential Fish Habitat

Snappers (Family: Lutjanidae), groupers (Family: Serranidae), redfish (*Sciaenops ocellatus*), penaeid shrimp, and other valuable fisheries occurring at NSA Panama City are federally-managed by the Gulf of Mexico Fishery Management Council (GMFMC), as directed by the Magnuson-Stevens Fishery Conservation and Management Act of 1996

(MSA). Species that require similar habitats during various life stages are grouped into fishery management units (FMUs). In accordance with the MSA, the GMFMC has developed management plans and designated essential fish habitat (EFH) for the various FMUs. EFH includes all waters and substrate necessary to fish for spawning, breeding feeding, or growth to maturity and extends from offshore habitats to inland areas to where there is saltwater influence. AT NSA Panama City, EFH includes habitats such as emergent marsh, unconsolidated sediment (e.g., mud and sand), seagrass, oyster-encrusted infrastructure, and the water column. A fish habitat assessment was completed at NSA Panama City in 2016 (GSRC 2017). Projects and actions on the installation that may adversely affect any of these habitat types require EFH consultation with the NMFS Habitat Protection Division, as per the MSA.

3.3 Planning for National Environmental Policy Act Compliance

The National Environmental Policy Act (NEPA) requires an environmental analysis of major Federal actions, including actions that occur with Federal funding or on Federal lands. NEPA requires the evaluation of the environmental effects of proposed land use, development, and military training activities. Some Navy actions fall under existing categorical exclusion (CATEX) and require no further analysis. For those actions not covered by an existing CATEX, the initial environmental document, the Environmental Assessment (EA) determines the potential for significant project impacts and the feasibility of proposed actions. The NEPA process requires coordination with appropriate Federal and state agencies and the general public. The public review process scopes or identifies significant issues to develop and evaluate alternatives. The preparation of an Environmental Impact Statement (EIS) occurs only if significant impacts are identified. If the EA finds “no significant impacts”, the Navy would complete the preparation of a formal Finding of No Significant Impact (FONSI) and make it available for public review.

An EA and FONSI were prepared and finalized in 2001 for implementation of this INRMP. The EA evaluated potential environmental impacts that could result from the implementation of various levels of management intensity, with all levels being in compliance with the Sikes Act. The Navy found, based upon the information gathered during preparation of the EA, that the implementation of the INRMP at NSA Panama City would not significantly impact the environment.

3.4 Beneficial Partnerships and Collaborative Resource Planning

The current staffing level of natural resource personnel at NSA Panama City and the need for outside expertise increases the importance of developing cooperative projects with other agencies, universities, contractors, other installations, local residents, conservation organizations, and the Navy command. Cooperating Federal and state agencies, universities, and non-governmental organizations (NGO) can provide a beneficial exchange of technical information, natural resources services, and field assistance.

Stakeholders are those organizations or individuals who have a vested interest in land management at NSA Panama City. Stakeholders include FWC, FDEP, and the regional USFWS office. NSA Panama City values open communication between the installation and the surrounding community, which enhances its philosophy of sharing information and resources with other resources management agencies and organizations, including federal, state, and local governmental agencies, and other non-governmental organizations and groups. The development of partnerships with state and federal natural resources agencies, local conservation groups, and academic institutions makes expertise available to natural resources managers, and fosters productive community relationships.

Partnerships, cooperative agreements, and community programs that affect natural resources management at NSA Panama City are discussed below.

- **Cooperative Agreement between the DON and the USFWS and the Florida GFWFC, 1979** – In accordance with this Agreement, biologists are able to make visits to review fish and wildlife management practices, which also allows them the opportunity to provide written recommendations for future management.
- **Tri-partite agreement between the DON, the NPS and the Florida Division of Recreation and Parks** –This agreement provides the Installation with professional and technical information and assistance necessary to coordinate actions pertaining to the operation, development, management, and protection of outdoor recreation resources. The NPS and the State of Florida act in an advisory capacity on matters pertaining to the management of outdoor recreation resources on lands administered by the installation.
- **Audubon Christmas Bird Count** – The Florida Audubon Society conducts an annual Christmas bird count through a partnership of cooperating agencies. This survey adds to the database of natural resources information for NSA Panama City.
- **International Coastal Cleanup** – The International Coastal Cleanup is a global project of the Center for Marine Conservation (CMC) and is supported by an international network of environmental and civic organizations, government agencies, industries, and individuals who remove debris and collect valuable

information on the amount and types of debris. NSA Panama City has been a part of this program, which occurs on the third Saturday of September, for many years.

- **Tree City USA** – The Tree City USA program has helped create greener cities and towns across America since 1976. It is a nationwide movement that provides the framework necessary for communities to manage and expand their public trees. More than 3,400 communities have made the commitment to becoming a Tree City USA. They have achieved Tree City USA status by meeting four core standards of sound urban forestry management: maintaining a tree board or department, having a community tree ordinance, spending at least $2 per capita on urban forestry and celebrating Arbor Day. NSA Panama City has been a Tree City Community for 21 years.
- **Arbor Day Foundation** – Arbor Day Foundation is a nonprofit conservation and education organization. Founded in 1972, the centennial of the first Arbor Day observance in the 19th century, the Foundation has grown to become the largest nonprofit membership organization dedicated to planting trees, with over one million members, supporters, and valued partners. The foundation inspires people to plant, nurture, and celebrate trees. Arbor Day is an annual observance that celebrates the role of trees in our lives and promotes tree planting and care. Each year, NSA Panama City participated in Arbor Day by planting native trees on the installation.

3.5 Public Access and Outreach

The Morale, Welfare, and Recreation Division (MWR) promotes and maintains the morale and welfare of military personnel and their dependents, both active and retired, in addition to DOD civilians when possible. This is accomplished through the programming and operation of recreation and club facilities. The MWR maintains outdoor recreational programs and facilities such as the marinas, picnic pavilions, campgrounds, cabins, and ball fields. The MWR also offers equipment rentals, trips, camper rentals, and cabin rentals. The NRM reviews and provides natural resources recommendations and guidance for all new projects proposed by MWR.

The CO authorizes access for educational and outdoor natural resources recreational activities consistent with the military mission and security levels. The outdoor recreational program at NSA Panama City derives numerous benefits from the attractive natural settings and from the temperate marine climate associated with the northern Gulf of Mexico Coast. The warm climate and proximity to several large bodies of water affords such opportunities as swimming, fishing, canoeing, sailing, and motorized boating on a year-round basis. The MWR operates and manages a marina at NSA Panama City with access to water-related recreational opportunities. Additional concentrated outdoor recreation activities include camping, picnicking, fitness and jogging, and outdoor education and interpretation. Hunting and the use of off-road vehicles are prohibited at NSA Panama City.

3.6 Florida's State Wildlife Action Plan

The U.S. Congress mandated each state to develop a comprehensive wildlife conservation plan. Each plan was required to include the species and habitats to be conserved, the conservation actions proposed, procedures to review the plan, and coordination with the public and other agencies. Florida completed the State Wildlife Action Plan (Action Plan; previously the Comprehensive Wildlife Conservation Strategy) in 2005 in response to this mandate. The Action Plan provides a list of 974 Species of Greatest Conservation Need (SGCN) as well as the status and trends of each species. The Action Plan also contains detailed information on each of 45 habitat categories, including location and status information, associated SGCN, threats to the habitat, and recommended actions. The entire Action Plan can be downloaded at http://myfwc.com/conservation/special-initiatives/fwli/action-plan/download/.

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4 Existing Environment

4.1 Climate and Air Quality

Panama City, Florida, is located within the coastal plain. The climate is characterized by mild winters with hot and humid, but breezy summers. Panama City has a year-round average temperature of 66 degrees Fahrenheit (°F) and receives an average 63 inches of rainfall per year (see Table 4-1). The coldest month of the year is January with an average minimum temperature (defined as the monthly mean of the minimum daily temperature) of 37 °F. The warmest month of the year is July with an average maximum temperature of 92 °F.

These rainfall totals may be influenced periodically by three types of weather disturbances that result in unpredictable weather patterns. These disturbances are cold fronts, periodic thunderstorms, and hurricanes. Of these, hurricanes are the most destructive. Although hurricane season extends from June 1 through November 30, the frequency of hurricanes in the Gulf of Mexico is greatest during the months of August, September, and October. In fact, the Bay County area has experienced one hurricane (Hurricane Ida [2009]) and two tropical storms (Tropical Storm Fay [2008] and Tropical Storm Claudette [2009]) in the past ten years.

The Clean Air Act (CAA) provides the principal framework for national, state, and local efforts to govern and protect air quality. In accordance with the CAA, legal limitations on pollutant concentration levels allowed to occur in ambient air, also known as national ambient air quality standards (NAAQS) have been established by the EPA and FDEP. These pollutants include particulate matter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ground level ozone (O_3). Areas that do not meet NAAQS for criteria pollutants are designated as “non-attainment areas” for that pollutant. Areas that achieve the air quality standard after being designated non-attainment are redesignated as attainment following United States Environmental Protection Agency (EPA) approval of a maintenance plan. Panama City is currently in attainment for ground level ozone and PM_{10}. The levels of NO_2, CO, SO_2, and Pb currently are not being monitored in Panama City due to the lack of sources for

these criteria pollutants in the region. In addition, past monitoring efforts found levels sufficiently low, warranting no monitoring at this time.

Table 4-1. Average Temperatures and Rainfall in the Panama City Beach Vicinity

Month	Average Temperature (°F)	Average Low Temperature (°F)	Average High Temperature (°F)	Average Rainfall (inches)
January	53	42	63	4.9
February	56	46	66	5.3
March	62	51	72	5.7
April	68	57	78	3.7
May	75	65	84	3.1
June	81	73	89	6.2
July	83	75	90	7.4
August	83	75	90	7.0
September	80	71	88	6.0
October	71	60	81	3.6
November	63	52	73	4.5
December	55	44	65	4.0

Source: Internet http://www.weather.com

4.1.1 Climate Change

Climate change is estimated to result in rising sea levels, altered precipitation patterns, and changing ecological systems, and will shape strategic, infrastructure, and natural resources considerations for the foreseeable future. NSA Panama City must have the land, air, and water necessary to train and operate to successfully execute its military mission. The frequent and intense heat extremes projected to occur with climate change may limit outdoor training, strain personnel efficiency, degrade air quality through elevated ozone caused by higher temperatures, and strain electricity supply due to the increased demand on the grid. Changes in precipitation patterns will reduce water supply, increase the frequency and intensity of wildfires, damage local ecosystems, and cause shifts in species composition or geographic range.

4.2 Geology, Topography, and Soils

NSA Panama City lies in the Gulf Coastal Lowlands within the Apalachicola Embayment (FNAI 1997). The surface geology of the Florida Panhandle is sedimentary, comprised of three types of sediments: limestones, organics, and clastics (silt, clay, sand, and gravel). Bay County is relatively flat in relief, averaging from sea level to approximately 17 feet above mean sea level (msl), and is mostly covered with Pleistocene to Recent quartz sands (NSA Panama City

1998a). Near the coast, sedimentary fill is underlain by metamorphosed Paleozoic deposits. The county is underlain by water-yielding zones in both the sand and limestone strata (NSA Panama City 1998a).

The soils of NSA Panama City are characterized by poorly drained and very poorly drained soils with approximately 0 to 2 percent slope. The soils of NSA Panama City have a high water table during most of the year and often experience ponding in depression areas. Table 4-2 and Figure 4-1 present the soil map units, the acreage, and descriptions of the soils found on the NSA Panama City. This soil information has been compiled from the USDA NRCS soil survey for Bay County (USDA Soil Conservation Service [SCS] 1984).

Table 4-2. Soil Map Units and Acreage Occurring on NSA Panama City

Soil Map Unit	Type of Soil	Acreage	Description
13	Leon sand	250	Poorly drained sandy soils.
22	Pamlico-Dorovan Complex	1	Very poorly drained, extremely acidic, organic soils on nearly level floodplains and depressions.
27	Mandarin sand	161	Somewhat poorly drained, nearly level soils on landscapes that are slightly higher than adjacent flatwoods.
29	Rutledge sand	133	Deep, very poorly drained soils on upland flats and depressions.
31	Osier fine sand	8	Poorly drained, level soils of the coastal plains.
40	Arents	44	Mixed sand to sandy clay-loam soils deposited over other soils in former low areas now filled above natural levels.
42	Resota fine sand	38	Moderately well drained soils occurring on small to broad-ridged areas near the Gulf of Mexico.
52	Bayvi loamy sand	9	Level to nearly level, very poorly drained soils located in the tidal marshes inundated daily by normal high tides.

Source: USDA SCS 1984.

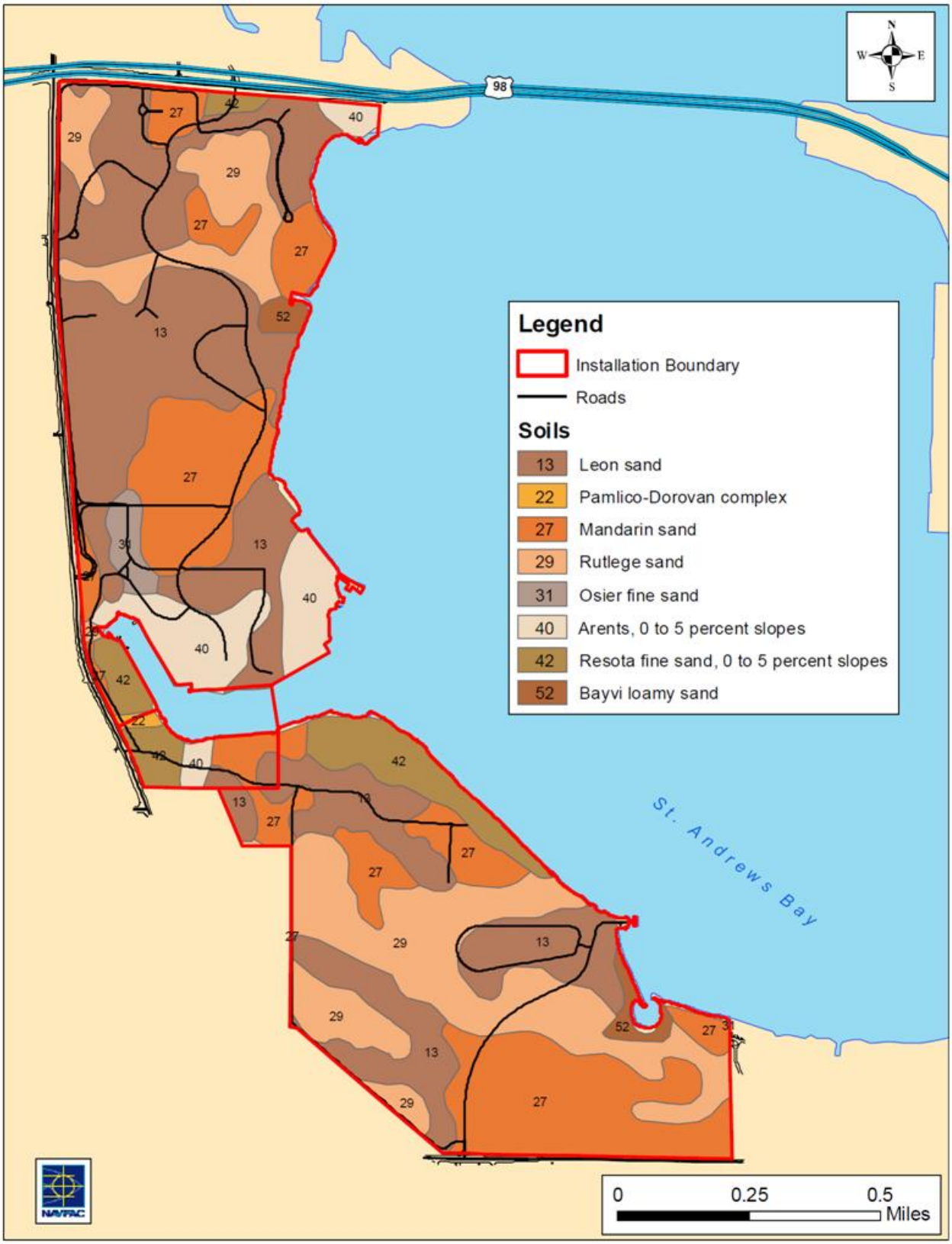

Figure 4-1. Soil types at NSA Panama City, Florida.

4.3 Hydrology

4.3.1 Surface Waters

St. Andrew Bay Drainage Basin

NSA Panama City lies entirely within the boundaries of the St. Andrew Bay drainage basin. The drainage basin includes an area from the Apalachicola River to the Choctawhatchee River. The nine major streams of the basin discharge into St. Andrew Bay. St. Andrew Bay, St. Andrews State Park Aquatic Preserve, and Outstanding Florida Water

The bay itself is considered one of the largest areas of sea grass beds in the state of Florida. The sea grass beds are home to juvenile fish and are a component of essential nutrients for a fully functional ecosystem. The eastern boundary of NSA Panama City is shoreline along St. Andrew Bay; this shoreline area of NSA Panama City is approximately 2 to 3 miles north of the St. Andrews State Park Aquatic Preserve. The NSA Panama City shoreline is scattered with sea grass beds.

The pristine qualities of St. Andrew Bay earned the designation of State Park Aquatic Preserve in 1972 by the Florida Legislature. The primary purpose of the designation is the preservation and maintenance of the biological resources in a natural state. The Preserve covers the entire inlet to St. Andrew Bay, which includes approximately 25,000 acres of sovereign submerged lands located below the mean high water line. Since its designation as a State Park Aquatic Preserve, the area has been recognized consistently as an exceptional water resource of the state.

On March 1, 1979, the State Park Aquatic Preserve was designated an Outstanding Florida Water (OFW), pursuant to Chapter 62-302, Florida Administrative Code (FAC). The OFW program is administered by FDEP to protect lakes, rivers, and streams against degradation of existing ambient water quality. In 1991, the St. Andrews State Park Aquatic Preserve Management Plan was adopted to protect the Preserve's natural resources for the benefit of future generations (Florida Department of Natural Resources 1991).

In 1998, in response to growing concerns regarding the water quality of the bay, the BEST, in cooperation with FDEP, completed and adopted *A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem* (BEST and FDEP 1998). This plan provides management actions for all land and water within the drainage basin of St. Andrew Bay.

NSA Panama City Surface Water Bodies

Surface water bodies on NSA Panama City include four small ponds (these ponds are considered jurisdictional wetlands; see Section 3.3.1) on the north part of the installation, and wetlands and open ditches throughout the installation. No streams bisect NSA Panama City. Surface water bodies on the north part of the installation receive stormwater runoff from U.S. Highway 98 and Thomas Drive through a system of grass swales and concrete culverts. Surface water bodies on the southern part of the installation receive stormwater runoff from private property adjacent to the old golf driving range and the vacant field between Navy property and the commercial development at the corner of Thomas Drive and Magnolia Beach Road.

4.3.2 Wetlands

Generally, wetlands are considered transitional zones between the terrestrial and aquatic environment. Wetland areas are characterized by physical, chemical, and biological features indicative of certain hydrological conditions. Currently, wetlands are regulated by the USACE, under Section 404 of the Clean Water Act (CWA) of 1972. In 1998, a formal delineation of the wetland jurisdictional boundaries on NSA Panama City was completed. Wetland jurisdictional lines were delineated using the USACE Wetlands Delineation Manual (1987) and the FDEP methods identified in Chapter 62-340, FAC. This delineation was recertified in 2003 and expired in 2009. In 2010, a new delineation was completed for planning purposes. Since the new delineation was not a certified survey, a jurisdictional determination was received by USACE, but not by FDEP. Since a jurisdictional determination could be obtained from both agencies, guidelines for activities taking place in the wetland 50-foot buffers require that the wetland line be surveyed and flagged so that no wetland encroachment will take place. Figures 4-2 and 4-3 identify all NSA Panama City wetlands, which total 102 acres.

Wetlands on the NSA Panama City installation are mostly associated with low areas and drainage ditches that eventually empty into St. Andrew Bay. Emergent and forested wetlands dominate the coastline in undeveloped areas of the installation. The larger forested wetlands are located in the undeveloped southern portion of the installation; in the northern portion of the installation, wetlands are limited by past development (e.g., housing). Managed ponds comprise the open water wetlands on the installation. Many of the wetlands on the NSA Panama City

Figure 4-2. Wetlands on the northern section of NSA Panama City, Florida.

Figure 4-3. Wetlands on the southern section of NSA Panama City, Florida.

have been hydrologically altered by past ditching. Some wetlands on the installation still contain invasive, exotic species, such as Chinese tallow trees (*Sapium sebiferum*) and wild taro (*Colocasia esculenta*). The report provides no additional information regarding the health of NSA Panama City's existing wetlands.

NSA Panama City's wetlands are typical of wetland complexes associated with coastal areas of northwest Florida. Forested wetlands on the installation are dominated by slash pine (*Pinus elliottii*), with various shrub layer species such as gallberry (*Ilex glabra*), laurel oak (*Quercus hemisphaerica*), titi (*Cliftonia* spp.), and vines (*Smilax* spp.). Shrub wetlands generally contain the same species found in the forested wetlands, and, for the most part, are isolated or mixed with the forested wetlands. Freshwater emergent wetlands contain various sedges and rushes (*Juncus* spp. and *Rhynospera* spp.), ferns (*Osmunda* spp. and *Woodwardia* spp.), and various other ground species. Some of the emergent wetlands along the coastline of St. Andrew Bay contain salt marsh species such as cordgrass (*Spartina* spp.*)*.

4.3.3 Floodplains

Floodplains are defined as low and relatively flat areas adjoining inland and coastal waters and include flood-prone areas of offshore islands. The Federal Emergency Management Agency (FEMA) defines floodplain areas as being subject to a one percent or greater chance of flooding in any given year. According to FEMA 100-year Flood Insurance Rate Maps (FIRM), approximately one-quarter of the installation is within the 100-year floodplain (see Figure 4-4). Additionally, because of its proximity to St. Andrew Bay and Alligator Bayou, NSA Panama City is susceptible to coastal flooding during hurricanes and other strong storm events. Currently, tidal flooding occurs along the eastern boundary and along areas adjacent to Alligator Bayou (CSS 1998a).

4.3.4 Groundwater

The stratigraphic arrangement and water-bearing characteristics of the geological formations underlying the subject area contribute to the formation of three distinct aquifers. The uppermost aquifer, the water table aquifer, is permeable surface sands ranging from 65 to 140 feet along the coast and 10 to 30 feet further inland. Below this aquifer is an impermeable layer of sandy clay and clayey shell material, which forms an aquaclude. An aquaclude is defined as an area of sediment that blocks the vertical movement of water. Underlying this aquaclude is an

Figure 4-4. 100-year floodplains at NSA Panama City, Florida.

artesian or confined aquifer, known as the Floridan aquifer. This is composed of limestone formations that range up to 1,200 feet.

Between the base of the water table aquifer and the top of the Floridan aquifer is a bed of shell-hash interlain with sandy clay. The sandy clay serves as a semi-confining layer that maintains water in the shell-hash under pressure, acting as a secondary artesian aquifer.

4.4 Natural Communities

Little of the native communities that originally occurred on NSA Panama City remain today. The few natural communities that do remain suggest that the upland areas of NSA Panama City were dominated by a mosaic of scrub, scrubby flatwoods, and mesic flatwoods (FNAI 1997).

- **Scrub** communities are often characterized as closed-to-open canopy forest of sand pines with dense clumps or vast thickets of scrub oaks and other shrubs dominating the understory. The ground cover is generally very sparse and dominated by ground lichens or, rarely, herbs. Open batches of barren sand are common. Scrub occurs on sand ridges along former shorelines and is essentially a fire-maintained community. The scrub ecosystem and its many endangered and threatened species have been lost to development. Scrub is readily damaged by off-road vehicular traffic and even foot traffic, which destroy delicate ground cover allowing the loose sand to erode. Ground lichens require 50 years or more to recover (FNAI and FDNR 1990).
- **Scrubby flatwoods** are characterized as an open canopy forest of widely scattered pine trees with a sparse shrubby understory and areas of barren white sand. The vegetation is a combination of scrub and mesic flatwoods species. Some of the typical plants include longleaf pine, slash pine, sand live oak, Chapman's oak, myrtle oak, scrub oak, saw palmetto, staggerbush, wiregrass, dwarf blueberry, gopher apple, rusty lyonia, tarflower, golden-aster, lichens, and sweet bay. Scrubby flatwoods generally occur intermingled with mesic flatwoods along slightly elevated sandbars and dunes. The white sandy soil is several feet deep and drains rapidly. Periodic fires approximately every 8 to 25 years appear to be natural for this community (FNAI and FDNR 1990).
- **Mesic flatwoods** are characterized as an open forest of widely spaced pine trees with little or no understory, but a dense ground cover of herbs and shrubs. Several variations of mesic flatwoods are recognized, the most common associations being the longleaf pine–wiregrass–runner oak and the slash pine–gallberry–saw palmetto. Mesic flatwoods occur on relatively flat, moderately to poorly drained terrain. The soils typically consist of 1 to 3 feet of acidic sands, generally overlying an organic hardpan or clayey subsoil. Nearly all plants and animals inhabiting this community are adapted to fires; several species depend on fire for their continued existence. During pre-Columbian times, fire probably occurred every one-to-eight years (FNAI and FDNR 1990).

On the installation, the longleaf pines of the mesic flatwood and scrubby flatwood communities are essentially gone. Two forest stands on the northern portion of the installation have longleaf pines, containing mixtures of longleaf, slash, and sand pines, and various

hardwoods (Lee et al 2013). Human activities in the surrounding region have effectively removed the longleaf pine community. Most of the region's native longleaf pine communities have been adversely affected by human activities, including forestry, agriculture, building development, and decades of fire suppression. Because of these activities, only about 12 percent of the region's original 29.6 million acres occupied by longleaf pine remain in longleaf pine today. The regional area currently occupied by longleaf pine and its associated biodiverse and fire-dependent understory is about 1.2 to 1.9 million acres (Outcalt et al. 1999).

Because of its ecological value and the limited opportunities for lands in the area of the installation to support an ecosystem based on longleaf pine, natural communities supporting longleaf pine are an important aspect of the regional ecosystem. With proper management, the resilient mesic flatwoods and scrubby flatwoods communities of NSA Panama City can generally be restored to support a better balance of longleaf pine to slash pine.

On the other hand, the scrub community is sensitive to the impact of human activities. Because of its sensitivity and its occurrence on highly desirable lands, regional impacts to the community have been substantial. Because of restoration difficulties, it is expected that any additional impacts to this community on or off-installation will contribute to a permanent decline in this community in the region as a whole.

NSA Panama City contains one high quality natural-community maritime hammock, which is located on the southern part of the installation. Maritime hammocks are narrow bands of hardwood forest lying just inland of the coastal strand community. Maritime hammocks occur on old coastal dunes that have been stabilized long enough for the growth of a forest. The tree growth occurs in swales between dune ridges where a higher moisture content exists. Live oak (*Quercus* spp.), cabbage palm (*Sabal palmetto*), and redbay (*Persea borbonia*) generally combine to form a dense, wind-pruned canopy whose profile deflects winds and generally prevents hurricanes from uprooting the trees. Other typical plants include American holly (*Ilex opaca*), Southern magnolia (*Magnolia grandiflora*), red cedar (*Juniperus virginiana*), wild olive (*Cordia boissieri*), saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), poison ivy (*Toxicodendron radicans*), coral bean (*Erythrina herbacea*), coontie (*Zamia integrifolia*), prickly ash (*Zanthoxylum americanum*), and ferns (FNAI 1997). Maritime hammock communities have been fragmented into short strips by commercial and residential coastal development, and it is rapidly disappearing (FNAI 1997).

4.5 Plants and Wildlife

4.5.1 State-Protected Plants

NSA Panama City is within, or approached by, the range of at least 58 rare, threatened, endangered, or declining plant species. These include federal and state-listed species (FNAI 1997). Two state-listed plant species presently occurs on NSA Panama City (Table 4-3). No federally listed plant species presently occur on NSA Panama City.

Table 4-3. Rare Plant Species Occurring at NSA Panama City

***Scientific Name* (Common Name)**	**Federal Status**	**State Status**	**Community**
Chrysopsis godfreyi (Godfrey's Golden Aster)	N	E	Primarily scrub on the edge of roadways or on the beach
Lilaeopsis carolinensis (Carolina Lilaeopsis)	N	N	Drainage ditch and ponds
Polygonella macrophylla (Large-leaved jointweed)	N	T	Primarily scrub on the edge of roadways

Source: Inventory of Species of Interest, NSA Panama City, January 2011

Key:

N = Not Listed

E = Listed as endangered by the FWC

T= Listed as threatened by the FWC

Large-leaved jointweed (*Polygonella macrophylla*) occurs in two small areas of remnant scrub: on USCG Station property, and on the southeast side of the NSA Panama City installation. Godfrey's golden aster (*Chrysopsis godfreyi*) occurs on the bayside shoreline extending from the marina north to the housing area and northeast of the spoil area along the north-south fire lane.

4.5.2 Federally and State-Protected Wildlife

NSA Panama City is within the range of, or approached by the habitats of, at least 53 rare, threatened, endangered, or declining animals (FNAI 1997). Fourteen state-listed threatened or endangered wildlife species were found to occur at NSA Panama City in 2008-09, as were four state species of special concern (Table 4-4; GSRC 2011). Seventeen federally-listed, candidate, or petitioned species also occur or potentially occur at NSA Panama City (Table 4-4; GSRC 2011).

Table 4-4. Rare Vertebrates Occurring or Potentially Occurring at NSA Panama City

***Scientific Name* (Common Name)**	**Federal Status**	**State Status**	**Community**
Acipenser oxyrinchus desotoi (Gulf Sturgeon)[b]	T	T	St. Andrew Bay, Sep-Oct
Alligator mississippiensis (American Alligator)[b]	T	T	Estuarine Open Water
Calidris canutus ssp. Rufa (Red Knot)	T	T	St. Andrew Bay, Shoreline
Caretta caretta (Loggerhead Sea Turtle)	T	T	Gulf Beach Sites and St. Andrews Bay
Charadrius melodus (Piping Plover)[b]	T	T	Gulf Beach Sites
Charadrius nivosus (Snowy Plover)[b]	N[c]	T	Gulf Beach Sites
Chelonia mydas (Green Sea Turtle)	T	T	Gulf Beach Sites
Crotalus adamanteus (Eastern Diamondback Rattlesnake)	C	N	Shrub, Mesic Flatwoods, and Pine Plantation
Dermochelys coriacea (Leatherback Sea Turtle)[b]	E	E	Gulf Beach Sites
Eretmochelys imbricata (Hawksbill Sea Turtle)[b]	E	E	Gulf Beach Sites
Egretta caerulea (Little Blue Heron)	N	SSC	Salt Marsh
Egretta thula (Snowy Egret)	N	SSC	Salt Marsh
Falso sparverius (American Kestrel)	N	T	Mesic flatwoods, slash pine
Haliaeetus leucocephalus (Bald Eagle)	N	T	St. Andrew Bay Shoreline
Hippocampus zosterae (Dwarf Seahorse)[b]	P	N	St. Andrew Bay
Lepidochelys kempii (Kemp's Ridley Sea Turtle)[b]	E	E	Gulf Beach Sites
Macrochelys temminckii (Alligator Snapping Turtle)	P	SSC	Salt Marsh
Manta birostris (Giant Manta Ray)	C	N	Gulf Coastal Waters
Pelecanus occidentalis (Brown Pelican)	N	SSC	St. Andrew Bay
Peromyscus polionotus allophrys (Choctawhatchee Beach Mouse)	E	E	Beach Sites
Sterna antillarum (Least Tern)	N[c]	T	Building Rooftop
Trichechus manatus latirostris (Florida Manatee)[a]	T	T	Alligator Bayou

Source for terrestrial species: Inventory of Species of Interest, NSA Panama City (GSRC 2011)

Key:

N = Not Listed
C = Candidate for Listing
E = Endangered
P = Petitioned
T = Threatened
SSC = State Species of Special Concern

a = periodically observed
b = potentially observed at beach sites
c = federally listed elsewhere, but not in Florida

Currently, NSA Panama City implements management activities for the green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), Choctawhatchee beach mouse

(*Peromyscus polionotus allophrys*), piping plover (*Charadrius melodus*), and snowy plover (*Charadrius nivosus*) at the Gulf Beach sites. Management activities are implemented at the main installation site for the bald eagle (*Haliaeetus leucocephalus*) and least tern (*Sternula antillarum*), and information is relayed to vessel operators when manatees and sea turtles are sighted in the area. Adequate available habitat exists to support population needs of the remaining species.

NSA Panama City is in the range of the federal-candidate gopher tortoise (*Gopherus polyphemus*), but the species does not occur on the installation (NAVFAC SE 2010). Nonetheless, managers at the installation continue to implement activities such as prescribed burns, tree thinnings, and soil conservation that would convey conservation benefits to the gopher tortoise and its habitat if they were present.

Actions and projects that take place on NSA Panama City must be analyzed in accordance with the Endangered Species Act (ESA) to ensure they do not result in the unauthorized harassment, injury, or death of any plants or animals protected by the ESA. There are three possible conclusions of such analysis: the action

- "would have no effect to the species" (the species must be absent from the action area for this to be the case),
- "may affect, but is not likely to adversely affect the species" (resulting in an informal consultation with the regulator), or
- "may adversely affect the species" (resulting in a formal consultation and request for take permits).

Consultations, if necessary, would take place with either the USFWS or National Marine Fisheries Service (NMFS), depending upon the species.

4.5.3 Migratory Birds

Migratory bird surveys were completed at NSA Panama City in 2008-09 and 2014-15 (GSRC 2011; GSRC 2015). The same 31 fixed sites were surveyed in both years across four seasons (Figure 4-5). Two state-listed bird species were observed in both years, least terns (*Sterna antillarum*) and American kestrels (*Falco sparverius*). A complete list of all bird species observed, by year and season, is presented in Table 4-5.

Figure 4-5. Bird survey point-count stations on NSA Panama City (2008-09 and 2014-15).

Table 4-5. Bird species observed on NSA Panama City in 2008-09 and 2014-15.

Common Name	*Genus species*	Summer		Fall		Winter		Spring	
		2009	2014	2009	2014	2009	2014	2009	2014
Acadian Flycatcher	*Empidonax virescens*					X			
American Crow	*Corvus brachyrhynchos*		X		X		X		X
American Kestrel	*Falco sparverius*			X			X	X	
American Robin	*Turdus migratorius*	X	X	X			X	X	
Bald Eagle	*Haliaeetus leucocephalus*			X			X	X	X
Barn Swallow	*Hirundo rustica*	X		X				X	X
Barred Owl	*Strix varia*		X						X
Belted Kingfisher	*Ceryle alcyon*			X		X	X	X	X
Black Vulture	*Coragyps atratus*						X		
Black-crowned Night-Heron	*Nycticorax nycticorax*			X	X		X	X	
Blue Jay	*Cyanocitta cristata*	X	X	X	X	X	X	X	X
Blue-gray Gnatcatcher	*Polioptila caerulea*	X		X			X	X	X
Boat-tailed Grackle	*Quiscalus major*			X				X	
Bonaparte's Gull	*Chroicocephalus philadelphia*						X		
Broad-winged Hawk	*Buteo platypterus*	X							
Brown Pelican	*Pelecanus occidentalis*	X	X	X	X	X	X	X	X
Brown Thrasher	*Toxostoma rufum*	X	X	X			X	X	X
Brown-headed Cowbird	*Molothrus ater*	X	X	X		X	X	X	
Brown-headed Nuthatch	*Sitta pusilla*	X	X	X	X	X	X	X	
Bufflehead	*Bucephala albeola*			X			X	X	
Carolina Chickadee	*Poecile carolinensis*		X	X	X	X	X	X	X
Carolina Wren	*Thryothorus ludovicianus*	X	X	X	X	X	X	X	X
Cedar Waxwing	*Bombycilla cedrorum*			X			X	X	X
Chimney Swift	*Chaetura pelagica*	X	X	X	X			X	X
Chipping Sparrow	*Spizella passerina*			X			X	X	
Chuck-Will's-Widow	*Caprimulgus carolinensis*	X		X				X	
Common Grackle	*Quiscalus quiscula*			X		X		X	X
Common Ground-dove	*Columbina passerina*		X				X		X
Common Loon	*Gavia immer*			X			X	X	
Common Merganser	*Mergus merganser*								X
Common Nighthawk	*Chordeiles minor*	X	X			X			
Common Yellowthroat	*Geothlypis trichas*	X			X		X		
Cooper's Hawk	*Accipiter cooperii*					X			
Double-crested Cormorant	*Phalacrocorax auritus*		X	X	X		X	X	
Downy Woodpecker	*Picoides pubescens*	X		X		X	X	X	X
Eastern Bluebird	*Sialia sialis*	X	X	X	X		X	X	X
Eastern Kingbird	*Tyrannus tyrannus*				X				X
Eastern Phoebe	*Sayornis phoebe*			X	X	X	X	X	X

Table 4-5. Bird species observed on NSA Panama City in 2008-09 and 2014-15.

Common Name	*Genus species*	Summer		Fall		Winter		Spring	
		2009	2014	2009	2014	2009	2014	2009	2014
Eastern Towhee	*Pipilo erythrophthalmus*	X	X	X	X	X	X	X	X
Eurasian Collared Dove	*Streptopelia decaocto*	X		X				X	X
European Starling	*Sturnus vulgaris*	X	X	X	X		X	X	X
Fish Crow	*Corvus ossifragus*	X	X	X			X	X	X
Gray Catbird	*Dumetella carolinensis*	X		X	X	X		X	X
Great Blue Heron	*Ardea herodias*	X	X	X	X	X	X	X	X
Great Crested Flycatcher	*Myiarchus crinitus*	X		X				X	
Great Egret	*Ardea alba*	X	X	X	X	X	X	X	X
Great Horned Owl	*Bubo virginianus*	X		X		X		X	X
Great-crested Flycatcher	*Myiarchus crinitus*		X		X				X
Greater Yellowlegs	*Tringa melanoleuca*			X				X	
Green Heron	*Butorides virescens*		X	X				X	
Hairy Woodpecker	*Picoides villosus*		X	X	X		X	X	X
Herring Gull	*Larus argentatus*	X				X	X		
Hooded Merganser	*Lophodytes cucullatus*			X			X	X	
Horned Grebe	*Podiceps auritus*			X			X	X	
House Finch	*Carpodacus mexicanus*	X	X	X	X	X		X	X
House Sparrow	*Passer domesticus*	X	X	X	X			X	X
House Wren	*Troglodytes aedon*			X				X	
Hummingbird	*Calypte sp.*			X				X	
Indigo Bunting	*Passerina cyanea*			X				X	X
Killdeer	*Charadrius vociferus*	X		X		X	X	X	X
Laughing Gull	*Larus atricilla*	X	X	X	X	X	X	X	X
Least Tern	*Sternula antillarum*	X	X	X	X			X	X
Little Blue Heron	*Egretta caerulea*	X		X	X			X	X
Loggerhead Shrike	*Lanius ludovicianus*			X	X	X		X	
Magnolia Warbler	*Dendroica magnolia*			X				X	
Mallard	*Anas platyrhynchos*								X
Mississippi Kite	*Ictinia mississippiensis*				X				
Mourning Dove	*Zenaida macroura*	X	X	X	X	X	X	X	X
Northern Cardinal	*Cardinalis cardinalis*	X	X	X	X	X	X	X	X
Northern Flicker	*Colaptes auratus*			X	X	X	X	X	X
Northern Mockingbird	*Mimus polyglottos*	X	X	X	X	X	X	X	X
Northern Parula	*Parula americana*		X	X				X	X
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	X	X	X				X	
Orchard Oriole	*Icterus spurius*				X				
Osprey	*Pandion haliaetus*	X	X	X	X	X	X	X	X
Painted Bunting	*Passerina ciris*								X

Table 4-5. Bird species observed on NSA Panama City in 2008-09 and 2014-15.

Common Name	*Genus species*	Summer		Fall		Winter		Spring	
		2009	2014	2009	2014	2009	2014	2009	2014
Palm Warbler	*Dendroica palmarum*			X	X	X		X	X
Peewee	*Contopus sp.*			X				X	
Pied-billed Grebe	*Podilymbus podices*						X		
Pileated Woodpecker	*Dryocopus pileatus*		X	X				X	
Pine Warbler	*Dendroica pinus*	X	X	X	X		X	X	X
Prairie Warbler	*Setophaga discolor*								X
Purple Martin	*Progne subis*	X							
Red-bellied Woodpecker	*Melanerpes carolinus*	X	X	X	X	X	X	X	X
Red-eyed Vireo	*Vireo olivaceus*	X		X				X	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	X	X	X				X	
Red-shouldered Hawk	*Buteo lineatus*			X	X	X	X	X	X
Red-tailed Hawk	*Buteo jamaicensis*		X				X		X
Red-winged Blackbird	*Agelaius phoeniceus*	X	X	X		X	X	X	X
Ring-billed Gull	*Larus delawarensis*			X			X	X	
Rock Pigeon	*Columba livia*	X		X	X		X	X	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			X				X	X
Royal Tern	*Thalasseus maximus*	X		X	X			X	
Ruby-crowned kinglet	*Regulus calendula*			X		X	X	X	X
Ruby-throated Hummingbird	*Archilochus colubris*				X				
Ruddy Turnstone	*Arenaria interpres*				X				
Rusty Blackbird	*Euphagus carolinus*					X			
Savannah Sparrow	*Passerculus sandwichensis*				X	X	X		
Scarlet Tanager	*Piranga olivacea*			X				X	
Semipalmated Plover	*Charadrius semipalmatus*				X				
Snowy Egret	*Egretta thula*	X	X	X	X		X	X	X
Snowy Plover	*Charadrius nivosus*						X		
Song Sparrow	*Melospiza melodia*					X			
Spotted Sandpiper	*Actitis macularius*			X			X	X	X
Summer Tanager	*Piranga rubra*	X		X				X	
Swamp Sparrow	*Melospiza georgiana*						X		
Tree Swallow	*Tachycineta bicolor*	X							
Tufted Titmouse	*Baeolophus bicolor*	X	X	X	X			X	X
Turkey Vulture	*Cathartes aura*		X	X	X		X	X	
White-eyed Vireo	*Vireo griseus*	X	X	X	X		X	X	X
Willet	*Tringa semipalmata*			X	X		X	X	
Yellow Warbler	*Setophaga petechia*								X
Yellow-crowned Night Heron	*Nyctanassa violacea*				X				X
Yellow-rumped Warbler	*Dendroica coronata*			X	X	X	X	X	

Sources: GSRC 2011; GSRC 2015

4.6 Land Use

4.6.1 Regional and Installation Land Use

In the region of NSA Panama City, the unincorporated area of Bay County and the city of Panama City, Florida, have and will continue to experience rapid urban development. As a result, the installation abuts dense residential and commercial development.

The land use patterns on the installation have evolved since the development of the NSA Panama City. Presently, the NSA Panama City occupies 656 acres of land, which are divided into four general categories based on operational needs and the intensity of required maintenance (Table 4-6). *Improved lands or grounds* include residential, commercial, and industrial areas; linear infrastructure facilities, which include transportation, communications, and utilities; and recreational and construction sites. Improved grounds occur over approximately 108 acres or 16.7 percent of the total installation. *Semi-improved grounds* include agricultural lands, altered lands, mowed airfield areas, road shoulders, and other land use areas that require little maintenance. Semi-improved lands occur over approximately 61 acres or 9.4 percent of the installation. *Unimproved areas* include forestlands, wetlands, waterways, and other non-developed areas and occur over approximately 394 acres or 60.9 percent of the installation. *Other lands* include areas occupied by buildings, streets, parking areas, sidewalks and other paved areas, and occur over approximately 81 acres or 13 percent of the installation.

At this time, most of the operational activities are focused around the waterfront, which has resulted in a crowded industrial area around Alligator Bayou. In the central area of the NSA Panama City installation, a variety of community-based activities, such as the administrative facilities, public works, and bachelor housing, are interspersed with vacant land uses. The northernmost section of the NSA Panama City installation is dedicated to base housing activities, while the land south of Alligator Bayou is occupied by the Naval Diving and Salvage Training Center, the USCG Station, FWC, and ordnance storage facilities. The south part of NSA Panama City is almost completely encumbered by ESQD arcs and/or a non-electromagnetic operations area.

Table 4-6. Categories of Installation Land Use by Acreage

Land Use and Management Unit	I	U	SI	O	Total Acres
Administrative, Housing, Industrial (North of Alligator Bayou)/*Urban Management Unit*	108	154	9	64	**335**
Magazine and Test Areas/*Operational Management Unit*	0	240	60	21	**321**
Total	108	394	61	81	**656**

Source: CSS 1998a.

Key:

I = Improved grounds.
U = Unimproved grounds.
SI = Semi-improved grounds.
O = Other.

4.6.2 Forestry Resources

Stand Conditions

Forestry stands were inventoried in 1987, 1992, 1997, and 2013. The forest stands were reconfigured by the Environmental Office in 2010 to make management more conducive. Reconfigured stands were inventoried by FWC in 2013 (Lee et al. 2013). Stand data is stored in the Navy's GeoReadiness Explorer (GRX) system. The GRX provides map-based access to a variety of Navy business systems as well as the ability to overlay Navy data with other web based map services. NSA Panama City uses the information stored in the GRX database for the overall management of their forestry resources. Table 4-7 presents the inventory data for each forest stand on NSA Panama City. Stand locations are shown on Figure 4-6. Slash pine (*Pinus elliottii)* is the primary pine species present.

Stand Management

Most of NSA Panama City's scrub, scrubby flatwoods, and mesic flatwoods communities and depression marsh communities have been managed using prescribed burns and intermediate cuttings. NSA Panama City's NRM has used a combination of firing techniques, including backing fires to control burn intensity in areas of high fuel-load accumulation.

Commercial Market

Generally, the local market for forestry products from NSA Panama City is poor because: (1) one paper mill in the region has closed and the other mill has reduced operations; and (2) there is a lack of interest among harvesting companies because the harvest amounts

are small (compared to commercial forest). It is also difficult and relatively time-consuming for timber harvesting companies to get on and off the installation.

Table 4-7. Forest Stand Information at NSA Panama City

Stand	Stand Acreage	Average Diameter (inches)	Average Basal Area (square feet)	Average Live Crown Height (feet)	Average Total Height (feet)	Estimated Pulpwood Volume per Acre (cubic feet)	Estimated Sawtimber Volume per Acre (board feet)
1	5.0	14.07	118	54.3	77.5	170.50	15,490.00
2	3.0	9.22	149	45.4	62.8	1,084.00	9,250.00
3	12.5	19.88	85	39.6	67.1	21.14	11,704.29
4	15.1	13.86	102	43.7	67.4	88.70	12,321.00
5	6.3	5.48	38	33.9	55.2	221.80	682.00
7	15.4	9.74	56	35.8	67.5	104.00	6,067.00
8	15.0	12.18	73	45.7	75.8	143.40	8,456.00
9	36.2	8.04	75	32.4	46.8	318.10	3,958.00
10	38.1	13.58	96	44.3	68.6	150.36	11,523.64
11&12	38.0	12.51	74	44.3	68.7	58.50	8,996.67

(Lee et al. 2013)

* Stand 6 was not surveyed in 2013 because of its small size, composition, and development potential.

4.6.3 Coastal Zone Management

The Florida Coastal Management Program (FCMP), the State of Florida's federally approved management program, was approved by the National Oceanic and Atmospheric Administration (NOAA) in 1981 for implementation of the Coastal Zone Management Act (CZMA) of 1972, 16 U.S.C. 1451 et seq. The FCMP compiles 23 Florida statutes, which are administered by 11 state agencies and four of the five state water management districts, and are designed to ensure the wise use and protection of the state's water, cultural, historic, and biological resources; to minimize the state's vulnerability to coastal hazards; to ensure compliance with the state's growth management laws; to protect the state's transportation system; and to protect the state's proprietary interest as the owner of sovereign submerged lands (Florida Department of Community Affairs [DCA] 1999).

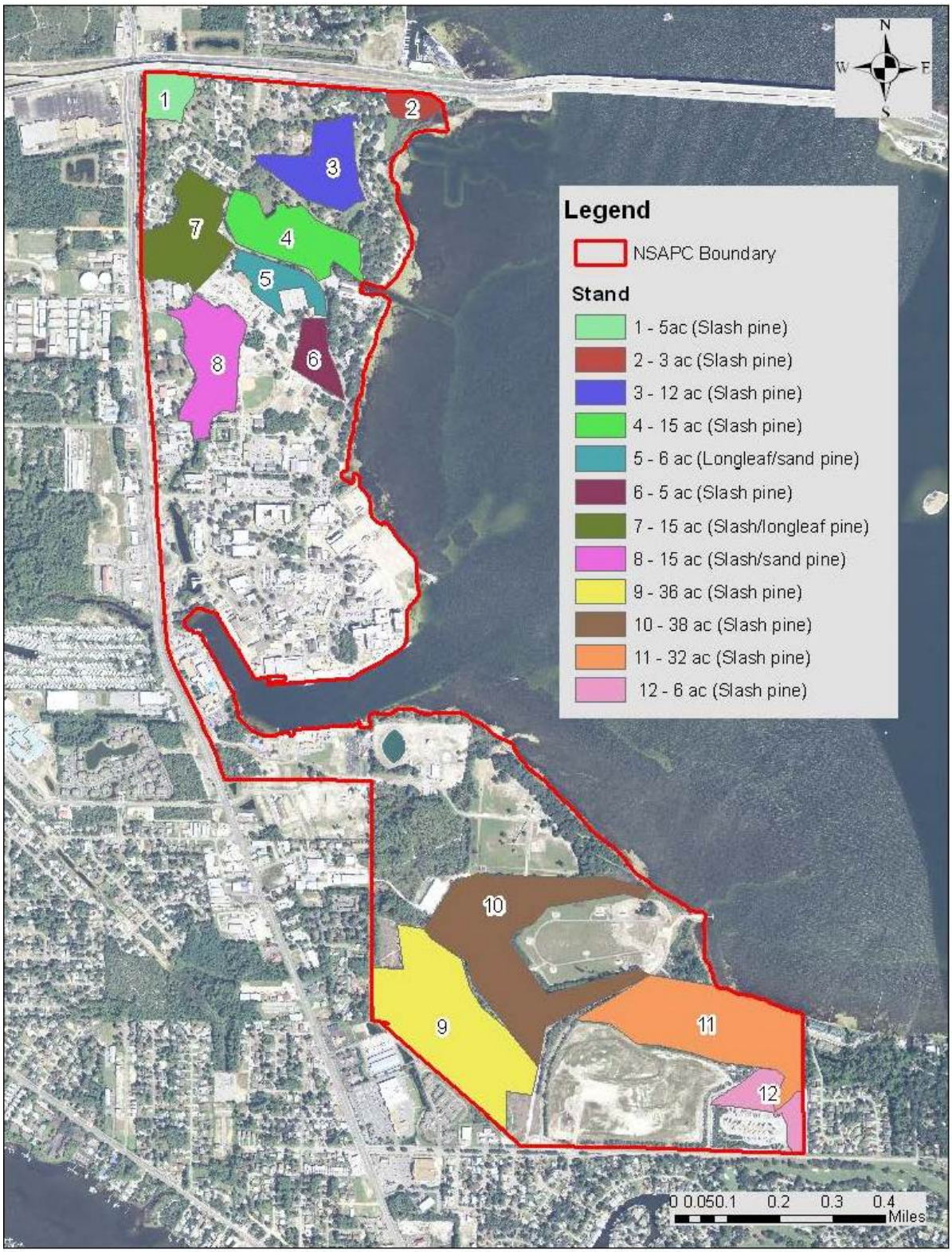

Figure 4-6. Forest stands at NSA Panama City, Florida.

4.6.3.1 Clean Marina Program

The marina facility at NSA Panama City has been designated as a member of the Clean Marina Program (CMP). Members of the CMP pledge to take a proactive approach to environmental stewardship and implement a set of Best Management Practices (BMPs) that help protect coastal waterways (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010). Membership must be maintained annually to ensure adherence to the BMPs. The BMPs include a variety of measures that ensure good water quality, such as proper use of fertilizers and pesticides, proper storage and disposal of oils, fuels, solvents, and soiled rags, proper use and disposal of cleaning supplies, adequate and well-managed trash receptacles, convenient recycling of batteries, refrigerants, and fluorescent bulbs, zero discharge of raw sewage, written plans for hurricane preparedness, and possession of a National Pollution Discharge Elimination System (NPDES) stormwater permit and a Stormwater Pollution Prevention Plan.

4.7 Recreation Activities

The Morale, Welfare and Recreation department of NSA Panama City is the primary entity responsible for maintaining and developing outdoor recreational activities on NSA Panama City. Most of the programs and facilities maintained by Morale, Welfare and Recreation have been established for many years. The Natural Resources Manager and the environmental office reviews and provides natural resources recommendations and guidance for all new projects proposed by Morale, Welfare and Recreation.

Outdoor recreation programs on NSA Panama City generally focus on non-natural resources-based activities, such as the marina, picnic pavilion, campground, and ball fields. Natural resources-based recreational opportunities are limited to walking and jogging trails and occasional outdoor classes. The installation also offers equipment rentals, trips (e.g., rafting, canoeing, hiking, biking, horseback riding), camper rentals, and cabin rentals. Hunting, freshwater fishing, and the use of off-road vehicles are not authorized on the installation. Saltwater fishing is permitted in two areas on the installation. Because of the limited resources for natural resources-based recreational activities, NSA Panama City has not entered into cooperative agreements or cooperative efforts with agencies for the development of a natural resources-based outdoor recreational plan.

Access to the installation's recreational resources is limited to uniformed military personnel and dependents, retired military personnel, and DoD personnel. NSA PANAMA

CITY currently has no shared recreational opportunities with the general public. Public access to the installation is not permitted due to the: (1) lack of transportation infrastructure to support additional traffic; (2) munitions storage and associated ESQD arcs on the southern end of the installation; and (3) mission security concerns.

St. Andrew State Recreation Area is located approximately 3 miles south of the installation. The park is owned by the State of Florida, with management authority and responsibility delegated to FDEP, Division of Recreation and Parks. Other agencies having a direct role in managing the park include the FDACS, Division of Forestry; FWC; the Department of State, Division of Historic Resources; and FDEP, Division of Marine Resources.

Public outdoor recreation is the designated single use for the St. Andrew State Recreation Area. The recreation area contains 49.88 acres of lands developed for public recreational uses, which include a fishing pier, camping and picnic areas, trails, boat ramps, swimming areas, and public facilities (FDEP 1999).

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5 Natural Resources Goals, Objectives, and Strategies

This section presents the goals, objectives, and strategies for natural resources management at NSA Panama City over the next 10-year period. Four goals have been identified for NSA Panama City:

Goal 1 Preserve, protect, and conserve the ecological value and diversity of natural resources through fostering knowledge of and participation in adaptive ecosystem management.

Goal 2 Protect and maintain the NSA Panama City ecosystem through the continuation and enhancement of ecologically appropriate and beneficial land management practices, while ensuring the expansion and continuation of the military mission.

Goal 3 Protect, maintain, and restore native vegetative communities and plant and wildlife populations.

Goal 4 Provide facilities and develop policies that allow for passive, recreational uses and environmental education activities that will not adversely affect the natural areas.

To ensure success in achieving these goals at NSA Panama City, a framework or "road map" of objectives, strategies, projects, and other management initiatives is discussed in this section. The goals, objectives, strategies, projects, and initiatives are referenced throughout the INRMP where appropriate and relevant.

Definitions

Goals. Goals are general expressions of desired future conditions that represent the long-range aim of management. For this INRMP, goals are compatible with the military mission of NSA Panama City and provide conservation and ecosystem management targets and direction.

Issues. To establish objectives for achieving the stated INRMP goals at NSA Panama City, issues that must be addressed were identified and are described in Section 5. Issues may include the presence, abundance, distribution, function, condition, and sensitivity of a particular natural resource feature, resource-based human function, or other attribute on the installation, or within the broader ecological or community setting. Issues

may also include the effectiveness or ineffectiveness of existing or past practices regarding management and use of resources on the installation, and the requirements for regulatory compliance regarding the management and use of natural resources.

Objectives. Objectives can be defined as defensible targets or specific components of a goal, the achievement of which represents measurable progress toward that goal. Objectives help to focus management activities, and provide a yardstick against which to evaluate and communicate results. One or more objectives may be identified for successfully achieving a particular goal. Objectives are comprised of strategies and defined actions or projects.

Strategies. Strategies establish the approach and expected end result for the actions that are necessary to accomplish stated objectives. One or more strategies may be identified for accomplishing a particular objective. Strategies involve certain actions to be taken by the DoN, such as the completion of specific projects and/or the implementation of other management initiatives at NSA Panama City. Strategies usually specify timeframes for completion of various actions.

Projects. Discrete actions for fulfilling a particular strategy are identified as projects. Projects may be required to fulfill obligations by NSA Panama City in meeting regulatory requirements regarding natural resources management or may enhance existing measures for ensuring compliance. Other projects are not compliance-driven, but may allow for more effective and efficient management of natural resources and/or simply provide for sound natural resources stewardship. Projects require labor resources and funding in addition to the day-to-day requirements of the installation.

Other Management Initiatives. Some strategies identify the need for incorporating sound natural resources management principles into the day-to-day decision-making processes and other actions of the various departments at NSA Panama City. These types of initiatives typically strive to elevate awareness throughout the NSA Panama City organization, avoid potentially reactive approaches to natural resources issues at NSA Panama City, and facilitate a proactive approach to addressing natural resources within the mission of the installation. Initiatives are fundamental, non-measurable actions necessary for successful implementation of a strategy. Initiatives attempt to solve problems that preclude meeting specific strategies.

Goal 1: Preserve, protect, and conserve the ecological value and diversity of natural resources through fostering knowledge of and participation in adaptive ecosystem management.

Issue: Existing installation programs and plans for maintaining and managing natural resources on NSA Panama City currently do not consider the interrelationships among resources on the installation. Instead, existing programs and plans have typically focused on the management of individual resources in accordance with federal or state laws.

Ecosystem management cannot be accomplished solely through the implementation of programs and plans focused on individual resources. A coordinated effort among all programs and personnel, from tenant commands as well as decision-making authorities on the installation, is required to protect the interdependent components of communities that define an ecosystem. The coordinated effort will address the consequences of actions on related resources and will resolve conflicts between competing programs and plans for use of the installation's natural resources.

Ecosystem management is a holistic, adaptive-management concept that transcends human-made boundaries internal and external to NSA Panama City. Management for a sustainable ecosystem requires awareness, education and training, and responsible participation of all individuals potentially affecting the ecosystem, as well as adjustments in management principles and practices to respond to new knowledge and dynamic conditions.

Objective 1.1: To incorporate the concept of ecosystem management into all planning and management processes.

Strategy 1.1.1: A member of the Natural Resources staff will present NSA Panama City environmental resources and constraints (e.g., wetlands, floodplains, threatened and endangered species) to the CO during decision-making processes.

Projects: None.

Initiatives: Hold regular briefings with the CO on the importance of the contributions of a Natural Resources staff member. Briefing will include communicating to the CO the potential ramifications to the military mission associated with non-compliance with federal and state laws. Cross References: Military Mission discussions throughout Section 5.

Strategy 1.1.2: Integrate the management concepts of the INRMP into all working programs and department plans (i.e., SWPPP, PMP, and Grounds Maintenance Plan).

Projects: None.

Initiatives: Maintain a working team to integrate the INRMP, SWPPP, PMP, and Grounds Maintenance Plan documents. The team will consist of a representative from each department who is tasked with the responsibility of implementing programs, plans, or policies related to natural resources management. The Natural Resources Manager should be involved in the

team selection process. The team should meet monthly until all documents are integrated with the INRMP.

Strategy 1.1.3: NSA Panama City will continue using Computer-Aided Drafting and a Geographic Information System (GIS) for construction, engineering, and natural resource mapping as mission and funding allow. NSA Panama City will use available and/or will build NSA Panama City-and-immediate-area GIS data coverages, and will update coverages as new information becomes available. GIS will allow NSA Panama City's environmental professionals to produce custom maps for preliminary environmental site assessments and to facilitate analysis of environmental issues.

Projects: None.

Initiatives: Contract with appropriate entities to inventory natural resources, to compile GIS data coverages, and to maintain and update data. GIS data coverages will include, but not be limited to:

- Wetlands and water bodies and water courses;
- Natural communities;
- Undisturbed and undeveloped 100-year floodplain;
- Military constraint areas (e.g., ESQD arc);
- Map soil units and areas where soil type presents a threat of erosion;
- Habitats of endangered and threatened species and species of special concern;
- Hazardous waste sites;
- Land use;
- Infrastructure and utilities;
- NSA Panama City boundaries and buildings;
- Roads;
- Cultural, natural, historical, or archeological resources;
- Surface water quality monitoring stations;
- Stormwater outfalls;
- Shoreline areas and essential fish habitat; and
- Buffer areas for wetlands, cultural resources sites, and shoreline areas.

Strategy 1.1.4: NSA Panama City will ensure that all cooperative agreements, memoranda, or other agreements between the installation and federal and state agencies that oversee and regulate natural resources protection are current.

Projects: None.

Initiatives: It will be the responsibility of the Natural Resources Manager to ensure that NSA Panama City has up-to-date agreements. The Natural Resources Manager will consult with foresters, fish and wildlife biologists from the Natural Resources Section of NAVFAC SE, as well as with federal, state,

and county wildlife biologists, foresters, and land managers for assistance. The Natural Resources Manager will also consult with installation commands and departments, such as Morale, Welfare, and Recreation.

Objective 1.2: To implement training, education and stewardship initiatives for ecosystem management.

Strategy 1.2.1: NSA Panama City will support the training and certification of an individual in prescribed-burn management, in addition to the NSA Panama City Natural Resources Manager. NSA Panama City will have a minimum of three installation personnel trained and certified in prescribed-burn management.

Projects: Project No. 2 - Prescribed Burns; see Appendix A.

Initiatives: Identify certified prescribed-burn training programs. Ensure that the program and its duration are compatible with the timeframe of the implementation strategy.

- Consider the one-month federal course FDACS, Division of Forestry, in Tallahassee, which is sufficient to receive certification.
- Consider Florida's Interagency Prescribed Fire Course administered through Hillsborough Community College. This course is offered at various locations throughout the state, but requires the participant to complete three supervised prescribed burns to become a certified burn technician.

Strategy 1.2.2: NSA Panama City will continue to evaluate and upgrade its established public awareness and training/education. NSA Panama City will provide opportunities to apply knowledge learned by the civilian and military populations through "hands-on" opportunities to participate in natural resources-based projects.

Projects: Project No. 5 - Nature Trail Development; see Appendix A.

Initiatives: (1) For program development, enlist the services of foresters, fish and wildlife biologists, and soil conservationists from the Natural Resources Section of NAVFAC SE, as well as federal, state, and county wildlife biologists, foresters, and land managers.

(2) Encourage participation in projects by providing information about upcoming projects.

Strategy 1.2.3: NSA Panama City will continue to implement, expand, and update its technical education and training program for all contract and installation personnel involved in activities on the installation that may directly or indirectly affect NSA Panama City's success in natural resources management. Individuals required to attend will be those involved in activities with or associated with departments including, but not limited to, stormwater management; roof maintenance; landscaping; timber stand improvements; hazardous waste response teams; MWR; law enforcement; Public Works Department; volunteers; operations; and trainers. NSA Panama City's current program, which is being expanded, involves a training program for:

- roof maintenance personnel for the protection of the least terns;
- law enforcement personnel for the protection natural resources; and
- all station personnel for protection of cultural resources.

Projects: None.

Initiatives:
(1) Hold regular briefings with the CO on the status of training and education to ensure cooperation among participating departments and contractors. Communicate to the CO the importance of all contract and installation personnel receiving education in relevant environmental laws, regulations, directives, and mandates that have the potential to affect the military mission.

(2) For program development, enlist the services of foresters, fish and wildlife biologists, and soil conservationists from the Natural Resources Section of NAVFAC SE, as well as federal, state, and county wildlife biologists, foresters, and land managers.

(3) The Natural Resource Manager will establish a directory of training and education programs that will be required for contract personnel prior to their initiating work on NSA Panama City that may impact natural resources.

(4) Provide information about NSA Panama City natural resources to visiting commands (e.g., training groups) prior to the command initiating actions.

Strategy 1.2.4: NSA Panama City will continue to implement programs and initiatives that foster citizen participation in natural resources education and stewardship.

Projects: Project No. 5 Nature Trail Development; see Appendix A.

Initiatives:
(1) Encourage the use of volunteer groups (e.g., Scout troops, Student Conservation Association) on the installation. Offer hands-on training or activity participation to better demonstrate the concept, application, and importance of natural resources management. Cross References: Strategy 1.2.4 (Projects) and activities such as landscaping (Section 5.1.5), wetland enhancement (Section 5.1.1), reforestation (5.2.2), urban forestry (Section 5.2.3), and habitat improvements (Section 5.3.1).

(2) Actively pursue suggestions from NSA Panama City personnel for environment enhancement projects. Initiate an annual environmental awareness achievement award for project suggestions and participation.

(3) Continue participation in Earth Day activities, field trips, and other environmental stewardship opportunities.

(4) Maintain “Tree City USA” designation.

(5) Pursue participation in the Coastal America Program.

(6) Participate in regional natural resources management initiatives).

(7) Develop a Watchable Wildlife Program.

Objective 1.3:To establish a planning team to review and update the INRMP in accordance with OPNAVINST5090.1D 12-3.4(c).

The INRMP is intended as a dynamic, evolving planning document; updates are required to ensure compliance with regulations and to initiate requests for project funding.

Strategy 1.3.1: NSA Panama City will contract a private firm or develop a team of experts with sufficient technical knowledge to evaluate the effectiveness of INRMP implementation and to recommend improvements.

Projects: None.

Initiatives: Review NSA Panama City staffing, including assistance from the Land Management Department of NAVFAC SE and federal, state, and county agencies, to identify whether there are adequate staffing and expertise to update the INRMP. If not, list private contracting as a compliance project for implementation of Strategy 1.3.1. Cross Reference: Section 1.5.3 for updating compliance.

Goal 2: Protect and maintain the NSA Panama City ecosystem through the continuation and enhancement of ecologically appropriate and beneficial land management practices, while ensuring the expansion and continuation of the military mission.

Issue: As development and training activities have the greater potential to affect a greater amount of the land area on NSA Panama City, land management decisions and practices will become increasingly important aspects of ecosystem management. The use and management of lands for military mission needs and the decision-making process regarding such land use directly affect the sustainability of the ecosystem. To restore and maintain a viable ecosystem, NSA Panama City needs to:

- develop an inclusive strategy for management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.
- support the needs of the military mission while protecting the remaining undisturbed acreage within the 100-year floodplain on NSA Panama City. Most of the ecological functions of the floodplain, such as the transport and cycling of nutrients and provision of productive and essential habitat, have been lost. Only fragments of the original floodplain community remain.
- ensure appropriate site selection and development to avoid impacts associated with arbitrarily located human-made linear and nonlinear features. The arbitrary location of features undermines ecological processes through the separation and isolation of wildlife and plant populations, which can render the fragmented parcels unsustainable for wildlife. Arbitrary location of features also increases costs associated with daily land management practices and infrastructure improvements.
- minimize landscaping costs while ensuring the maintenance of aesthetic and environmental resources.

- ensure that invasive and exotic species do not interfere with military and recreational activities or the quality and functions of wildlife habitats, forests, wetlands, or other natural resources and processes.
- ensure that land management and land use decisions comply with all applicable laws, executive orders, regulations, directives, and memoranda.

Objective 2.1: To reduce invasive and exotic pest plant vegetation cover to no more than one percent of the total vegetation coverage; to exclude and/or remove exotic and/or nuisance wildlife; and to control wildlife diseases that may adversely affect human health or welfare, the health of the ecosystem, or the military mission.

Strategy 2.1.1: NSA Panama City will have a plan and implementation strategy for the removal of invasive and exotic species from NSA Panama City. NSA Panama City will treat (e.g., with pesticides) and/or physically remove invasive and exotic species.

Project: Project No. 1 – Invasive and Exotic Species Removal and Project No. 8 – Urban Forestry Plan; see Appendix A.

Initiatives:

(1) Develop an invasive and exotic species management strategy that involves a survey of the installation to determine areas and extents of exotic and invasive species; removal methods, including time of year for removal; and pesticide application rates.

- Consult the NAVFAC Natural Resources Section and the FDACS Pesticide Division (850-487-2130) to determine removal methods. Consider non-pesticide removal methods and removal using pesticides with lower toxicity and applied at reduced rates. Cross Reference: Section 5.1.2 - Additional Sources of Information for invasive and exotic species control.
- Consult with foresters and fish and wildlife biologists from the Natural Resources Section of NAVFAC SE, as well as with federal, state, and county wildlife biologists, foresters, and land managers for the identification of invasive and exotic species and for appropriate, effective measures to protect fish and wildlife. Cross Reference: Section 5.1.2 - Additional Sources of Information for invasive and exotic species control.

(2) Identify individuals or groups that could contribute to the removal effort.

- Natural Resources staff members.
- Interested base personnel. Cross Reference: Strategy 1.2.2.
- Contractor and installation personnel. Cross Reference: Strategy 1.2.3.
- Volunteer groups (e.g., Scout troops, Student Conservation Association). Cross Reference: Strategy 1.2.4.

(3) Ensure adequate training of removal teams. Cross Reference: Strategy 1.2.3.

(4) Maintain a program for the eradication and control of invasive and exotic species and prohibit the planting of such species as part of NSA Panama City's Grounds Maintenance Plan. Develop a monitoring and re-removal program for problem areas. Cross References: Strategy 2.1.1 (1) for organizations to consult for guidance, and Section 5.1.2 – Laws … Relevant to Invasive Species.

Strategy 2.1.2: NSA Panama City will continue to monitor the health and size of animal populations and species.

Projects: Project No. 6 – Survey and Inventory of Biological Resources.

Initiatives: (1) NSA Panama City will establish a public awareness program to communicate indicators of wildlife population problems and diseases. NSA Panama City will use pamphlets, flyers, and command units to disseminate information. Cross Reference: Section 5.3.2.

(2) Monitor the habitat of wildlife species that may present future problems.

- White-tailed deer (*Odocoileus virginianus*). Determine the effects of browsing on native species;
- Opossum (*Didelphis virginiana*) and raccoon (*Procyon lotor*). Keep records of animals that are unafraid of people and the amount of garbage raiding by these animals;
- Predators (e.g., coyotes [*Canis latrans*], and feral dogs [*Canis lupus familiaris*]). Keep records of animals that are unafraid of people and, in cases of animal kills by a predator, identify what type of predator killed the animal;
- Gray squirrels (*Sciurus carolinensis*). Keep records of damage to structures.

Objective 2.2: To continue existing programs and establish new programs and procedures to maintain and enhance water quality.

Strategy 2.2.1: NSA Panama City will maintain a long-term management plan to protect and conserve the natural functions of wetlands and shoreline areas, including limiting wetland shoreline destruction and reducing adverse impacts to water quality.

Projects: Project No. 3 – Soil Erosion Control; and Project No. 4 – Wetlands Delineation; see Appendix A.

Initiatives: (1) NSA Panama City will maintain 50-foot vegetative buffers around all wetlands.

- Inventory wetlands to identify areas with insufficient or inadequate buffering. List any areas with insufficient or inadequate buffering, identified by the survey, as projects in subsequent INRMP updates.
- Encourage the use of volunteers (e.g., Scout troops, Student Conservation Association) to create buffers of native vegetation. Cross Reference: Strategy 1.2.2 and Strategy 1.2.4.

- Use native species and xeriscaping principles when creating buffers. Cross References: Strategy 2.4.1 and Section 5.1.5 - Additional Sources of Information (for xeriscaping).
- Map wetlands and 50-foot buffers areas. Cross Reference: Strategy 1.1.3 (GIS maps).

(2) NSA Panama City will, as part of their Oil and Hazardous Substance Spill Contingency Plan, establish a natural resources damage assessment program for assessing natural resources damage or potential damage arising from the release of oil or hazardous substances that injure or threaten to injure natural resources of the United States.

- Action shall be undertaken by the Environmental Engineer in the Environmental Section of the Public Works Department in concert with the Natural Resources Manager. Action will include consultation with Environmental Engineers from NAVFAC SE.

(3) The Public Works Department should review stormwater discharge into wetlands to address the protection of water quality. They should ensure that:

- stormwater runoff is subjected to BMPs prior to discharging into wetlands (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010). BMPs shall prevent or reduce the amount of pollution in water to a level compatible with Florida Surface Water Quality Standards.
- stormwater discharge onto NSA Panama City from external sources does not adversely impact water quality on NSA Panama City. Use the existing NSA Panama City stormwater pollution prevention team to sample stormwater runoff entering NSA Panama City from areas external to NSA Panama City. Consult FDEP and Bay County in the event that incoming stormwater causes NSA Panama City surface waters and wetlands to not meet applicable state water quality standards.
- no site activities on NSA Panama City result in violation of state water quality standards associated with the siltation of wetlands or reduction in the natural retention or filtering capability of wetlands. Cross Reference: Strategy 2.2.1(2) for the use of buffers to minimize the siltation of wetlands from nonpoint sources.
- adequate soil erosion measures are implemented. Cross Reference: Strategy 2.2.3.
- no site activities allow water to become a health hazard or to contribute to the breeding of mosquitoes. Cross Reference: Section 5.3.2 – Wildlife Disease, and Strategy 2.1.1.

(4) NSA Panama City will establish a natural shoreline buffer along undeveloped areas adjacent to St. Andrew Bay. A natural vegetated buffer will be maintained from the mean high water line to 50 feet landward or 50 feet upland, whichever is greater. Allowances may be made for essential military mission requirements.

- Ensure consistency with the Florida Coastal Management Program, as well as FDEP regulations for shoreline development and protection.

Strategy 2.2.2: NSA Panama City will evaluate its stormwater management program and activities contributing to stormwater runoff and/or pollutant loading in stormwater runoff.

Projects: Project No. 3 – Soil Erosion Control; see Appendix A.

Initiatives: (1) NSA Panama City will continue to manage point and nonpoint source stormwater in industrial areas consistent with BMPs (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010) and will update its SWPPP to include stormwater management practices for non-industrial areas. The SWPPP will ultimately address the maintenance of stormwater structural control; stormwater treatment projects; roadway maintenance activities; flood and soil control projects; pesticide, herbicide and fertilizer application; external connections and discharges; and construction activities.

- Action shall be undertaken by the Environmental Engineer in the Environmental Section of the Public Works Department in concert with the Natural Resources Manager. Action will include consultation with Environmental Engineers and professionals from NAVFAC SE.

(2) NSA Panama City will, as part of their Oil and Hazardous Substance Spill Contingency Plan, establish a natural resources damage assessment program for assessing natural resources damage or potential damage arising from the release of oil or hazardous substances that injure or threaten to injure natural resources of the United States.

- Action shall be undertaken by the Environmental Engineer in the Environmental Section of the Public Works Department in concert with the Natural Resources Manager. Action will include consultation with Environmental Engineers from NAVFAC SE.

(3) NSA Panama City will continue to retrofit existing stormwater facilities through the construction of retention ponds as directly and completely possible within the limitations of funding. NSA Panama City will actively manage stormwater runoff from new development to achieve no net increase in stormwater discharge from the installation, unless it is impossible to do so and satisfy the military mission. Cross Reference: Section 5.1.4.

- Action shall be implemented in consultation with the Public Works Department.

Strategy 2.2.3: NSA Panama City will evaluate its soil erosion control management plan and will reduce the rate of soil erosion through the implementation of long-term measures and projects.

Project: Project No. 3 – Soil Erosion Control; see Appendix A.

Initiatives:

(1) Map soils units and areas where soil type presents a threat of erosion. Cross Reference: Strategy 1.1.3 (GIS maps).

(2) Train and educate all contract and department personnel on actions that may directly or indirectly contribute to soil erosion problems and measures that can be employed to avoid or lessen these conditions. Cross Reference: Strategy 1.2.3.

- Consult with soil conservation experts from the Land Management Department of NAVFAC, as well as with the USDA NRCS on the training program development. Cross Reference: Section 5.1.3 - Additional Sources of Information.

(3) Continue to operate the existing soil conservation and erosion control program through BMPs (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010). Implement the long-term management concepts in Section 5.1.3, including, updating the SWPPP to include control measures for forest and shoreline areas and for forestry, reforestation, and timber stand improvements. Cross Reference: Strategy 1.1.2.

- Action shall be undertaken by the Environmental Engineer in the Environmental Section of the Public Works Department in concert with the Natural Resources Manager. Action will include consultation with soil conservation experts in the Natural Resources Section of NAVFAC SE and in the USDA NRCS.
- Consult with soil conservation experts at NAVFAC SE and in the USDA NRCS regarding BMPs (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010). Cross References: Section 5.1.3 - Additional Sources of Information.

Strategy 2.2.4: NSA Panama City will inventory the use of pesticides and fertilizers on NSA Panama City, and will assess alternatives to and a reduction in pesticide and fertilizer use. The intent is to reduce chemical pesticide and fertilizer use to help protect water quality.

Projects: None.

Initiatives:

(1) NSA Panama City will inventory current pesticide and fertilizer use and consult the NAVFAC SE Natural Resources Section and the FDACS Pesticide Division (850-487-2130) for means of reduction.

(2) Evaluate the use of a combination of organic and mineral fertilizers. Slow release fertilizers will be preferred to other mineral fertilizers.

(3) Consider non-pesticide removal methods or removal using pesticides with lower toxicity applied at reduced rates. Cross Reference: Strategy 2.1.1, and Sections 5.1.2 and 5.1.5 - Additional Sources of Information.

(4) Consult with foresters, fish and wildlife biologists, and soil conservationists from the Natural Resources Section of NAVFAC SE, as well as with federal, state, and county wildlife biologists, foresters, and land managers.

Objective 2.3: To maintain the attenuation capacity of the remaining undisturbed acreage within the 100-year floodplain.

Strategy 2.3.1: NSA Panama City will review proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall be first located in the previously disturbed areas of the floodplain.

Projects: None.

Initiatives:

(1) It will be the responsibility of the Natural Resources staff representative to ensure implementation of the floodplain management strategy. Cross Reference: Strategy 1.1.1.

(2) Map undisturbed and disturbed areas of the 100-year floodplain for use in the decision-making process. Cross Reference: Strategy 1.1.3.

(3) Where there is no practical alternative to development in the 100-year floodplain, NSA Panama City will construct to limit or minimize damage to structures caused by flooding and to avoid contamination of waters. NSA Panama City will evaluate the county's floodplain regulation, which addresses construction and building codes, as guidance for development in the floodplain.

(4) Retain the natural attenuation and filtering capacity of wetlands within the 100-year floodplain.

- Ensure no net loss of wetlands. Cross Reference: Strategy 2.2.1 (5).
- Ensure adequate buffers around and prescribed burns through wetland areas to maintain wetland attenuation capacity. Cross Reference: Section 5.2.1; and Strategy 2.2.1 (2) and Strategy 3.1.1, respectively.

Objective 2.4: To implement environmentally beneficial landscaping by reducing the need for irrigation, pesticides, and fertilizers.

Strategy 2.4.1: NSA Panama City will use xeriscaping principles with native species for new landscaping and will phase in these principles for existing landscaping.

Projects: None.

Initiatives:

(1) Educate grounds maintenance personnel on the principles of xeriscaping. Cross References: Strategy 1.2.3 and Section 5.1 - Land Management.

(2) Use volunteer groups and/or interested installation personnel to assist in plantings. Cross References: Strategy 1.2.2 (2) (3) and Strategy 1.2.4 (1).

(3) Integrate the concept of xeriscaping into the Grounds Maintenance Plan. Cross Reference: Strategy 1.1.2.

(4) To develop a xeriscaping program, enlist the services of foresters, fish and wildlife biologists, and soil conservationists in the Natural Resources Section of NAVFAC SE, as well as federal, state, and county wildlife biologists, foresters, and land managers. Cross Reference: Section 5.1.5 - Additional Sources of Information (for xeriscaping).

(5) Removal of invasive and exotic species. Cross Reference: Strategy 2.1.1.

Objective 2.5: To minimize adverse impacts to the natural environment when using lands in support of the military mission.

Strategy 2.5.1: NSA Panama City will ensure implementation of policies that minimize adverse impacts to natural resources from land disturbance activities (e.g., clearing, training).

Projects: None.

Initiatives: (1) It will be the responsibility of the Natural Resources staff representative to ensure the use of site selection and site plan development criteria to minimize impacts to the installation's environmental and ecological resources. Cross References: Strategy 1.1.1 and Section 5.5.

(2) Use natural resources maps as a tool for minimizing impacts. Cross Reference: Strategy 1.1.3 (1).

Goal 3: Protect, maintain, and restore native vegetative communities and plant and wildlife populations.

Issue: Little of the native communities that originally occurred on NSA Panama City remain today. The few natural communities that do remain suggest that the upland areas of NSA Panama City were dominated by a mosaic of scrub, scrubby flatwoods, and mesic flatwoods. The small strip of maritime hammock along the bay is a high quality community (FNAI 1997).

On the NSA Panama City installation as in the surrounding region, human activities have effectively removed the longleaf pine/wiregrass community. Most of the region's native longleaf pine communities have been adversely affected by human activities, including forestry, agriculture, building development, and decades of fire suppression. Because of these activities, only about 12 percent or 29.6 million acres of the region's original area occupied by longleaf pine remain today. The regional area currently occupied by longleaf pine and its associated biodiverse and fire-dependent understory is about 1.2 to 1.9 million acres (Outcalt et al. 1999).

The longleaf pine/wiregrass community is a desired community because it is one of the most biodiverse forest ecosystems outside the tropics. In addition to restoring a highly desirable tree species, restoration of the native longleaf pine community will enhance habitat for species that depend upon that habitat.

Human activities in and surrounding NSA Panama City have limited the potential for high quality habitat for animal and plant species. In addition, intense commercial and residential development surrounding the installation have all but eliminated any remaining natural communities that could function as wildlife corridors between NSA Panama City and significant off-installation wildlife areas. Because of limited habitat resources, habitat fragmentation, and the decline of much of the native communities, wildlife on the installation and in adjacent areas consists of a limited number of small and medium-size mammal species, and various populations of birds, amphibians, and reptiles.

Objective 3.1: To maintain ecological integrity by ensuring the long-term viability of native wetland and upland biological communities for the protection of listed plant and animal species and for other non-listed wildlife.

Strategy 3.1.1: NSA Panama City will continue implementation of its timber stand improvement program using prescribed burns and thinnings to increase the growth rate of preferred trees, reduce the potential for wildfires, control diseases and insect pests, and ensure the continuation of fire-dependent plant and wildlife communities.

Projects: Project No. 7 – Forest Management Inventory System

Initiatives:

(1) NSA Panama City will, in consultation with foresters and wildlife biologists from the Natural Resources Section of NAVFAC SE, as well as federal, state, and county wildlife biologists and foresters, continue to update cutting and prescribed burn prescriptions using existing NSA Panama City GRX layers and GIS data to be collected under Project No. 7. Cross Reference: Section 5.2.1.

- Develop and implement a prescribed burn regime that will adequately address safety and smoke concerns. Burns will be conducted by trained personnel. The prescribed burn schedule may be adjusted to accommodate fuel-reduction burns and site safety constraints.

(2) Contract with a private logging company to perform tree cutting and removal.

(3) Use revenues from timber sale to fund projects.

(4) Certify additional NSA Panama City personnel in prescribed burning. Cross Reference: Strategy 1.2.1.

Strategy 3.1.2: NSA Panama City will have established a longleaf pine/ wiregrass community restoration program for the installation.

Projects: Project No. 2 – Prescribed Burns; see Appendix A.

Initiatives:

(1) Use GIS data coverages (e.g., soils) to determine suitable areas for restoration. Cross Reference: Strategy 1.1.3.

(2) Use volunteers (e.g., Scout troops, Student Conservation Association) for planting. Cross Reference: Strategy 1.2.4.

(3) Contract with a private logging company to perform tree cutting and removal, if required.

(4) For project development, consult with foresters, fish and wildlife biologists, and soil conservationists from the Land Management Department of NAVFAC SE, as well as federal, state, and county wildlife biologists, foresters, and land managers. Cross Reference: Additional Sources of Information, Section 5.2.3.

Strategy 3.1.3: NSA Panama City will adopt an Urban Forestry Plan and implement a project to enhance wildlife habitat and aesthetics in NSA Panama City's developed areas.

Projects: None.

Initiatives: (1) See Appendix D, Summary Urban Forestry Plan. For a comprehensive urban forestry plan, contract an entity for plan development.

(2) Use volunteers (e.g., Scout troops, Student Conservation Association) for planting. Cross Reference: Strategy 1.2.4.

Strategy 3.1.4: NSA Panama City will continue to implement, evaluate, and update their BMPs (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010) for the protection of water quality in wetlands and St. Andrew Bay.

Projects: No. 3 – Soil Erosion Control; see Appendix A.

Initiatives: Cross References:

- Objective 2.1 – invasive and exotic species removal;
- Objective 2.2 – wetland and shoreline buffers, stormwater runoff, soil erosion, and pesticide and fertilizer use;
- Objective 2.3 – 100-year floodplain;
- Objective 2.4 – environmental beneficial landscaping; and
- Objective 2.5 – land impact guidelines.

Objective 3.2: NSA Panama City will preserve and protect threatened and endangered species and species of concern to ensure no reduction in species numbers or population sizes.

Strategy 3.2.1: NSA Panama City will have completed updated surveys for Neotropical Migratory Bird and Rare, Threatened, and Endangered Species.

Projects: No. 12 – Rare, Threatened, and Endangered Species Survey and Inventory; see Appendix A.

Initiatives: (1) Contract a private firm to conduct the surveys; or

(2) Develop a team of experts from within the DoN with sufficient technical knowledge to conduct the surveys. Cross Reference: Section 1.4; or

(3) Pursue services provided for in cooperative agreements between NSA Panama City and the USFWS, the FWC, and/or TNC. Cross Reference: Section 1.4.

Strategy 3.2.2: NSA Panama City will implement programs and activities for the protection and enhancement of habitat for animal and plant species.

Projects: Project No. 1 – Invasive and Exotic Species Removal; Project No. 2 – Prescribed Burns; Project No. 4 – Wetlands Delineation; Project No. 7 – Forest Management Inventory System and Project No. 8 – Urban Forestry Plan; see Appendix A.

Initiatives: (1) Cross References:

- Strategy 2.1.2 – Wildlife damage and disease control.
- Strategy 3.1.1 – Timber stand improvement.
- Strategy 3.1.2 – Longleaf pine/wiregrass.
- Strategy 3.1.3 – Urban forestry.

- Strategy 3.1.4 – (Objectives 2.1 – 2.4).
- Section 5.5 – Land impact guidelines.
- Sections 5.2.1, 5.2.2, and 5.3.1.

(2) NSA Panama City will use FWC habitat relocation guidelines to prepare a long-term strategy for the relocation and protection of listed species on NSA Panama City from the impacts of proposed development or land clearing. NSA Panama City will consult with FWC, USFWS, and/or NAVFAC SE wildlife biologists as needed.

- Based on the findings of the survey addressed in Strategy 3.2.1, updated relocation plans will be developed to address any changes to relocation strategies needed to provide for listed species resources.

(3) NSA Panama City will implement the habitat management recommendations in Section 5.3.1.2 for the protection of listed species.

- Subsequent to the findings of the surveys addressed in Strategy 3.2.1, updated management recommendations will be developed to address any changes to management prescriptions needed to provide for listed species resources.

(4) Use volunteers (e.g., Scout troops, Student Conservation Association) for construction of habitat enhancement projects. Cross References: Strategy 1.2.2 and Strategy 1.2.4.

(5) NSA Panama City will institute wildlife education and stewardship programs. Cross References:

- Strategy 1.2.2 – NSA Panama City personnel education and participation.
- Strategy 1.2.3 – Training for contract and NSA Panama City-employed maintenance personnel.
- Strategy 1.2.4 – Citizen Education and Participation.

Goal 4: Provide facilities and develop policies that allow for passive, recreational uses and environmental education activities that will not adversely affect the natural areas.

Issue: The SAIA requires that military installations evaluate the potential for providing outdoor recreational resources to the general public. Current access to NSA Panama City's existing recreational resources is limited to installation DoD civilians, uniformed military person and dependents, and retired military personnel. NSA Panama City currently has no shared recreational opportunities with the general public. Public access to the installation is not permitted due to: (1) lack of transportation infrastructure to support additional traffic; (2) munitions storage and associated ESQD arcs on the southern end of the installation; and (3) mission security concerns.

Objective 4.1: To address the long-term recreational needs of NSA Panama City and NSA Panama City's capability to provide recreational and educational opportunities to the public and installation personnel.

Strategy 4.1.1: The NSA Panama City CO will establish a recreation planning board that will address means for providing additional recreational activities. Membership on the recreation board will consist of, at a minimum, the Natural Resources Manager and the Director of Morale, Welfare, and Recreation.

Projects: None.

Initiatives: (1) Meet with Installation Command to discuss the potential for providing public access to natural resources-based outdoor recreation.

(2) The recreation board will:

- present possible solutions to the issues that currently prohibit public access;
- identify the types of recreation and education opportunities compatible with the NSA Panama City's mission;
- identify needed facilities development;
- examine security measures associated with expanding recreational opportunities; and
- investigate facility use agreements with other providers of educational, cultural, and recreational opportunities in the area.

Objective 4.2: To develop recreational facilities and trails and interpretive centers to support the anticipated population increase.

Strategy 4.2.1: NSA Panama City will develop recreational trails and/or interpretive centers in areas of NSA Panama City with unique cultural, natural, historical, or archeological resources.

Projects: Project 5 – Nature Trail Development; see Appendix A.

Initiatives: (1) Use GIS data coverages for preliminary site assessments. Cross Reference: Strategy 1.1.3.

(2) Use volunteers and interested installation personnel for construction of facilities. Cross References: Strategy 1.2.2 and Strategy 1.2.4.

Strategy 4.2.2: Expand, improve, and provide additional facilities for recreational opportunities.

Projects: Project No. 5 – Nature Trail Development; see Appendix A.

Initiatives: None.

6 Natural Resources Management

This section discusses natural resources management at NSA Panama City by dividing natural resource management into four management focuses: land management, forestry, fish and wildlife, and outdoor recreation. These focuses are further divided into management actions; for example, the land management discussion addresses wetlands, invasive and exotic species, soil conservation and erosion control, stormwater and water quality control, landscaping and maintenance, and floodplain management.

For each management action, Section 5 discusses the issue(s), long-term management of the issue(s), the relationships of the issue(s) to ecosystem management on NSA PANAMA CITY, the relationships among ecosystem management actions, legal requirements, and sources for additional management information. This section also correlates the goals, objectives, and strategies presented in Section 4 with the management actions defined in Section 5 (the issues identified in Section 5 for each management action were used to develop the natural resources management goals and objectives presented in Section 4).

The natural resource management actions described in this INRMP benefit the plants, animals, and ecosystems occurring on this installation. Special attention is given to rare, threatened, and endangered (RTE) species, and their habitats, through management actions referenced in Table 6-1. These actions are long-term conservation measures that provide benefits for terrestrial and aquatic habitats on the installation. Management actions such as soil conservation and storm water management, for example, control sediment and pollutant runoff to protect nearshore water quality for species such as shorebirds, fish, and aquatic plants. Forestry actions such as prescribed burning, thinning, and reforestation help to establish longleaf pine stands, providing ideal habitat for large-leaved jointweed, as another example.

The “Habitat Enhancement, and Threatened and Endangered Species” section of this INRMP (Section 5.3.1) includes additional goals, objectives, strategies, and projects for

the benefit and long-term conservation of RTE species found, or potentially found, on the installation

Table 6-1. Habitat Management Actions at NSA Panama City, Florida

Natural Resources Management Actions	Section
Wetland Management	5.1.1
Invasive and Exotic Species Management	5.1.2
Soil Conservation and Erosion Control	5.1.3
Stormwater and Water Quality Control	5.1.4
Landscaping and Grounds Maintenance	5.1.5
Floodplain Management	5.1.6
Timber Stand Improvement (i.e. thinning, prescribed burns)	5.2.1
Reforestation	5.2.2
Urban Forestry	5.2.3
Threatened and Endangered Species, and Habitat Enhancement	5.3.1
Wildlife Damage and Wildlife Disease Prevention and Control	5.3.2

6.1 Land Management

Land management is the development of programs and techniques for managing lands. The land management issues of this INRMP are wetlands, invasive and exotic species and noxious weeds, soil conservation and erosion control, stormwater, landscaping, and floodplains protection. Agricultural outleasing is a land management issue not relevant on NSA Panama City because of the lack of available and suitable land for agricultural uses. Currently, the majority of land is either within the urban area or forested and preserved for wildlife habitat.

The land management issues within this plan are not intended to regulate land use activity location (i.e., what buildings or activities should go where), but rather to provide managers with direction and general techniques (e.g., regarding soil conservation, stormwater management) to protect and enhance the natural environment, while continuing to provide for the needs associated with the NSA Panama City's military mission.

6.1.1 Wetlands

In general terms, wetlands are lands on which water covers the soil or is present either at or near the surface of the soil or within the root zone all year or for varying periods of time during the year, including during the growing season. USACE (Federal Register, Section 328.3(b), 1991) and the EPA (Federal Register, Section 230.4(t), 1991) jointly define wetlands as: ". . . those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (USACE 1982). The USACE definition relies on three key parameters – hydrology, soil, and vegetation – which must all occur and meet the defined characteristics in order for a location to be classified a wetland. The FDEP's definition for a wetland requires only two of the three key parameters for a location to be classified as a wetland.

Issues: The wetland areas on NSA Panama City provide valuable habitat for a diversity of species and help protect the water quality of St. Andrew Bay. Because of development constraints on NSA Panama City (e.g., limited lands, ESQD arcs, archaeological sites) and the need for future development of lands, NSA Panama City will be required to balance the need for protecting the installation's wetlands with supporting the military mission.

Goals, Objectives, and Strategies: Table 6-2 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to wetlands issues.

Table 6-2. Natural Resources Management Goals, Objectives, and Strategies Related to Wetlands

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
2	2.2	2.2.1	Wetlands protection
3	3.1	3.1.4	BMPs for wetlands (FDAC 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Wetland protection and monitoring

Long-Term Management: NSA Panama City has 97.25 acres of wetlands areas at the installation (see Figures 4-2 and 4-3). The 97.25 acres includes all acreage meeting FDEP's wetland classification requirements (NSA Panama City 1998b). Managed ponds comprise the open water wetlands on the installation. Some of the wetlands on NSA Panama City have been hydrologically altered by past ditching and some have become overrun with exotic species, such as Chinese tallow trees (*Sapium sebiferum*) and wild taro (*Colocasia esculenta*) (CSS 1998b). The functions of wetlands on NSA Panama City include providing habitat for birds, fish, other animals, and plants; storing and purifying water; and providing open space and aesthetic value.

Long-term management for the protection and enhancement of wetlands on the NSA Panama City will include DoN's policy of no net loss of wetlands, and will be to maintain and/or develop vegetative buffers with widths of 50 feet around wetland areas, except where sufficient acreage is not available as determined by the NSA Panama City Natural Resources Manager. NSA Panama City will increase the width of existing vegetative buffers that are less than 50 feet wide to a minimum of 50 feet, providing that buffer acreage is available. NSA Panama City will not remove any portion of the buffer when the width of the buffer is less than 50 feet. NSA Panama City will not remove buffer vegetation when the result would be a buffer width less than 50 feet. A minimum buffer width of 50 feet is required to provide the basic physical and chemical buffering needed to reduce siltation into the wetland, retain the natural attenuation and filtering capacity of the wetland, and maintain the biological wetlands communities.

In areas where the acreage available for buffering is not sufficient or greater protection is needed, other appropriate measures will be employed, prioritized by the least-invasive approach first. These protective measures include: (1) redirecting, discouraging, or prohibiting pedestrian and pet access to the wetland or buffer area by the placement of hedges, fences, or signs; and (2) planting native vegetated filter strips, swaths of land planted with grasses and trees, to intercept uniform sheet flows of runoff before the runoff reaches a wetland. NSA Panama City will use these methods individually or in combination along the perimeters of wetlands.

Other long-term management for wetlands will be the protection of water quality. The quality of water discharged into wetlands on NSA Panama City will be monitored by NSA Panama City's stormwater pollution prevention team. As mentioned in Section 3.3.1,

stormwater from roadways and private properties external to NSA Panama City is discharged into wetlands on NSA Panama City.

Environmental Considerations During Management Practices: Potential impacts to wetlands wildlife and water quality during expansion and enhancement of wetland areas.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of wetland areas and will be consulted for additional management information or provided as additional training and education:

- Invasive species – Section 5.1.2 – the use of pesticides within wetlands;
- Stormwater runoff – Section 5.1.3 – wetlands for stormwater runoff;
- Timber stand improvement – Section 5.2.1 – prescribed burns within wetlands;
- Outdoor recreation – Section 5.4 – restricted uses within wetlands;
- Urban forestry – Section 5.2.3 – use of urban forestry practices in developing buffers;
- Landscaping – Section 5.1.5 – use of xeriscape principles in developing buffers;
- Wetland buffer will be integrated into the NSA Panama City grounds maintenance program;
- Establishment of a shoreline buffer along undeveloped areas adjacent to St. Andrew Bay. A natural vegetated buffer will be maintained from the mean high water line 50 feet landward;
- Offer hands-on training or individual participation in wetland buffer development to better demonstrate the concept, application, and importance of wetland protection;
- Using volunteer groups, including local Scout troops, and interested installation personnel for buffer and wetland enhancement.

Ecosystem Management: Wetlands management is an essential component of ecosystem management because proper management will preserve, enhance, and create habitat for a variety of wildlife species, while providing aesthetic and educational values. Changes to hydrology, geochemistry, substrate, or species composition may impair the ability of a wetland area to function properly. Such alterations can affect the ability of the wetland area to filter excess sedimentation and nutrients from surface water, which can result in deteriorated surface water quality. Vegetative buffers between wetland and upland vegetative communities will help maintain and improve water quality by filtering sediments and other pollutants from runoff prior to discharge into the wetland. Vegetative buffers also will provide habitat for a diversity of species that are ecologically important to the healthy functioning of the ecosystem.

Military Mission: Installation and management activities that are detrimental to the functional values (e.g., storage and purification of water) of wetlands on the NSA Panama City can potentially affect the military mission of the NSA Panama City. For example, because wetland systems on the installation provide water storage and purification prior to discharge into St. Andrew Bay, actions adversely affecting the quality of water discharging into the bay may be ordered to be discontinued by FDEP.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Wetland Areas:

Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, prohibits the discharge of dredged or filled materials into waters of the United States, including wetlands, without first obtaining a permit from USACE (Section 404 of the CWA).

Executive Order (EO) 11990, 24 May 1977, as amended, requires government agencies, in carrying out agency actions and programs affecting land use, to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Clean Water Act: Section 401 Water Quality Certification, 1986, 33 U.S.C. 1341, requires that States certify compliance of federal permits or licenses with state water quality requirements and other applicable state laws. Under Section 401, States have authority to review any federal permit or license that may result in a discharge to wetlands or other waters under State jurisdiction to ensure that the actions would be consistent with the State's water quality requirements.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

OPNAVINST 5090.1D, 12-3.8(b) discusses natural resources management relating to wetland management.

Additional Sources of Information:

Technical Reports/Publications:

Wetland Creation and Restoration: The Status of the Science by Jon A. Kusler and Mary E. Kentula.

Telephone Contacts:

USFWS, Regional Wetland Coordinator - (404) 679-7128

The Center for Wetlands (University of Florida) - (352) 392-2424

The Wildlife Society - (301) 897-9770

Northwest Florida Water Management District - (850) 539-5999

Internet Addresses:

Weed Management: http://tncweeds.ucdavis.edu

Florida Exotic Pest Plant Council: www.fleppc.org

Weed issues: www.ces.uga.edu/pubs/pubsubj.html#weeds

Invasive Plant Management:
http://refuges.fws.gov/FICMNEWFiles/NatlWeedStrategyTOC.html

FDEP : Division of Water Facilities: www2.dep.state.fl.us/water/ :

FDEP: Bureau of Invasive Plant Management: www.dep.state.fl.us/stland/bapm :

University of Florida: Center for Aquatic and Invasive Plants:
Institute of Food and Agricultural Sciences:
http://aquat1.ifas.ufl.edu/welcome.html

Florida Native Plants Online: www.floridaplants.com

Florida Native Plant Society: www.flmnh.ufl.edu/fnps/fnps.htm

Environmental Protection Agency: Office of Water

Wetlands, Oceans and Watersheds: www.epa.gov/owow/

Environmental Law Institute: www.igc.apc.org/eli/

6.1.2 Invasive and Exotic Species

Species can be categorized as *exotic, native, exotic and invasive*, and/or *native and invasive*. An exotic species is defined as a non-indigenous (non-native) species that was either purposefully or accidentally introduced into an area outside its natural range. A native species in Florida is defined as a species already occurring at the time of European contact in 1500 (Florida Exotic Pest Council 1999). Invasive species are species that have been introduced into an environment in which they did not evolve and thus have no natural enemies to limit their reproduction and spread. In natural areas, the definition of invasive species is expanded to include aggressive plants that produce a significant change in terms of composition, structure, or ecosystem functions (Cronk and Fuller 1995).

The following species occur on the NSA Panama City (FNAI 1997; NSA Panama City 1998b) and are considered exotic and invasive:

- Japanese climbing fern (*Lygodium japonicum*) is generally found in damp, usually disturbed areas. The plant tolerates both shade and sun and can be found along the edges of swamps, marshes, creeks, and lakes, as well as in upland woodlands. It forms a tangled mass over groundcover and shrubs, eliminating understory vegetation.
- Chinese tallow or popcorn tree (*Sapium sebiferum*) tends to take over large areas, mainly areas with wet soils, but can thrive in upland areas as well. It can survive in both poorly drained freshwater and saline soils. It has the capacity to dominate wetland areas.
- Camphor tree (*Cinnamomum camphora*) generally occurs in drier disturbed areas, including scrub habitat, which is the habitat of many threatened and endangered species.

- Chinese privet (*Ligustrum sinese*) generally occurs in open disturbed areas, especially wet areas. This species is difficult to control in wetland areas.
- Wild taro (*Colocasia esculenta*) is an aggressive weed found along streams, marshy shores, canals, ponds, and ditches. Its dense growth displaces native shoreline plants.

Issue: Invasive species have the potential to interfere with military and recreational activities, wildlife habitats, forests, wetlands, and other natural areas. Invasive species also interfere with ecosystem functions.

The higher temperatures and changes in precipitation patterns associated with climate change are anticipated to cause shifts in species composition and geographic range. Among the species shifts anticipated are movement of wildlife to more favorable habitat, shifts in vector-borne diseases, and expansion of invasive grasses and shrubs. Invasive plants contribute fuel load for wildfires, which in turn increases the likelihood, range, and intensity of wildfire. Ongoing management of exotic and invasive species is therefore vital to offset the potential vulnerability of properties and native communities on NSA Panama City.

Goals, Objectives, and Strategies: Table 6-3 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to invasive and exotic species issues.

Table 6-3. Natural Resources Management Goals, Objectives, and Strategies Related to Invasive and Exotic Species

Goals	Objectives	Strategies	Comments
1	1.2.	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
2	2.1	2.1.1	Invasive species removal
2	2.4	2.4.1	Xeriscaping
3	3.1	3.1.4	BMPs for water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: Long-term management for invasive and exotic species will be the removal of the species and restrictions on the introduction of the species to the installation in accordance with Executive Order 13112. The use of pesticides for removal of invasive species will be conducted in accordance with federal and state laws regulating the use of pesticides. According to the EPA (EPA 1997), a “pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses…the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests."

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136, pesticides are registered at the federal level and by individual states. Therefore, a particular pesticide product that is federally registered by the EPA is not legal for use until it is also registered by the individual state. FIFRA allows individual state registrations to be more restrictive than federal registrations, but not less so. Therefore, prior to the use of a pesticide regulated under FIFRA on invasive species on the NSA Panama City, the installation's Natural Resources Manager will contact the NAVFAC SE Natural Resources Section and the FDACS Pesticide Division (850-487-2130) for information regarding approved pesticides and the location of use, amount, and concentrations, as well as treatment methods (e.g., basal-bark, cut-stump, cut-surface, foliar). The FDEP Bureau of Invasive Plant Management (850-488-5631) issues licenses that may be required for special use pesticides.

To ensure that the application of pesticides does not contaminate surface waters and/or inadvertently affect flora or fauna, pesticides will be applied by skilled workers, according to label instructions. Careful prescription of the type and amount of chemical to be applied and the use of buffer areas around surface waters will also help prevent misdirected application or deposition. NSA Panama City will use pesticides with lower toxicity and applied at rates reduced below those specified on the label when it is believed that such modifications can adequately control the problem. NSA Panama City will evaluate the effectiveness of the lower rates and toxicity and will apply pesticides in accordance with label instructions if the lower rate applications are not adequately controlling the problem. NSA Panama City will also consider the applicability of non-pesticide removal methods. This removal method could be implemented through the use of volunteer groups.

Environmental Considerations During Management Practices: Potential impacts to non-target species and water quality during pesticide use.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of invasive species and will be consulted for additional management information or provided as additional training and education:

- Landscaping and maintenance – Section 5.1.5 – native species only;

- Threatened or endangered species – Section 5.3.1 – pesticide use;
- Wetlands – Section 5.1.1 – pesticide use in or near wetlands;
- Stormwater – Section 5.1.4 – pesticide use and stormwater runoff;
- Using volunteer groups, including local Scout troops, and interested installation personnel for invasive and exotic species removal;
- Invasive species management will be integrated as part of NSA Panama City's grounds maintenance program and pest management program.

Ecosystem Management: The management of invasive species is a fundamental component of the ecosystem management concept. Because invasive species typically out-reproduce native species by definition, and have a propensity to spread into unstable or disturbed areas (e.g., highway and utility right-of-ways, site disturbance areas, ponds, and wetland areas), the eradication of invasives and replacement with native species at NSA Panama City is essential for the protection and enhancement of biodiversity at NSA Panama City and in the region, and for the proper functioning of the wetland as a water storage and purifying system.

Military Mission: With their ability to spread virtually unchecked, invasive species have the potential to displace protected federally and/or state-listed flora and fauna and to affect water quality by reducing the water purification capacity of wetlands.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Invasive Species:

Federal Noxious Weed Act of 1974, 7 U.S.C. 2801 et. seq., provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 136, requires that all pesticides, whether for commercial or private use, be applied in accordance with product labeling and that containers are properly disposed of. EPA is responsible under FIFRA for the registration of all pesticide active ingredients used in the United States.

OPNAVINST 6240.4B, 27 August 1998, DoD Pest Management Program, provides the DoN with policies for implementing pest management programs directed against pests that conflict with or adversely affect the mission of the DoD; affect the health and well-being of the DoN personnel and their dependants; attack or damage real property, supplies, or equipment; adversely affect the environment; or are otherwise undesirable.

Federal Plant Pest Act, 7 U.S.C. 150aa et seq., regulates the importation and interstate movement of plant pests and authorizes the Secretary of Agriculture to take emergency measures to destroy infected plants or materials.

OPNAVINST 5090.1D, 12-3.10, discusses natural resources management relating to the control of noxious weeds and invasive species.

Florida Statutes, Chapter 487, the Florida Pesticide Law, regulates the distribution and use of pesticides.

Florida Statutes, Chapter 482, Structural Pest Control Act, requires using pesticides for their intended purpose in accordance with the registered labels or as directed by the EPA.

Florida Statutes, Chapter 369.2, Florida Aquatic Weed Control Act, regulates noxious aquatic weeds on public lands.

Florida Statutes, Chapter 369.252, Invasive Exotic Plant Control, requires a program be established to eradicate or maintain control of the species detrimental to the State's natural environment.

Additional Sources of Information:

Telephone Contacts:

Bay County Extension Office - (850) 784-6105

TNC Florida Office - (407) 682-3664

NAVFAC SE Natural Resources Section - (904-542-6313)

FDACS, Pesticide Division - (850-487-2130), pesticide use

Internet Addresses:

Weed Management: http://tncweeds.ucdavis.edu

Florida Exotic Pest Plant Council: www.fleppc.org

Weed issues: www.ces.uga.edu/pubs/pubsubj.html#weeds

Invasive Plant Management:

http://refuges.fws.gov/FICMNEWFiles/NatlWeedStrategyTOC.html

University of Florida, Center for Aquatic and Invasive

Plants:http://aquat1.ifas.ufl.edu/welcome.html

6.1.3 Soil Conservation and Erosion Control

Definition: Soil conservation is the use of soil within the limits of its physical characteristics while protecting it from uncontrolled stormwater runoff to prevent and control soil erosion. Erosion is the detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Issue: On NSA Panama City, soil erosion is a particular problem because of sandy soils and intense rainfall. Soil erosion contributes to water quality problems; can effectively undermine roadways, shoreline facilities, and other military structures; and increases

maintenance time and costs associated with stormwater facilities. Actions contributing to the susceptibility of the soil to erosion include:

- Human-made alterations to the natural vegetative cover and topography, including the channeling of water flow (e.g., ditches) which increases the quantity and rate of flow; the exposure of soils and increased soil slopes; and/or the creation of impervious surfaces.
- Forestry practices, including prescribed burns, thinning, and reforestation, expose soils to rainfall and stormwater runoff.
- Wave and wake action along the shoreline area of NSA Panama City.

Goals, Objectives, and Strategies: Table 6-4 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to soil conservation and erosion control issues.

Table 6-4. Natural Resources Management Goals, Objectives, and Strategies Related to Soil Conservation and Erosion Control

Goals	Objectives	Strategies	Comments
2	2.2	2.1.1	Wetlands protection
2	2.2	2.2.2	Stormwater pollution prevention
2	2.2	2.2.3	Long-term erosion prevention measures
3	3.1	3.1.4	BMPs for water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: Long-term management for soil conservation is to identify and understand the suitability and sustainability of a soil unit for a proposed action. USDA NRCS soil surveys may be used to identify the potential applicability and limitations of each soil unit for land use activities. Land uses may include forestry, building construction, recreational, and wildlife habitat. The USDA soil survey for Bay County (1984), *Soil Survey of Bay County and Florida,* also provides information about potential erosion hazards; groundwater contamination; productivity of cultivated crops, trees, and grass; and the protection of water quality, wetlands, and wildlife habitat.

NSA Panama City will:

- continue to operate its soil conservation and erosion control program through BMPs (FDOT and FDEP 2007; FDEP 2008; NSAPC 2010) and using the six principles for soil conservation and erosion management presented in Smoot and Smith (1999):
    1. minimizing areas of disturbance;

2. stabilizing and protecting disturbed areas from raindrop and runoff energies as soon as practicable;
3. minimizing runoff velocities;
4. protecting disturbed areas from adjacent area runoff;
5. retaining sediment within construction sites; and
6. reducing exposure time.

- update its SWPPP to include control measures for forest and shoreline areas and for forestry, reforestation, and timber stand improvement actions.
- evaluate areas on the installation for erosion control problems.
- use state BMPs in forest management actions (FDACS 2003).

Measures to control potential erosion problems include, but are not limited to:

- vegetative and structural protective covers (e.g., permanent seeding, groundcover);
- sediment barriers (e.g., straw bales, silt fence, brush);
- sediment detention ponds and basins (e.g., sediment traps and basins);
- stream and shore bank protection (e.g., riprap);
- constructing pervious surface walkways in areas of high pedestrian traffic;
- water conveyances (e.g., slope drains, check dam inlet and outlet protection);
- temporary construction and road stabilization (e.g., placement of stone and geotextile fabrics [Smoot and Smith 1998]) ;and
- prohibit off-road vehicle use.

Environmental Considerations During Management Practices: None.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of soil erosion and conservation and will be consulted for additional management information or provided as additional training and education:

- Stormwater runoff – Section 5.1.4 – stormwater and sedimentation;
- Reforestation – Section 5.2.2 – erosion control during reforestation;
- Wetlands – Section 5.1.1 – sedimentation of wetlands;
- BMPs of the SWPPP (NSAPC 2010);
- Soil conservation and erosion control for non-industrial areas and actions will be integrated into NSA Panama City's SWPPP.

Ecosystem Management: Soil conservation is an essential component of the ecosystem management concept. Soils are particularly susceptible to erosion from uncontrolled stormwater runoff and may discharge into water bodies from point and nonpoint

sources. Sediments in stormwater runoff have the capacity to obstruct drainage infrastructure and to reduce the volume capacity of wetlands, potentially resulting in damaging flood conditions. Turbidity pollution derived from soil erosion also may affect surface water quality in St. Andrew Bay and adjacent wetlands as well as other associated aquatic communities.

Military Mission: Uncontrolled soil erosion has the potential to increase sediment loading in stormwater runoff, which may increase turbidity and reduce water quality in St. Andrew Bay. As mentioned in Section 5.1.1 (wetlands issues), actions adversely affecting the bay may be ordered discontinued by FDEP.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Soil Conservation:

Soil Conservation Act, 16 U.S.C. 590a et seq., provides for soil conservation practices on federal lands.

Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, regulates the dredging and filling of wetlands and establishes procedures for identifying and regulating nonpoint sources of polluted discharge, including turbidity, into waterways.

Executive Orders 11989 and 12608 close areas to off-road vehicles where soil, wildlife, or other natural resources may be adversely affected.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems. Vegetative buffers and landscaping to control soil erosion must comply with this executive order.

OPNAVINST 5090.1D, 12-3.8(d), discusses natural resources management relating to soil conservation management.

Florida Statutes, Chapter 582.05, provides for control and prevention of soil erosion and damage from floodwater and sediments, and for the conservation of soil and water resources.

Additional Sources of Information:

Telephone Contacts:

USDA NRCS, Chipley Florida, Field Service Center - (850) 638-1718

(*Soil Survey of Bay County and Florida*)

Bay County Extension Office – (850) 784-6105

Internet Addresses:

University of Tennessee, Knoxville, Water Resources, Civil and Environmental Engineering: http://www.engr.utk.edu/research/water/erosion/index.html

6.1.4 Stormwater and Water Quality Control

Stormwater runoff is precipitation that falls onto surfaces such as roofs, streets, the ground, etc., and is not absorbed or retained by that surface, but collects volume and energy and flows off. Stormwater-runoff management addresses measures to reduce pollutants in stormwater and to control discharge from point and nonpoint sources. Nonpoint source pollution refers to the polluting of surface-water and groundwater resources by diffuse sources, rather than by single, identifiable point sources. Point and nonpoint source pollutants are commonly associated with land use. These pollutants routinely include sediments from land disturbance; pesticides and nutrients from urban lawns and landscaping; and oil, grease, heavy metals, and other toxic materials from streets, rooftops, and parking lots. Stormwater runoff is the most common transport mechanism for nonpoint source pollution; the majority of pollutant loading occurs during and immediately after storm events.

Issue: As development covers more land area on NSA Panama City, the control of stormwater drainage is an increasingly important aspect of water quality control on NSA Panama City. More surface area covered (less land available for absorption and filtration) translates to faster runoff rates and increased pollution loads. More development means more land clearing and landscaping activities that require appropriate stormwater management practices.

Goals, Objectives, and Strategies: Table 6-5 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to stormwater and water quality control issues.

Table 6-5. Natural Resources Management Goals, Objectives, and Strategies Related to Stormwater and Water Quality Control

Goals	Objectives	Strategies	Comments
2	2.2	2.2.1	Discharge into wetlands
2	2.2	2.2.2	Stormwater management
2	2.2	2.2.3	Long-term erosion prevention measures
3	3.1	3.1.4	BMPs for stormwater (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: NSA Panama City will be guided by five management initiatives for stormwater runoff and water quality control:

1. NSA Panama City will continue to manage point and nonpoint stormwater in industrial areas consistent with BMPs described in the SWPPP (NSAPC 2010).
2. NSA Panama City will update its SWPPP to include stormwater management practices for non-industrial areas such as forested and shoreline areas, and for non-industrial activities such as forestry, reforestation, and timber stand improvement.
    - NSA Panama City will establish a shoreline buffer along undeveloped areas adjacent to St. Andrew Bay. A natural vegetated buffer will be maintained from the mean high water line 50 feet landward or 50 feet upland, whichever is greater. Allowances may be made for essential military mission requirements.
    - NSA Panama City will use their stormwater pollution prevention team for monitoring the quality of stormwater being discharge into NSA Panama City's stormwater system from sources external to the installation.
3. NSA Panama City will, as part of their Oil and Hazardous Substance Spill Contingency Plan, establish a natural resource damage assessment program for assessing natural resource damages arising from the release of oil or hazardous substances that injure or threaten to injure natural resources of the United States. This applies to releases from both DoD and non-DoD sources. The program will consist of criteria and procedures for collecting and evaluating the extent of damage to natural resources resulting from an incident and determining restoration measures.
4. NSA Panama City will manage stormwater runoff from new development to achieve no net increase in stormwater discharge from the installation, unless there are no means to do so that will satisfy the military mission. To accomplish no net increase in stormwater discharge, NSA Panama City will:
    - Provide stormwater retention by developing and enhancing stormwater wetlands. Stormwater in shallow pools provides ideal growing conditions for wetland plants, which will take up some or all of the pollutants.
    - Retrofit stormwater infrastructure to provide natural infiltration (e.g., grass swales, shallow retention ponds adjacent to intakes) of stormwater or to increase detention time prior to discharge.
    - Use natural or planted buffers around newly created stormwater ponds. Vegetation will provide wildlife habitat and will reduce impacts associated with runoff by filtering sediments and sediment-bound pollutants and by facilitating infiltration prior to discharge into surface water. Reducing sediment loading will increase the longevity of the retention ponds and will reduce future maintenance costs.
    - Use permeable alternatives to impervious surfaces, for example, wood decks instead of concrete patios, grass swales instead of concrete.
5. With the intent of helping to protect water quality, NSA Panama City will inventory its use of pesticides and fertilizers and will assess alternatives to and reducing the use of mineral fertilizers and/or pesticides. NSA Panama City will use a

combination of organic and mineral fertilizers to minimize the potential for nutrient loading in stormwater runoff while ensuring the growth of landscaping on NSA Panama City. NSA Panama City will use pesticides with lower toxicity levels and to apply them at reduced rates.

- Organic matter will be the nutrient material of choice for landscaping. Organic matter consists of the wastes and remains of plants and animals. Organic matter is the nutrient of choice because it improves soil composition and structure by making soil more resistant to erosion by stormwater runoff. Other benefits from increasing the organic matter content of soil include better soil aeration and temperature control, increased soil water holding and nutrient retaining capacities, and a steady supply of nutrients to plants.
- Mineral fertilizers are materials, either natural or manufactured, containing nutrients essential for the normal growth and development of the plants. Mineral fertilizers include both fast and slow-release fertilizers and will be used as a supplement to organic matter for the growth and development of landscaping.
- Slow-release fertilizers will be the mineral fertilizer of choice, and will be used, after consultation with the Natural Resources Manager, in combination with organic matter when it is impractical for the use of organic matter only. Slow-release mineral fertilizers are released at slow rate throughout the season, thereby reducing the amount of waste by leaching and reducing the potential for surface water contamination. Other benefits of using slow-release fertilizers are the reduced application frequency and the minimization of fertilizer burn.
- A blended fast and slow-release mineral fertilizer will be used in areas where the following conditions are met: (1) areas of size where the use of organic material is impractical; and (2) areas where there is no potential for the discharge of fertilizer into surface water bodies.
- NSA Panama City will evaluate the use of pesticides with lower toxicity levels applied at reduced rates.
- Fertilizers or pesticides will not be applied before or during rain events due to the strong likelihood of runoff. Fertilizers and pesticides will be applied during maximum plant uptake periods to minimize leaching.
- NSA Panama City will contact the NAVFAC SE Natural Resources Section and the FDACS Pesticide Division (850-487-2130) for information regarding fertilizer and pesticide applications.

Environmental Considerations During Management Practices: Loss of open space, forested areas, and/or wildlife habitat for the construction of stormwater facilities.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of stormwater and water quality and will be consulted for additional management information or provided as additional training and education:

- Soil conservation and erosion – Section 5.1.3 – soil erosion as a pollutant load in stormwater runoff;
- Wetlands – Section 5.1.1 – the use of wetlands for stormwater management and buffers for water quality protection;
- Landscaping – Section 5.1.5 – using the principles of xeriscaping to reduce the use of pesticides and fertilizers;
- Invasive species – Section 5.1.2 – invasive species in stormwater wetlands;
- Floodplain management – Section 5.1.6 – runoff storage; and
- Train and educate all contract and department personnel on actions that may directly or indirectly contribute to soil erosion.

Ecosystem Management: Like soil conservation, the effective management of stormwater, and associated pollutant loading, is essential to successful ecosystem management. Implementation of BMPs in developed, semi-developed, and unimproved areas will help protect water quality and habitat for aquatic life (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010). BMPs address the reduction of sedimentation, nutrient overloading, bacterial and parasitic pests, and harmful chemicals in stormwater. Construction of any new stormwater ponds in accordance with stormwater and water quality management will increase wildlife habitat and reduce the potential for additional discharge from new development into St. Andrew Bay.

Military Mission: The threat to the military mission is similar to the threats discussed under Sections 5.1.1, Wetlands; and 5.1.3, Soil Conservation and Erosion Control.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Stormwater:

Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, describes guidelines for the control of nonpoint source pollution.

Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq., establishes authority (Section 6217) for States to administer coastal nonpoint pollution programs when approved by the National Oceanic and Atmospheric Administration (NOAA) and EPA. NSA Panama City will coordinate with the State of Florida for nonpoint source compliance with the Florida Coastal Nonpoint Source Pollution Control Program.

Executive Order (EO) 11990, 24 May 1977, as amended, directs the preservation and enhancement of wetlands.

Oil Pollution Act of 1990 (OPA 90), 33 U.S.C. 2701, requires planning for, rescue of, minimization of injury to, and assessment of damages or injury to fish and wildfire resources from the discharge of oil**.**

Comprehensive, Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601, et seq., authorizes Natural Resource Trustees to recover damages for injury to, destruction of or loss of natural resources resulting from the release of a hazardous substance.

OPNAVINST 5090.1D, 12-3.8(f), discusses natural resources management relating to nonpoint source pollution.

Florida Statutes, Chapter 373.403, regulates the management and storage of surface water and is implemented by the Northwest Florida Water Management District (NWFWMD) under Environmental Resource Permitting.

Florida Statutes, Chapter 376, Pollutant Discharge Prevention and Removal, prohibits the discharge of pollutants into coastal waters, estuaries, tidal flats, or beaches.

Florida Statutes, Chapter 380.012, The Florida Environmental Land and Water Management Act of 1972, is intended: 1) to ensure a water management system that reverses the deterioration of water quality and that provides optimum utilization of limited water resources; 2) to facilitate orderly, well planned development; and 3) to protect public health, welfare, safety, and quality of life for Florida residents.

Florida Statutes, Chapter 403, Florida Air and Water Pollution Control Act, conserves, protects, maintains, and improves the quality of the public water supply. Waste must not be discharged into any waters without prior approval from the State.

Florida Statutes, Chapter 582.05, provides control and prevention of soil erosion, prevention of damage from floodwater and sediments, and conservation of soil and water resources.

Florida Coastal Management Program, requires federal action in the coastal zone to be consistent with 23 Florida Statutes, which are administered by 11 state agencies and four of the five state water management districts. The coastal zone includes the area encompassed by the State's 67 counties and its territorial seas. Therefore, federal actions which occur throughout the state are reviewed by the State for consistency with the FCMP. Consistency with the statutes constitutes consistency with the FCMP (DCA 1999).

Additional Sources of Information:

Telephone Contacts:

U.S. Environmental Protection Agency

Nonpoint Source – (404) 562-9451

Stormwater – (404) 562-9229

NWFWMD – (850)-539-5999

Internet Addresses:

Nonpoint Source Pollution of Surface Waters: http://esa.sdsc.edu/carpenter.htm

Water Runoff Control Programs:
http://webcentral.bts.gov/ntl/DOCS/RUNOFF.html

Controlling Nonpoint Source Pollution:
http://waterknowledge.colostate.edu/roads.htm

NWFWMD: http://sun6.dms.state.fl.us/nwfwmd/
FDEP: Division of Water Facilities: www2.dep.state.fl.us/water/

FDEP: Best Management Practices for Stormwater/Non-point Source Management:
www2.dep.state.fl.us/water/slerp/nonpoint_stormwater/stormh2o.htm

FDEP: State Statutes: www.dep.state.fl.us/ogc/documents/statutes/text/403.pdf

South Florida Water Management District: Florida Administrative Code: http://141.232.1.11/org/reg/reg_rules.html

Environmental Law Institute: www.igc.apc.org/eli/
USGS Water Resource Home Page: http://h2o.usgs.gov/

USGS Water Resources of Florida Home Page: www-sflorida.er.usgs.gov/
EPA: Office of Water: www.epa.gov/owow/

6.1.5 Landscaping and Grounds Maintenance

Landscaping and grounds maintenance is defined here as landscaping design and construction practices intended to benefit the environment and to generate long-term cost savings. Such practices include the use of native species, reduce the need for irrigation and fertilization, stabilize soil, and improve wildlife habitat.

Issues: Landscaping and maintenance time and costs on NSA Panama City exceed current budgetary constraints. NSA Panama City needs to minimize landscaping costs while ensuring the quality of aesthetic and environmental resources.

Goals, Objectives, and Strategies: Table 6-6 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to landscaping and grounds maintenance issues.

Table 6-6. Natural Resources Management Goals, Objectives, and Strategies Related to Landscaping and Grounds Maintenance

Goals	Objectives	Strategies	Comments
1	1.2.	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
2	2.2	2.2.1	Xeriscaping principles for wetland buffers
2	2.4	2.4.1	Xeriscaping principles for reducing pesticide and fertilizer use
3	3.1	3.1.4	Reduces water usage for protection of water quality
3	3.2	3.2.2	Native habitat

Long-Term Management: NSA Panama City will use *xeriscaping* in landscaping around all newly constructed buildings or other facilities. Xeriscaping will also be phased into existing landscaped areas. Xeriscaping offers a viable alternative to the typically high-volume water requirements of other landscaping approaches by conserving water through creative landscaping. Xeriscaping makes use of native plants, which are typically better

adapted to local climatic conditions and variations; more resistant to drought, disease, and pests; and require less water than non-native species. The potential benefits of xeriscaping include reduced water use, reduced heating and cooling costs from placement of appropriate tree species, decreased stormwater and irrigation runoff, fewer pesticide and fertilizer applications, less yard waste, increased habitat for plants and animals, and lower labor and maintenance effort and thus costs. Xeriscaping projects have reduced water use from 30 to 80 percent.

Xeriscaping incorporates seven principles (Xeriscape Colorado Inc. 1999):

1. Planning and design for water conservation and beauty;
2. Creating practical turf areas using manageable sizes, shapes, and appropriate grass species;
3. Selecting plants with low water requirements and grouping plants with similar water needs, then experimenting to determine how much and how often to water the plants;
4. Using soil amenities, such as compost or manure, appropriate to site and plant needs;
5. Using mulches such as wood chips to reduce evaporation and keep the soil cool;
6. Irrigating efficiently with properly designed systems (including hose-end equipment) and by applying the right amount of water at the right time; and
7. Maintaining the landscape properly by mowing, weeding, pruning, and fertilizing properly.

To integrate the principles of xeriscaping into existing landscaped areas, NSA Panama City will evaluate current landscaping practices to determine how effective the principles of xeriscaping would be in improving existing conditions. NSA Panama City will determine if: (1) implementation of xeriscaping principles will provide sufficient benefits to justify any additional cost; (2) the implementation of certain principles may achieve the desired results; or (3) continuation of existing conditions will achieve desired results. NSA Panama City will monitor the success of integrating the principles of xeriscaping with existing landscaped areas and adjust management practices as warranted.

Pesticide and fertilizer applications during xeriscaping will be consistent with the long-term management for stormwater (see Section 5.1.4 [5]).

Environmental Considerations During Management Practices: Temporary disturbances to habitats during upgrading to xeriscape landscaping.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to

the management of landscaping and will be consulted for additional management information or provided as additional training and education:

- Invasive Species – Section 5.1.2 – invasive species and pesticide use;
- Urban Forestry – Section 5.2.3 – urban forestry as a component of xeriscaping;
- Stormwater – Section 5.1.4 – xeriscaping buffers around stormwater ponds;
- NSA Panama City Grounds Maintenance Program will be used for routine maintenance activities (e.g., mowing, pruning, etc.);
- NSA Panama City grounds maintenance crew will be trained in the principles of xeriscaping;
- Using volunteer groups, including local Scout troops, and interested installation personnel to offer hands-on training or individual participation to better demonstrate the concept, application, and importance of xeriscaping;
- Xeriscape management will be integrated into the NSA Panama City grounds maintenance program and its pest management program.

Ecosystem Management: Beneficial landscaping through construction and design practices is consistent with an ecosystem management approach because it reduces the need for irrigation, pesticides, and fertilizers and relies on the functions and characteristics of native plant species. The use of native species also is recommended for the reduction and control of invasive species. Reducing the demand for irrigation, fertilizers, and pesticides reduces costs associated with grounds maintenance and reduces pollutant loading to stormwater runoff and surrounding surface waters and aquatic communities.

Military Mission: Because inappropriate landscaping and maintenance practices (e.g., excessive use or application of inappropriate pesticides) may potentially affect federally and state-designated endangered or threatened species and/or water quality, consequent regulatory actions by agencies such as the USFWS, FDEP, or USACE could threaten the NSA Panama City military mission. In addition, appropriate landscaping and maintenance practices need to be implemented for the safety of dependents and quality of life for everyone. Additionally, reduced costs provide maintenance savings which may be spent on other mission related activities.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Landscaping:

The President's April 16, 1994, Memorandum on Environmentally Beneficial Landscaping, requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. 136, governs the use and application of pesticides in natural resources management programs.

Federal Water Pollution Control Act as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, prohibits the discharge of dredged or filled materials into waters of the United States, including wetlands, without first obtaining a permit from USACE (Section 404 of the CWA).

OPNAVINST 5090.1D, 12-3.8(e), discusses natural resources management relating to environmentally and economically beneficial landscaping.

Additional Sources of Information:

Telephone Contacts:

St. Johns River Water Management District (SJRWMD) – Waterwise Landscaping 1-800-451-7106

Bay County Extension Office – (850) 784-6105

Internet Addresses:

Where to find native nurseries: www.fnps.org/wheretofind.html

Creating Vegetative Designs: http://www2.nrcs.usda.gov/Netdynamics/VegSpec/pages/HomeVegspec.htm

Xeriscaping: http://www.xeriscape.org

Association of Native Nurseries: http://www.afnn.org/

Low energy landscapes in Florida: http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_MG013

FNAI: http://www.fnai.org

Florida Native Plant Society: http://www.fnps.org

TNC: http://www.tnc.org/infield/State/Florida/

SJRWMD: http://sjr.state.fl.us

WaterWiser is a program of the American Water Works Association, which is operated in cooperation with the U.S. Environmental Protection Agency and the U.S. Bureau of Reclamation: http://www.waterwiser.org

6.1.6 Floodplain Management

Floodplain management is the operation of an overall program of corrective and preventive measures for reducing flood damage.

Issues: Over the years, substantial development (i.e., grading, filling, dredging, extraction, storage, soil mixing, and the construction or improvement of structures) has occurred within the 100-year floodplain on NSA Panama City. Some of the ecological functions of the floodplain, such as the transport and cycling of nutrients and provision of productive and essential habitats, have been lost. Only fragments of the original floodplain community remain.

Goals, Objectives, and Strategies: Table 6-7 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to floodplain management issues.

Table 6-7. Natural Resources Management Goals, Objectives, and Strategies Related to Floodplain Management

Goals	Objectives	Strategies	Comments
2	2.3	2.3.1	Floodplain management
3	3.1	3.1.4	BMPs for water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: NSA Panama City will avoid construction or management practices that will adversely affect the attenuation capacity of the 100-year floodplain, which occupies about one-quarter of the installation, unless NSA Panama City finds that: (1) there is no practical alternative; or (2) the proposed action has been designed to minimize harm to or within the floodplain. To enforce this, preferred sites for development will be outside the 100-year floodplain. If there is no suitable location outside the 100-year floodplain that will satisfy the need of the NSA Panama City military mission, preferred sites for development will be within previously disturbed areas of the 100-year floodplain. For all development within the 100-year floodplain, NSA Panama City will evaluate alternatives and techniques for controlling and reducing the potential for flood damages. NSA Panama City will evaluate the use of the county's floodplain regulation as guidance for development in the floodplain. Consistent with DoN's policy of no net loss of wetlands, NSA Panama City will avoid any construction in wetlands within the 100-year floodplain. Wetlands play an important role in flood control by providing storage, slowing flood waters, reducing flood peaks, and increasing the duration of the flow.

Environmental Considerations During Management Practices: None.

Applicability of Other Management Issues: The following management issues, programs, and actions are directly or indirectly related to floodplain management and will be consulted for additional management information or provided as additional training and education:

Wetlands – Section 5.1 – Wetlands for flood attenuation.

Ecosystem Management: The proper management of the 100-year floodplain is an essential ecosystem-management concept. Floodplains perform important natural functions, including protection from storm surge and floods, temporary storage of floodwaters, moderation of peak flows, maintenance of water quality, groundwater recharge, and erosion prevention, and providing buffers against sea level rise as the result of climate change. Floodplains also provide habitat for wildlife, recreational opportunities, aesthetic benefits, and areas of archaeological significance.

Military Mission: Inappropriate floodplain-management practices have the potential to decrease the flood attenuation capacity of the floodplain, and increase the amount and rate in which flooding occurs. Flooding has the potential to adversely affect necessary infrastructure components of the military mission.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Floodplains:

Executive Order 11988, Floodplain Management, May 24, 1977, requires federal service agencies to avoid construction or management practices that will adversely affect floodplains, unless it is found that: 1) there is no practical alternative and 2) the proposed action has been designed to minimize harm to or within the floodplain.

OPNAVINST 5090.1D, 12-3.8(c), discusses natural resources management relating to floodplain management.

Additional Sources of Information:

FEMA's Floodplain Management Summary: http://www.fema.gov/mit/fldmit.htm

Floodplain Management: http://www.fws.gov/directives/613fw1.html

Strategies for floodplain management: http://floodplain.org/c-overvi.htm

6.2 Forest Management

Forestry management generally involves actions for the commercial production and sale of forest products, including practices such as timber management, timber sales, reforestation, timber stand improvement, and other directly related functions. Because of limited forest resources (approximately 201 acres), forestry management issues relevant to NSA Panama City include timber stand improvement, forest regeneration, and urban forestry. Forest management personnel at NSA Panama City recognize that the frequent and intense heat extremes and altered precipitation patterns projected to occur with climate change may increase the frequency and intensity of wildfires. Ongoing and continued forest management and protection measures are therefore vital to offset the potential vulnerability of properties on the installation.

General Information: Little of the native communities that originally occurred on NSA Panama City remain today. The few natural communities that do remain suggest that the upland areas of NSA Panama City were dominated by a mosaic of scrub, scrubby flatwoods, and mesic flatwoods. The small strip of maritime hammock along the bay is a high quality community (FNAI 1997).

Because of their regional ecological value and poor marketability, forestry resources on the installation will be managed primarily for wildlife protection and enhancement, aesthetics, and recreation, where possible.

6.2.1 Timber Stand Improvement

Timber stand improvement is the release of trees of desirable species from the competition of brush and/or from overtopping by undesirable species. The primary timber stand improvement tools will be cutting and prescribed burns.

Cutting refers to logging operations within a forest stand; cutting cycle is the frequency of logging operations within a forest stand. Cuttings to be used on NSA Panama City include intermediate and regeneration cuttings.

Intermediate cuttings on NSA Panama City will include three types:

Thinnings are cuttings in immature stands to increase the rate and quality of growth and improve stand composition. A thinning can be a removal of every other row of trees or the removal of select trees that are ready for the market and low-value trees that are competing with future crops. In either case, a thinning will redistribute the growth potential of the site to the best trees so that they grow at a faster rate and increase sunlight penetration to the forest floor, stimulating understory growth and creating food and cover for some wildlife species.

Improvement cuttings place wild stands under management and remove undesirable trees that are of sufficient size to provide merchantable products.

Salvage cuttings will be used to remove dead or injured trees so that they can be used before they become worthless or jeopardize the health of adjacent trees in the stand.

Regeneration cuttings will include three types:

Clear cuttings will be used at the discretion of the Natural Resources Manager in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal and state agencies. Clear cutting will be used when there is an identified need to change species (e.g., slash pine to longleaf pine), remove an over-mature or diseased stand, or for another reason deemed essential.

Shelterwood cuttings will be used at the discretion of the Natural Resources Manager in consultation with NAVFAC SE foresters and fish and wildlife

biologists, as well as other federal and state agencies. Shelterwood cuttings will be used to regenerate timber through a series of perhaps two to three cuts rather than making one final clear-cut. Cuttings may be separated by as much as 20 years.

Seed tree cuttings will be used at the discretion of the Natural Resources Manager in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal and state agencies. Seed tree cutting involves the removal of all trees except trees of the desired species in sufficient numbers to reseed the cutover area.

Prescribed burning is the purposeful application of fire in a controlled, knowledgeable manner to forest fuels on a specific land area under selected weather conditions to accomplish predetermined, well-defined management objectives.

Issue: Timber stands on the NSA Panama City require periodic maintenance (i.e., cuts and burns). Maintenance neglect represents a threat to the military mission and to the sustainability of forestry and wildlife resources, which are in short supply in areas immediately surrounding NSA Panama City. Timber stands require maintenance to increase the growth rate of the preferred trees, to reduce the potential for wildfires, to control diseases and insect pests, and to ensure the continuation of fire-dependent plant and wildlife communities.

Goals, Objectives, and Strategies: Table 6-8 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to timber stand improvement issues.

Table 6-8. Natural Resources Management Goals, Objectives, and Strategies Related to Timber Stand Improvement

Goals	Objectives	Strategies	Comments
2	2.1	2.1.1	*Reduce nuisance wildlife and animal diseases and exotic plants*
2	2.1	2.2.1	*Wetland enhancement through burns*
2	2.3	2.3.1	*Floodplain enhancement*
3	3.1	3.1.2	*Site preparation*
3	3.2	3.2.2	Habitat protection and enhancement

Description of Natural Communities: Five natural communities characterize NSA Panama City. Because the timber stand improvement management techniques for three communities are nearly identical (scrub, scrubby flatwoods, and mesic flatwood communities), they have been discussed as one. The two remaining natural communities,

maritime hammock and depression marsh, require slightly different management techniques and are discussed separately.

Scrub, scrubby flatwoods, and mesic flatwoods communities, as a group, constitute the majority of the natural community forest areas on the installation. Timber stand improvement for this group will include cutting and prescribed burning.

The maritime hammock community generally needs no active management. Nutrient recycling generally is accomplished by detrital organisms instead of fire. Management will be for hazardous conditions (e.g., unsafe conditions created after a storm) or for the removal of exotic species should they infiltrate the maritime hammock community. Prescribed burns in adjacent communities will be permitted to naturally extinguish at the hammock's edge.

Depression marshes, which are synonymous with isolated wetlands, flatwoods pond, St. John's wort pond, pineland depressions, ephemeral pond, and seasonal marsh, will generally be managed using prescribed burning. Fire is important to maintaining this community type by restricting invasive shrubs and trees and the formation of peat. Selected cutting will also be used to maintain this community.

Long-Term Management: Cutting and prescribed burn cycles will be established for the natural communities and forested areas on the NSA Panama City installation, and will be conducted consistent with the long-term management for wildlife (Section 5.3). To accomplish this, the Natural Resources Manager will have timber prescriptions reviewed by foresters and fish and wildlife biologists from NAVFAC SE and the Florida Division of Forestry. This review will help ensure that ongoing management techniques include those that enhance wildlife populations that are dependent on forest ecosystems.

Cutting: For the scrub, scrubby flatwoods, and mesic flatwoods communities and other forested pine areas, the cutting cycle will begin when the stand reaches merchantable size (approximately 13 to 15 years) and will continue every 7 to 10 years until the rotation age of 80 years is reached; or will be scheduled at the discretion of the Natural Resources Manager. Stands older than 80 years will be evaluated by the Natural Resources Manager as well as by NAVFAC SE wildlife biologists for their value as wildlife habitat. Ultimately, cutting will decrease stand density between 60 and 80 percent. Cutting activities in depression marshes will occur as determined by the Natural Resources Manager. There will be no established cutting cycle for maritime hammock. NSA Panama City will practice snag retention, the practice of leaving dead trees standing in managed forest, to minimize impacts

to wildlife habitat. Dead trees are often colonized and/or used by various wildlife species. NSA Panama City will not remove a snag unless it jeopardizes property or is a safety risk.

Prescribed Burning: A prescribed burn will involve running low-intensity, surface fires through forest stands. Prescribed burning improves habitat by removing dense, scrubby understory vegetation and allowing early successional flora to grow. Burning removes forest floor litter making wildlife food easier to find, promotes germination of plants scarified by the heat, releases minerals and nutrients tied up in vegetation to the soil, and creates an edge effect along the boundaries between burned and unburned areas.

As conditions for prescribed burns permit, NSA Panama City's scrub, scrubby flatwood, and mesic flatwoods areas and other forested pine areas, as well as depression marshes will be burned on a rotation to prevent the accumulation of unsafe levels of fuel and to provide habitat for the enhancement of wildlife. NSA Panama City will attempt to burn on a three-year rotation (one third of the forest stand will be burned every year); or burns will be scheduled at the discretion of the Natural Resources Manager. Prescribed burns will occur through wetland areas from April to August after the understory fuels have been burned using backfires during the first prescribed burn. Dormant-season burns can be alternated with growing-season burns as long as hardwoods are eliminated by a growing-season burn before they reach a size that is more fire resistant. Prescribed burns will not be used in maritime hammock communities. Implementation of a prescribed burn regime will adequately address safety and smoke concerns. Burns shall be conducted by trained and Florida-certified personnel.

For prescribed burns to be an effective management technique, at a minimum, the following conditions must be understood and described in each prescription: (1) recognition of the biological requirements of target species (e.g., large-leaved jointweed); (2) vegetative condition of the stand to be burned; and (3) expected end results from fire for understory stature and species composition. Prescribed burns also will be used as a management tool for site preparation during reforestation (Section 5.2.2).

Environmental Considerations During Management Practices: Timber stand improvement (TSI) practices could result in impacts to wildlife habitat and wetland and water quality and could potentially increase soil erosion, stormwater runoff, and invasive species. Also, the military mission and the surrounding community could be affected by smoke from prescribed burning.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to timber stand management and will be consulted for additional management information or provided as additional training and education:

- Threatened and Endangered Species – Section 5.3.1 – timber stand improvement requirements for species;
- Habitat Management – Section 5.3.1 – habitat enhancement during timber stand improvement activities;
- Offer hands-on training or individual participation to better demonstrate the concept, application, and importance of timber stand improvement actions.

Ecosystem Management: Cuttings are essential to the redistribution of the site's growth potential to the best trees so that they grow at a faster rate. Cuttings also stimulate understory growth, which creates food and cover for some wildlife. Prescribed burning is a natural part of the natural ecosystem at NSA Panama City, and, when used in combination with cutting, can maintain a healthy and vigorous forest stand on the installation, as well as provide critical habitat for rare, threatened, or endangered species.

Military Mission: The practices of cutting and prescribed burning forested areas on the installation decrease forest fuel loads, thus decreasing fuel available to wildfires. Wildfires could threaten NSA Panama City mission activities, facilities, and housing.

6.2.2 Reforestation

Reforestation is the renewal of a forest by either natural or artificial means. Reforestation is generally preceded by a clear cut, a seed tree cut, or a shelterwood cut.

Issue: Reforestation of lands on NSA Panama City is required for specific reasons and involves: (1) clear cutting to revert slash pine to longleaf pine and removing an overmature or diseased/damaged stand; (2) shelterwood or seed tree cutting to enhance wildlife habitat; or (3) converting open area to forested area.

Goals, Objectives, and Strategies: Table 6-9 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to reforestation issues.

Table 6-9. Natural Resources Management Goals, Objectives, and Strategies Related to Reforestation

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
3	3.1	3.1.2	Longleaf pine restoration
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: On the NSA Panama City installation as in the surrounding region, human activities have effectively removed the longleaf pine community. Most of the region's native longleaf pine communities have been adversely affected by human activities, including forestry, agriculture, building development, and decades of fire suppression. Because of these activities, only about 12 percent of the region's original 29.6 million acres occupied by longleaf pine remain in longleaf pine today. The regional area currently occupied by longleaf pine and its associated biodiverse and fire-dependent understory is about 1.2 to 1.9 million acres (Outcalt et al. 1999).

Because of its ecological value, longleaf pine will be the preferred species for forest regeneration, within soil limitations, because it is one of the most biodiverse forest ecosystems. In addition to restoring a highly desirable tree species, restoration of the native longleaf pine community will enhance habitat for dependent wildlife and plant species.

In wetter soil not suitable for longleaf pine, slash pine will be used for reforestation. In general, both pine communities, when properly managed, will support various populations of birds, amphibians and reptiles, and small and large mammals. Regeneration of hardwood areas will be accomplished by natural seeding or direct planting. Over the long-term, new stands will be managed according to the timber stand improvement practices described in Section 5.2.1, and wildlife habitat enhancement methods describes in Section 5.3.1. Long-term reforestation management practices are subject to change at the discretion of the Natural Resources Manager. Changes in reforestation management practices may be effected in response to changes in wildlife species on NSA Panama City, military mission requirements, or federal or state legal requirements.

Environmental Considerations During Management Practices: Potential for temporary increases in erosion and stormwater runoff during site preparation for reforestation. Also, site disturbance tends to favor invasive species over native species.

Applicability of Other Management Issues: The following management issues, programs, and actions are directly or indirectly related to reforestation management and will be consulted for additional management information or provided as additional training and education:

- Invasive Species – Section 5.1.2 – Introduction of invasive species;
- Timber stand improvement – Section 5.2.1 – prescribed burns for site preparation;
- Using volunteer groups, including local Scout troops, and interested installation personnel to offer hands-on training or individual participation to better demonstrate the concept, application, and importance of reforestation;
- SWPPP to include BMPs for stormwater runoff and soil conservation and erosion (FDACS 2003; NSAPC 2010).

Ecosystem Management: Reforestation controls long-term erosion and improves wildlife habitat. Reforestation with longleaf pine will promote the continuation of a highly desirable species (ecologically and economically) that has lost much of it original range due to development and reforestation with slash pine.

Military Mission: Without reforestation, sites that have been clear-cut may experience erosion problems that could potentially increase levels of turbidity in St. Andrew Bay. Conditions detrimental to the water quality of the bay would likely result in an enforcement action by FDEP.

6.2.3 Urban Forestry

Urban forestry is the management of forests and related natural resources within human communities. Urban or community forests include trees, other vegetation, and natural elements of a forest, plus human development, such as roads, buildings, and utilities. Successful urban forestry programs manage these resources so that natural and human-built features enhance each other.

Issues: Trees and vegetation in urban areas, when properly managed, contribute to the ecological and social health on the NSA Panama City. Certain areas on the installation, such as industrial areas, would benefit from urban forestry practices that contribute to:

- Reduced noise levels, stormwater runoff, and soil erosion;
- Increased habitat for wildlife;
- Purer air, reduced pollution, and controlled wind speeds;
- Moderated temperature in paved areas;

- Aesthetic improvements, including color, views, and seasonal changes; and
- Defined space, buffers, and barriers.

The consequences of urban forestry practices have been shown to contribute to individuals' physical and mental health and quality of life.

Goals, Objectives, and Strategies: Table 6-10 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to urban forestry issues.

Table 6-10. Natural Resources Management Goals, Objectives, and Strategies Related to Urban Forestry

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
3	3.2	3.2.2	*Habitat protection and enhancement*

Long-Term Management: Long-term management for urban forestry will involve identifying areas where the benefits of urban forestry can be applied, developing a plan for planting trees and shrubs, and recruiting and training volunteers and developing partnerships to support NSA Panama City urban forestry. The primary components of consideration in the preparation of an urban forestry plan for NSA Panama City are listed below. The components presented here are expanded upon in Appendix D.

- Selection of the appropriate tree species.
- Use of appropriate maintenance measures (pruning, fertilizing, watering) for new plantings and established trees.
- Completion of inventories and annual work plans to implement the overall urban forestry plan.
- Use of volunteer organizations for assistance with planting and maintenance activities.

Environmental Considerations During Management Practices: None.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to urban forestry management and will be consulted for additional management information or provided as additional training and education:

- Landscaping and Maintenance – Section 5.1.5 – using principles of xeriscaping;
- Stormwater – Section 5.1.4 – use of urban forestry to create buffers;
- Using volunteer groups, including local Scout troops, and interested installation personnel to offer hands-on training or individual participation to better demonstrate the concept, application, and importance of urban forestry;
- Maintenance according to NSA Panama City's grounds maintenance program;
- Urban forestry management practices will be integrated into the NSA Panama City grounds maintenance program.

Ecosystem Management: Urban forestry supports the ecosystem management concept by providing wildlife habitat through the development of new greenways and managing urban areas for the enhancement of wildlife. Urban forestry also helps reduce stormwater runoff and soil erosion, and will be used as a component of xeriscaping.

Military Mission: Urban forestry practices can be implemented to help protect and enhance water quality and wildlife, thereby reducing the potential for adverse impacts to these resources that could threaten the military mission.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Forest Management:

Federal Noxious Weed Act of 1974, 7 U.S.C. 2801, establishes control and eradication of noxious weeds and regulates them in interstate and foreign commerce.

Executive Order 13112, Invasive Species, as previously described.

DODINST 7310.5 administers the reimbursement of costs of managing forest resources for timber production. Under this regulation, only expenses related to the maintenance of timber for commercial sale are reimbursed.

OPNAVINST 5090.1D, 12-3.8(j), discusses laws that govern natural resources management relating to the protection and management of forest resources.

Additional Sources of Information:

Technical Reports/Publications:

Myers, R., and J. Ewel. 1990. *Ecosystems of Florida.*

Drew, M.B., L.K. Kirkman, and A.K. Gholson. (1998). *The Vascular Flora of Ichauway, Baker County, Georgia: A Remnant Longleaf Pine/Wiregrass Ecosystem*. Castanea. 63:1-24.

Kirkman, L.K., M.B. Drew, L.T. West, and E.R. Blood. 1998. *Ecotone Characterization between Upland Longleaf Pine/Wiregrass Stands and Seasonally-Ponded Isolated Wetlands*. Wetlands 18:346-364.

Kirkman, L.K., R.M. Mitchell, R.C. Helton and M.B. Drew. (In review). *Productivity Controls on Plant Diversity Across an Environmental Gradient in a Fire-Dependent Ecosystem* (Submitted to Ecology).

Telephone Contacts:

Tall Timbers Research Station – (850-893-4153). Information resource for the areas of fire ecology, game bird management, vertebrate ecology and forestry.

TNC Florida Regional office. Fire Management Info – (407-682-3664)

Bay County Foresters – (850-747-5308)

Alliance for Community Trees – (301-277-0040). ACT provides support for nonprofit organizations involved in planting trees and educating the public about the benefits of trees in urban areas.

Internet Addresses:

Tall Timbers Research Station:
Plant Ecology – Effectiveness of Prescribed Burns: www.talltimbers.org /research/peco.html

Effects of Fires on Forest Birds, Red-Cockaded Woodpeckers, Gopher Tortoises:
www.talltimbers.org/research/ve.html

A Guide for Prescribed Fire in Southern Forests:
www.pfmt.org/standman/prescrib.htm

Prescribed Burning Regulations: www.sfrc.ufl.edu/Extension/ffws/pb.htm
Natural Resource Issues: http://ext.msstate.edu/anr/
Southern Research Station (Publication-Scientific) :
www.srs.fs.fed.us./pubs/1999-12_publications.htm

Vegetation Management: www.sfrc.ufl.edu/Extension/vegman.htm
Forested Wetlands:
http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_FR006

Florida's Forestry information: www.sfrc.ufl.edu/Extension/ffws/ffwshome.htm

Effects of Fire on Threatened and Endangered Plants:
http://fire.r9.fws.gov/ifcc/T&EPlants/T&EPlants.htm#Abstract

Firing Techniques: www.pfmt.org/standman/firingtech.htm

Fire Effects on Plants and Wildlife: http://www.fs.fed.us/database/feis/

Serving the Wholesale Nursery Industry: http://www.growit.com

Your Florida Backyard: http://www.nsis.org

American Forests – (202-955-4500): http://www.americanforests.org/
American Forests is one of the nation's oldest citizen conservation organizations and a leading force in the protection and management of forest resources in America.

National Arbor Day Foundation – (402-474-5655): http://www.arborday.org/
A major program of the foundation is the Tree City USA program. Other programs include Tree Line USA, Conservation Trees, Trees for America, Arbor Day Farms, and Rain Forest Rescue.

International Society of Arboriculture – (217-328-2032):
http://www2.champaign.isa-arbor.com/

A nonprofit organization for municipal foresters and professionals in arboriculture and urban forestry.

National Association of State Foresters – (202-624-5415):
The association represents the directors of the state forestry agencies from all 50 states.

Society of American Foresters – (301-897-8720):
An organization of 18,000 members involved in allied areas of professional forestry.

Society of Municipal Arborists – (314- 862-1711):
The organization's approximately 500 members promote interest in the planting and maintenance of public trees and the preservation of public open space.

USDA Forest Service – (202-205-9694): http://www.fs.fed.us/
The lead federal agency for providing technical and financial assistance and research on urban and community forestry for the nation.

Treelink: http://www.treelink.org/
Information, research, and networking for people working in urban and community forestry.

6.3 Fish and Wildlife

Fish and wildlife management actions are designed to preserve, enhance, and regulate indigenous wildlife and its habitats. These actions include the conservation of protected species and non-game species, management and harvest of game species, bird aircraft strike hazard reduction, and animal damage and disease control. Primary management issues for fish and wildlife are: (1) habitat enhancement and protection of threatened or endangered species; and (2) prevention and control of wildlife damage and wildlife diseases. Fish and wildlife management issues not relevant on NSA Panama City are: (1) bird aircraft strike hazard reduction management because tenant air operations have not identified the need for a management program; and (2) game species (defined as wildlife harvested per applicable federal and state hunting laws) because hunting is not authorized on the installation.

The Navy is a member of several conservation partnerships, including Partner in Flight (PIF), which focuses on bird conservation (www.partnersinflight.org) and DOD Partners in Amphibian and Reptile Conservation (DoD-PARC), which focuses on herpetofauna conservation (www.dodnaturalresources.net/DoD-PARC.html). Additionally, the Marine Resources Support Group (MRSG) is a network of Navy environmental professionals who work together to meet the environmental planning and compliance requirements for Navy at-sea training and testing (www.navfac.navy.mil/products_and

services/ev/products_and_services/marine_resources.html). All of these partnerships offer excellent networking opportunities to help manage fish and wildlife on NSA Panama City.

General Information: Between 1996 and 1997, the FNAI completed a rare plant, rare animal, and rare natural community inventory on NSA Panama City (FNAI 1997). The inventory concluded that the NSA Panama City is within or approached by the ranges of at least 58 rare, threatened, endangered, or declining plant species and 53 rare, threatened, endangered, or declining vertebrate species. Currently, fourteen state-listed threatened or endangered vertebrate species and two state-listed plant species occur on NSA Panama City (see Section 3.5).

Because of the size of the installation, minor adverse impacts on wildlife resources may effectively eliminate a number of wildlife species from the installation. Current demands on wildlife resources and long-term needs for wildlife programs include:

- Limited demand on fish resources because saltwater fishing is only permitted in two locations and pond fishing is not permitted. Freshwater fishing is prohibited because the ponds are small and not well suited for recreational fishing.
- No demand on game wildlife resource because hunting is not permitted on NSA Panama City. Hunting is not permitted because area on the installation is inadequate, the installation is too close to the civilian urban area, and the number of game species is limited. Therefore, at this time NSA Panama City will not develop a hunting program. Also, NSA Panama City will not manage resources specifically for game species, but will monitor the number of game species to ensure populations to not become a nuisance.
- Currently, population control of fish or wildlife is not a problem on NSA Panama City. If an animal population becomes a problem in the future, the NSA Panama City Natural Resources Manager will develop a plan for population control that is consistent with INRMP Section 5.3.2.
- NSA Panama City undertakes periodic surveys to determine to support the management of neotropical migratory birds (see Project No 6; Appendix A).
- NSA Panama City will develop a wildlife viewing program for DoN personnel and the public (see Project No. 5; Appendix A).

6.3.1 Threatened and Endangered Species, and Habitat Enhancement

This section discusses general habitat-enhancement activities for non-game species and threatened or endangered plant and vertebrate species.

6.3.1.1 Habitat Enhancement

Habitat enhancement consists of manipulating fish and wildlife habitat to change existing wildlife populations.

Issue: Human activities in and surrounding NSA Panama City have limited the potential for high quality habitat for animal and plant species. In addition, intense commercial and residential development surrounding the installation have all but eliminated any remaining natural communities that could function as wildlife corridors between NSA Panama City and significant off-installation wildlife areas. Because of limited habitat resources, habitat fragmentation, and the decline of much of the native communities, wildlife on the installation and in adjacent areas consists of a limited number of small and medium-size mammal species, and various populations of birds, amphibians, and reptiles. Because of these pressures on wildlife, NSA Panama City will maximize the use of its existing resources to help provide for the regional continuation of native species.

Goals, Objectives, and Strategies: Table 6-11 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to wildlife habitat enhancement issues.

Table 6-11. Natural Resources Management Goals, Objectives, and Strategies Related to Wildlife Habitat Enhancement

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
2	2.1	2.1.1	Supports invasive species removal
3	3.1	3.1.2	Supports longleaf pine community development
3	3.1	3.1.3	Supports urban forestry development
3	3.2	3.2.2	*Habitat protection and enhancement*
4	4.1	4.1.1	*Enhances the recreational experience*

Long-Term Management: Natural resource habitats will be managed to sustain and enhance fish and wildlife resources on the installation consistent with the military mission. Long-term habitat management for terrestrial wildlife management and aquatic wildlife management that will be used on the NSA Panama City are presented below.

Terrestrial Wildlife Management: NSA Panama City will sustain and enhance terrestrial wildlife habitat for urban and non-urban species using a combination of the following management techniques. These management techniques will be implemented under the discretion of the Natural Resources Manager.

- Preserving portions of stands to provide suitable large snags and trees for den and cavity activities.
- Providing nest boxes for birds and bats.
- Leave brush material along woodland edges following necessary clearing (e.g., military mission).
- Planting trees and shrubs, or seeding open areas for soil stabilization and to provide wildlife feeding plots.
- Use a longleaf pine/wiregrass community during reforestation where soil conditions permit.
- Maintaining pine stands with basal areas low enough to prevent crown closure in order to stimulate understory growth, which in turn creates food and cover.
- Prescribe burn on rotation through forest stands and wetland areas. Mosaic patterns, narrow-strip, or small-block burns will result in an interspersion of habitat types.
- Avoid habitat fragmentation. Although fragmentation increases edge, arbitrarily locating human-made linear and nonlinear features within wildlife areas undermines ecological processes through the separation of wildlife populations and may render the fragmented parcel unsustainable for wildlife.
- Create or enhance connections between habitats to facilitate wildlife movement between areas. The necessary characteristics of connections will vary depending on the species; for instance, amphibians need water or moist areas to move between ponds and wet areas, and most vertebrates require protective cover (from predation) such as trees, shrubs, dense ground cover, downed trees, and existing burrows.
- Create brush piles in clear-cuts and other open areas. Brush piles provide nesting, feeding, and cover; a medium for plant growth; and a perch for songbirds whose droppings may contain viable seeds.
- Maintain vegetative buffers around wetland areas and along undeveloped shoreline areas adjacent to St. Andrew Bay.
- Leave snags and downed logs for nesting, roosting, foraging, cover, perching, and/or territorial displays.
- Maintain hardwood areas for foraging activities.

Aquatic Wildlife Management: NSA Panama City has two distinctive management areas for aquatic wildlife: (1) the shoreline area along St. Andrew Bay; and (2) freshwater ponds within the boundaries of the installation.

St. Andrew Bay. In 1998, BEST and FDEP, with support from the United States Department of Commerce and the NOAA, completed *A Look to the Future, A Management Plan for the St. Andrew Bay Ecosystem* (BEST and FDEP 1998). NSA Panama City will manage its actions and the associated impacts to St. Andrew Bay consistent with the management actions presented in *A Look to the Future, A Management Plan for the St.*

Andrew Bay Ecosystem. Specifically, NSA Panama City will manage its actions to prevent the risk of direct or indirect impacts to the seagrass beds found along the NSA Panama City eastern shoreline. Potential sources of risk include waterfront construction activities, activities contributing to the pollutant load in stormwater runoff, and increasing stormwater runoff.

Freshwater Ponds. Long-term management for freshwater ponds on the installation will be the enhancement of water quality for use by non-game fish and wildlife species. Because installation ponds are classified as wetlands, the management of these ponds will be consistent with INRMP Section 5.1.1, but may also include improvement measures such as water level manipulation and structural alterations (e.g., increasing pond depth and bank improvements) to minimize vegetative growth and to enhance wetland functions.

Environmental Considerations During Management Practices: Temporary impacts to wetland wildlife and an increase in pond water turbidity during pond enhancement.

Applicability of Other Management Issues and NSA Panama City Program: The following management issues and programs are directly or indirectly related to habitat management and will be consulted for additional management information:

- Timber stand improvement – Section 5.2.1 – Use of timber stand improvement to enhance terrestrial wildlife;
- Wetlands – Section 5.1.1 – Buffers around wetlands;
- Stormwater – Section 5.1.4 – BMPs and wetland enhancement or creation;
- Invasive Species – Section 5.1.2 – Invasive species and pesticide use;
- Using volunteer groups, including local Scout troops, and interested installation personnel to offer hands-on training or individual participation to better demonstrate the concept, application, and importance of wildlife and habitat enhancement.

6.3.1.2 Threatened and Endangered Species

Species are listed as endangered or threatened if scientific and commercial data indicate habitat loss, disease, overexploitation, or other factors affecting their existence. The Endangered Species Act (ESA) was federally mandated in 1973 to provide a means to conserve endangered and threatened species and the habitats on which these species depend. The ESA also prohibits federal agencies from authorizing, funding, or carrying out any actions that destroy or adversely modify “critical habitat.” At NSA Panama City, there are no areas designated as critical habitat for threatened or endangered species. The

Florida Endangered and Threatened Species Act was enacted to provide additional protection to species that may or may not be recognized for protection under the ESA.

Issue: Listed species of plants and animals that occur on NSA Panama City require special protection efforts and this INRMP provides for some of those (Table 6-12). Many factors may cause the need for a species to be listed as threatened or endangered, but the principal factors are associated with development impacts and species habitat destruction.

Goals, Objectives, and Strategies: Table 6-13 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to threatened and endangered species issues.

Table 6-12. Natural Resources Management Goals, Objectives, and Strategies Related to Threatened and Endangered Species

Goals	Objectives	Strategies	Comments
2	2.1 – 2.4	All	BMPs for habitat protection (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
2	2.5	All	Minimizes impacts
3	3.1 and 3.2	All	Supports the need for habitat improvement and plant and animal species protection

Long-Term Management: NSA Panama City will actively manage areas for the species listed below and will manage for other federal or state-listed threatened or endangered species as conditions warrant. Changes in management practices may result from: (1) the listing of a new species for protective status or the removal of a species; or (2) a change in species found to occur on NSA Panama City. NSA Panama City will continue to conduct species survey updates to identify changes in species populations and habitat on NSA Panama City. Species information provided in the surveys will be used to modify management practices. Modification to management practices will be undertaken by the Natural Resources Manager in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal, state, and county agencies.

6.3.1.2.1 Federally-listed Species

Alligator Snapping Turtle (*Macrochelys temminckii*)

Status: Petitioned (Federal) and Species of Special Concern (State).

Alligator snapping turtles are highly aquatic. They rarely bask and will usually only emerge from the water to lay eggs, which occurs during spring. The species generally prefers shallow freshwater areas with mud substrate, aquatic vegetation, and natural debris. Nests will usually be within 50 feet of a river or pond. Alligator snapping turtles are potentially found in aquatic habitats on NSA Panama City. This INRMP protects habitat and water quality for alligator snapping turtles through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve alligator snapping turtle habitat include: Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

American Alligator (*Alligator mississippiensis*)

Status: Threatened (Federal and State) due to similarity of appearance to protected crocodilians.

The American alligator is periodically observed on NSA Panama City in estuarine open waters. Alligators typically inhabit low-lying areas near water, preferring freshwater but also venturing into brackish or saltwater. Females build nests near water and lay clutches of 20-60 eggs between May and July. They are protective of their nesting areas during this season and such areas should be avoided. This INRMP protects habitat and water quality for alligators through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve alligator habitat include: Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Table 6-13. INRMP Management Activities and Projects That Benefit Rare, Threatened, and Endangered Species Potentially Occurring on NSA Panama City

Species (in alphabetical order by common name)	Status	Category	Cross-reference to text	Management Activities that Benefit the Species and its Habitat													INRMP Projects that Benefit the Species and Its Habitat							
				Wetlands Management	Invasive and Exotic Species	Soil Conservation and Erosion Control	Stormwater and Water Quality Control	Landscaping and Grounds Maintenance	Floodplain Management	Timber Stand Improvement	Reforestation	Urban Forestry	Threatened and Endangered Species	Wildlife Damage and Wildlife Disease	Outdoor Recreation	Land Impact Guidelines	Invasive and Exotic Species Removal	Prescribed Burns	Soil Erosion Control	Wetlands Delineations	Nature Trail Development	Survey and Inventory of Biological Resources	Urban Forestry Plan	INRMP Update and Revision
Alligator Snapping Turtle (*Macrochelys temminckii*)	FP, SSC	Wetlands Turtle	Table 4-4 p. 6-42	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
American Alligator (*Alligator mississippiensis*)	FT	Wetlands Reptile	Table 4-4 p. 6-42	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Bald Eagle (*Haliaeetus leucocephalus)*	BGE	Wetland and Forest Bird	Table 4-4 pp. 4-15 & 6-45	M	M	M	M	M	M	M	M	M	M	M	M	M	P	P	P	P	P	P	P	P
Carolina Lilaeopsis (*Lilaeopsis carolinensis*)	R	Wetland Plant	Table 4-3 p. 6-52	M	M	M	M	M	M	M	M	M	M		M	M	P	P	P	P	P	P	P	P
Choctawhatchee Beach Mouse (*Peromyscus polionotus allophrys*)	FE	Small Mammal on Beach Dunes	Table 4-4 pp. 4-15 & 6-45	M	M	M	M		M				M	M	M	M	P		P	P	P	P		P
Dwarf Seahorse (*Hippocampus zosterae*)	FP	Fish in Seagrass	Table 4-4 p. 6-46	M		M	M	M	M				M		M				P	P				P
Eastern Diamondback (*Crotalus adamanteus*)	FP	Uplands Snake	Table 4-4 p. 6-46	M	M	M	M	M	M	M	M	M	M	M	M	M	P	P	P	P	P	P	P	P
Florida Manatee (*Trichechus manatus latirostris*)	FT	Marine Mammal Near Coasts	Table 4-4 pp. 3-3, 3-7, 4-15, & 6-46	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Giant Manta Ray (*Manta birostris*)	FC	Coastal fish	Table 4-4 p. 6-47	M		M	M	M	M				M		M				P	P				P
Green Sea Turtle (*Chelonia mydas*)	FT	Coastal, Nests on Beaches	Table 4-4 pp. 4-15 & 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Godfrey's Golden Aster (*Chrysopsis godfreyi*)	SE	Xeric Plant	Table 4-3 p. 6-50		M	M	M	M	M	M		M	M		M	M	P	P	P		P	P	P	P
Gopher Tortoise (*Gopher polyphemus*)	FC, ST	Upland Burrower	p. 4-15		M	M	M	M	M	M	M	M	M	M	M	M	P	P	P		P	P	P	P
Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)	FT	Anadromous Fish	Table 4-4 p. 6-47	M		M	M	M	M				M		M				P	P				P
Hawksbill Sea Turtle (*Eremochelys imbricate*)	FE	Coastal Turtle	Table 4-4 p. 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Kemp's Ridley Sea Turtle (*Lepidochelys kempi*)	FE	Coastal Turtle	Table 4-4 p. 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Large-leaved Jointweed (*Polygonella macrophylla*)	ST	Wetlands Plant	Table 4-3 pp. 6-1, 6-29, & 6-50	M	M	M	M	M	M	M	M	M	M		M	M	P	P	P	P	P	P	P	P

Table 6-12, continued.

Species (in alphabetical order by common name)	Status	Category	Cross-reference to text	Management Activities that Benefit the Species and its Habitat													INRMP Projects that Benefit the Species and Its Habitat							
				Wetlands Management	Invasive and Exotic Species	Soil Conservation and Erosion Control	Stormwater and Water Quality Control	Landscaping and Grounds Maintenance	Floodplain Management	Timber Stand Improvement	Reforestation	Urban Forestry	Threatened and Endangered Species	Wildlife Damage and Wildlife Disease	Outdoor Recreation	Land Impact Guidelines	Invasive and Exotic Species Removal	Prescribed Burns	Soil Erosion Control	Wetlands Delineations	Nature Trail Development	Survey and Inventory of Biological Resources	Urban Forestry Plan	INRMP Update and Revision
Least Tern (*Sterna antillarum*)	ST	Coastal Bird	Table 4-4 pp. 4-15 & 6-51	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Leatherback Sea Turtle (*Dermochelys coriacea*)	FE	Coastal, Nests on Beaches	Table 4-4 p. 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Little Blue Heron (*Egretta caerulea*)	SSC	Wetland Bird	Table 4-4 p. 6-51	M	M	M	M	M	M	M	M	M	M	M	M	M	P	P	P	P	P	P	P	P
Loggerhead Sea Turtle (*Caretta caretta*)	FT	Coastal, Nests on Beaches	Table 4-4 pp. 4-15 & 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Monarch Butterfly (*Danaus plexippus*)	FP	Migratory Butterfly	Table 4-4 p. 5-48	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Piping Plover (*Charadrius melodus*)	FT	Coastal Bird	Table 4-4 pp. 3-13 & 6-48	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Red Knot (*Calidris canutus* ssp. *rufa*)	FT	Coastal Bird	Table 4-4 pp. 6-48	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P
Snowy Egret (*Egretta thula*)	SSC	Wetland Bird	Table 4-4 pp. 6-52	M	M	M	M	M	M	M	M	M	M	M	M	M	P	P	P	P	P	P	P	P
Snowy Plover (*Charadrius nivosus*)	SSC	Wetland Bird	Table 4-4 pp. 4-15 & 6-49	M	M	M	M	M	M				M	M	M	M	P		P	P	P	P		P

M = The denoted management activity benefits the denoted species and its habitat.
P = The denoted project benefits the denoted species and its habitat.

Status Key:

FC = Federal Candidate; FE = Federally Endangered; FP = Federally Petitioned; FT = Federally Threatened
BGE = Bald and Golden Eagle Protection Act; SE = State Endangered; SSC = State Species of Special Concern;
ST = State Threatened; R = Rare

Bald Eagle (*Haliaeetus leucocephalus*)

Status: Protected under the Bald and Golden Eagle Protection Act.

Bald Eagle habitat is primarily riparian associated with coasts, rivers and lakes. Nesting adults usually require living tall trees and occasionally nest in dead trees. DoN will comply with the USFWS Habitat Management Guidelines for the Bald Eagle in the Southeastern Region if any nests are located on or adjacent to NSA Panama City properties. These guidelines will provide general guidance for compliance with the federal and state laws protecting bald eagles and are designed to minimize detrimental human-related impacts on bald eagles, particularly during nesting season. Potential Bald Eagle habitat on NSA Panama City is the St. Andrew Bay shoreline. This INRMP protects habitat for the Bald Eagle through active management of factors such as wetlands (Section 5.1.1), timber stand improvement (Section 5.2.1), reforestation (Section 5.2.2), and urban forestry (Section 5.2.3). Projects described in this INRMP that benefit and conserve Bald Eagle habitat include Invasive and Exotic Species Removal, Prescribed Burns, Wetlands Delineations, Nature Trail Development, Survey and Inventory of Biological Resources, Forest Management Inventory System, and Longleaf Pine and Wiregrass Restoration (see Appendix A for descriptions).

Choctawhatchee Beach Mouse (*Peromyscus polionotus allophrys*)

Status: Endangered (Federal and State).

The Choctawhatchee beach mouse is one of several Florida subspecies of oldfield mouse restricted to coastal sand dune ecosystems. These small, light-colored mice burrow and excavate nests within dune sand among sea oats, grasses, herbs and small shrubs. Beach mice are not known to live in buildings or frequent garbage sites. They are omnivores and mostly eat invertebrates such as beetles and the seeds and fruits of plants that grow among the dunes. The continued existence and recovery of the Choctawhatchee beach mouse depends largely on the conservation of a healthy coastal zone ecosystem. Feral cats in and adjacent to dwindling beach mouse habitat contribute to the decline of beach mouse populations. This INRMP protects habitat and water quality for the Choctawhatchee beach mouse through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve Choctawhatchee beach mouse habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Dwarf Seahorse (*Hippocampus zosterae*)

Status: Petitioned (Federal).

The dwarf seahorse occurs in sub-tidal aquatic seagrass beds in marine and estuarine environments. It is known to occur in the northern Gulf of Mexico and may be assumed to occupy seagrass beds adjacent to NSA Panama City. This INRMP protects potential habitat for the dwarf seahorse through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve potential dwarf seahorse habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for descriptions).

Eastern Diamondback Rattlesnake (*Crotalus adamanteus*)

Status: Petitioned (Federal).

Eastern diamondback rattlesnakes are common in the Florida panhandle and are likely present on NSA Panama City. They generally live in dry, pine flatwoods, sandy woodlands, and coastal scrub habitats. Although the eastern diamondback is not endangered, indiscriminate killing and widespread loss of habitat have decreased its numbers throughout its range. This INRMP protects habitat for the eastern diamondback rattlesnake through active management of factors such as invasive and exotic species (Section 5.1.2), landscaping and grounds maintenance (Section 5.1.5), timber stand improvement (Section 5.2.1), and reforestation (Section 5.2.2). Projects described in this INRMP that benefit and conserve eastern diamondback habitat include Invasive and Exotic Species Removal, Prescribed Burns, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, Survey and Inventory of Biological Resources, Forest Management Inventory System, and Longleaf Pine and Wiregrass Restoration (see Appendix A for descriptions).

Florida Manatee (*Trichechus manatus latirostris*)

Status: Threatened (Federal and State).

Florida manatees range throughout coastal and freshwater Florida waters and individuals can move long distances seasonally, although their distribution is restricted to springs and other relatively warm-water areas during the coldest weeks of winter. They have been periodically observed in the waters adjacent to NSA Panama City such as Alligator Bayou. Manatees are herbivorous and feed primarily on aquatic grasses in

saltwater and freshwater. They are threatened by vessel collisions and habitat loss. This INRMP protects habitat and water quality for Florida manatees through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve manatee habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Giant Manta Ray (*Manta birostris*)

Status: Proposed Threatened (Federal).

The giant manta ray has a worldwide distribution in tropical and temperate climates. It spends most of its time in offshore waters, but occasionally ventures into to coastal waters, where it may come in vicinity of NSA Panama City, although the likelihood is probably low. This INRMP protects water quality to the benefit of species such as the giant manta ray through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve the quality of adjacent coastal waters include Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Status: Threatened (Federal and State).

The Gulf sturgeon is anadromous; adults and sub-adults spend the coldest three to four months in the Gulf of Mexico and the remainder of the year in rivers where spawning occurs. Spawning typically takes place from February to April. Gulf sturgeons typically occur in water bodies adjacent to NSA Panama City (St. Andrews Bay) in September and October. This INRMP protects habitat and water quality for Gulf sturgeon through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve Gulf sturgeon habitat include Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Monarch Butterfly (*Danaus plexippus plexippus*).

Status: Petitioned (Federal).

The monarch butterfly is found throughout the United States during warm months, but migrates to Mexico during winter. Monarch caterpillars exclusively eat milkweed leaves, so the presence of milkweed (*Asclepias* spp.) is a crucial habitat requirement. Milkweed protection is therefore a key component of monarch butterfly conservation. This INRMP protects habitat for monarch butterflies through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and landscaping and grounds maintenance (Section 5.1.5). Projects described in this INRMP that benefit and conserve monarch butterfly habitat include Invasive and Exotic Species Removal, Prescribed Burns, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for descriptions).

Piping Plover (*Charadrius melodus*)

Status: Threatened (Federal and State).

The Piping Plover lives the majority of its life on open sandy beaches or rocky shores, often in high, dry sections away from water. It builds its nests higher on the shore near beach grass and other objects. Potential sightings of the piping plover have been reported at NSA Panama City gulf beach sites. This INRMP protects habitat for the Piping Plover through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve piping plover habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Red Knot (*Calidris canutus* ssp. *rufa*)

Status: Threatened (Federal).

The red knot migrates long distances between southern non-breeding habitats, as far south as southern South America, and nesting habitats in the Canadian arctic tundra. Flocks migrate north and south through the contiguous United States from April through October, with most breeding taking place in Canada between late May and mid-August. Red knots primarily utilize tidal flats and beaches along seacoasts during their migration and, so, could occur on coastal habitats at NAS Panama City. This INRMP protects

potential habitat for red knots through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve potential red knot habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Sea Turtles:
Green Sea Turtle (*Chelonia mydas*)
Hawksbill Sea Turtle (*Eretmochelys imbricata*)
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
Leatherback Sea Turtle (*Dermochelys coriacea*)
Loggerhead Sea Turtle (*Caretta caretta*)

Status: Green and Loggerhead are Threatened (Federal and State). Others are Endangered (Federal and State).

All five sea turtle species are primarily pelagic, but could venture into the embayments adjacent to NSA Panama City; this is particularly true for green sea turtles, Kemp's Ridley sea turtles, and loggerheads. Nesting typically occurs during summer months on sandy beaches facing open water; no nesting has been documented at NSA Panama City, although it is possible seaward of the dunes at Beach Site 4. The green sea turtle feeds upon seagrasses and algae and the other four species eat jellyfish, crabs, mollusks, and fish. This INRMP protects habitat and water quality for sea turtles through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve sea turtle habitat include Soil Erosion Control, Wetlands Delineations, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Snowy Plover (*Charadrius nivosus*)

Status: Threatened (Federal and State).

The diminutive Snowy Plover is a year-round resident of undisturbed, Gulf Coast beaches. This well-camouflaged species nests on large sandy beaches between April and July, laying eggs in a shallow scrape. The eggs and chicks are vulnerable to trampling by pedestrians and vehicles on beaches. Snowy plovers eat insects, worms, crustaceans and other invertebrates. Potential sightings of the Snowy Plover have been reported at gulf beach sites near NSA Panama City. This INRMP protects habitat for the snowy plover through active management of factors such as wetlands (Section 5.1.1), invasive and exotic

species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve snowy plover habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

6.1.2.2 State-listed Species

Godfrey's Golden Aster (*Chrysopsis godfreyi*)

Status: Endangered (State).

Godfrey's Golden Aster occurs as scatted plants behind sand dunes, in scrub openings, and beside beach roadsides along the west Florida panhandle. This INRMP protects habitat for Godfrey's golden aster through active management of factors such as invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and landscaping and grounds management (Section 5.1.5). Projects described in this INRMP that benefit and conserve Godfrey's golden aster habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for project descriptions).

Large-leaved Jointweed (*Polygonella macrophylla*)

Status: Threatened (State).

Large-leaved Jointweed occurs in two small areas of remnant scrub within the boundaries of NSA Panama City: on the USCG Station property and on the southeast side of the installation. Habitat protection for the large-leaved jointweed will include prescribed burning, reforestation with long-leaf pine, and maintenance of the longleaf pine scrub community where it is currently found. Management practices, such as thinning pines to enhance habitat , will be implemented. This INRMP protects habitat for large-leaved jointweed through active management of factors such as invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), timber stand improvement (Section 5.2.1), and reforestation (Section 5.2.2). Projects described in this INRMP that benefit and conserve large-leaved jointweed habitat include Invasive and Exotic Species Removal, Prescribed Burns, Wetlands Delineations, Nature Trail Development, Survey and Inventory of Biological Resources, Forest Management Inventory System, and Longleaf Pine and Wiregrass Restoration (see Appendix A for descriptions).

Least Tern (*Sterna antillarum*)

Status: Threatened (State).

Least terns typically nest on flat beach habitat with coarse sand or shells and little or no vegetation. However, habitat loss due to coastal development has resulted in increased instances of least terns nesting on tar-and-gravel roofs. This strategy has also resulted from increased predation by nuisance species such as feral cats. Building 110 on NSA Panama City has become a least tern nesting site. To protect nesting terns on such man-made structures, NSA Panama City will implement the following actions, as warranted:

- Scatter plastic shipping pallets to provide a structure for chicks to escape from heat, desiccation, and predation, when other shelter is not available. Plastic pallets are preferred to wood since warped wood makes the chicks more susceptible to predation.
- Close off rooftops to humans where active nesting is occurring during the spring and summer breeding season.
- Install "chick fencing," as necessary, on roofs where nesting occurs.

This INRMP further protects habitat for least terns through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve least tern habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for descriptions).

Little Blue Heron (*Egretta caerulea*)

Status: Species of Special Concern (State).

The Little Blue Heron is a wading bird that ranges throughout the southeastern United States. Population estimates indicate a decrease due to destruction and elimination of wetlands. Potential Little Blue Heron habitat on NSA Panama City includes the Salt Marsh. This INRMP protects habitat for the little blue heron through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and timber stand improvement (Section 5.2.1). Projects described in this INRMP that benefit and conserve little blue heron habitat include Invasive and Exotic Species Removal, Prescribed Burns, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, Survey and Inventory of Biological Resources, and Forest Management Inventory System (see Appendix A for descriptions).

Snowy Egret (*Egretta thula*)

Status: Species of Special Concern (State).

The snowy egret is a small and active wading bird whose diet primarily consists of shrimp, small fish, and small invertebrates. It feeds in fresh and salt water habitats within flocks of other wading birds. Snowy egrets commonly prefer shallow estuarine areas including mangroves, shallow bays, salt marsh pools, and tidal channels. Similar to other wading birds that depend on fragile estuaries and wetlands for foraging and breeding, snowy egrets are at risk of exposure to persistent contaminants such as heavy metals (ex. mercury) and pesticides. Other potential threats to snowy egret populations are alterations to the hydrology of foraging areas, and oil spill impacts to critical breeding, foraging, and roosting sites. Potential habitat for the Snowy Egret at NSA Panama City is the salt marsh. This INRMP protects habitat for the Snowy Egret through active management of factors such as wetlands (Section 5.1.1), soil conservation and erosion (Section 5.1.3), stormwater and water quality (Section 5.1.4), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve Snowy Egret habitat include Invasive and Exotic Species Removal, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, and Survey and Inventory of Biological Resources (see Appendix A for descriptions).

6.3.1.2.3 Other Rare Animal and Plant Species

The Natural Resources Manager will undertake measures, as appropriate, to ensure activities and actions conducted on the NSA Panama City are not detrimental to other rare animal and plant species and habitats upon which they depend.

Carolina Lilaeopsis *(Lilaeopsis carolinensis)*

Status: None.

Carolina lilaeopsis is a plant that occurs in freshwater marshes, ditches, and on the shores of ponds. This species has been identified as very rare, but occurs in a drainage ditch on the north side of the installation, in Alligator Bayou, and in the ponds near Building 304 (FNAI 1997). NSA Panama City will maintain the communities in which the species has been found (it thrives in sun and open drainage ditches, but also does well in the slow moving water at the stream edge), will avoid the use of herbicides around these areas, and will only mow these areas after seed dispersal. This INRMP protects habitat for Carolina lilaeopsis through active management of factors such as wetlands (Section 5.1.1), invasive and exotic species (Section 5.1.2), soil conservation and erosion (Section 5.1.3), and floodplains (Section 5.1.6). Projects described in this INRMP that benefit and conserve

Carolina lilaeopsis habitat include Invasive and Exotic Species Removal, Prescribed Burns, Soil Erosion Control, Wetlands Delineations, Nature Trail Development, Survey and Inventory of Biological Resources, and Forest Management Inventory System (see Appendix A for descriptions).

Environmental Considerations: Conservation of potentially-dangerous species, such as eastern diamondback rattlesnakes and American alligators, requires appropriate dissemination of appropriate safety advice to installation users.

Applicability of Other Management Issues: The following management issues, programs, and actions are directly or indirectly related to the wildlife management and will be consulted for additional management information or provided as additional training and education:

- Timber stand improvement – Section 5.2.1 – cuts and burns will be used for habitat management;
- Long-Term Management Practices – Section 5.1;
- Using volunteer groups, including local Scout troops, and interested installation personnel for habitat construction projects;
- Invasive species management will be integrated as part of NSA Panama City's grounds maintenance program and pest management program;
- Grounds Maintenance Program – include a special management program for areas supporting large-leaved jointweed.

Ecosystem Management: By effectively managing wildlife resources on the installation, NSA Panama City is not only enhancing wildlife communities, but may also be providing opportunities for new species and migratory species. For example, increasing large-leaved jointweed habitats may benefit other species and facilitate their introduction or re-introduction to the site. Such species include at least five rare vertebrates – gopher tortoise, gopher frog, indigo snake, pine snake, and eastern diamondback rattlesnake – that are dependent upon open forest canopy and prescribed fire to provide suitable habitat.

Military Mission: Without a complete understanding of impacts on fish and wildlife species, especially threatened or endangered species, actions and activities implemented by the NSA Panama City may counter federal or state legal requirements and thus may threaten the continuation of the military mission. For example, the USFWS or FWC may halt any development or training affecting a threatened or endangered species. Similarly, FDEP might rescind its permit authorizations for entity actions that violate special conditions implemented to protect listed species.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Fish and Wildlife Management:

Endangered Species Act, 16 U.S.C. 35, 32 CFR 190, provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. Requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.

Migratory Bird Treaty Act, as amended 16 USC 703-712, prohibits the taking or harming of a migratory bird, its eggs, nests, or young without the appropriate permit.

Sikes Act, as amended 16 USC 670 a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency.

Marine Mammal Protection Act of 1972, 16 USC 1361-1407, prohibits the taking or harming of marine mammals without the appropriate permit.

Fish and Wildlife Conservation Act, 16 U.S.C. 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.

Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668d, 54 Stat. 250, provides for the protection of the bald eagle and the golden eagle by prohibiting the take, possession, etc. of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.

OPNAVINST 5090.1D, 12-3.7, discusses laws that govern natural resources management relating to the protection and management of federally threatened and endangered species.

Florida Statutes, Chapter 370.12, regulates the taking, killing, destroying, harassing, disturbing, and molesting of any marine turtle.

Florida Statutes, Chapter 370.072, Florida Endangered and Threatened Species Act, is to conserve, protect, and manage the threatened and endangered species and their habitats.

6.3.2 Migratory Bird Management

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711) prohibits the unauthorized take of migratory birds, their eggs, nests, and feathers. Game birds are not protected by this Act, but their takes are governed by State hunting regulations. Migratory birds face serious challenges, including habitat loss, collisions with man-made structures, and environmental contaminants, which can result in species decline. Protecting migratory birds requires a coordinated effort involving multiple jurisdictions and interests because many species migrate across national boundaries, watersheds, and ecosystems. Under the

MBTA, the Navy is compelled to exercise due diligence for activities requiring NEPA analysis and must develop appropriate and reasonable conservation measures to avoid, minimize, and mitigate adverse effects to migratory birds and their nests resulting from such activities.

Issue: Migratory birds at NSA Panama City are protected under the MBTA against take for normal and routine operations such as installation support functions. Take includes pesticide application, nest or egg removal, and tree removal. The temporal and spatial presence of migratory bird species must therefore be considered when carrying out all management activities described in this INRMP. Habitat modification as a result of timber sales would not constitute a take; neither would nest removal outside nesting season.

Goals, Objectives, Strategies, and/or Projects: Table 6-14 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to wildlife damage issues.

Table 6-14. Natural Resources Management Goals, Objectives, and Strategies Related to Wildlife Damage

Goals	Objectives	Strategies	Comments
3	3.2	3.2.1	Maintain knowledge of migratory birds on base

Long-Term Management: Avoiding and minimizing impacts to migratory birds begins with an up-to-date working knowledge of species presence, seasonality, nesting habits, and habitat condition on the installation. The NRM will therefore ensure that migratory bird surveys are regularly completed on NSA Panama City. These surveys shall follow the guidance and recommendations in the DOD Coordinated Bird Monitoring Plan for survey design and data management. Additional guidance and information is available on the DOD Partners in Flight Monitoring Working Group website (www.dodpif.org). The NRM and Regional Natural Resources support staff will use collected data to avoid, minimize, and mitigate impacts to migratory birds resulting from activities on NSA Panama City. Because most migratory birds cross installation and state boundaries, data sharing is a vital component to their management. Data collected at the installation will be shared with federal and state agencies through participation in programs such as the Breeding Bird Research and Monitoring Database (BBIRD), eBird, and Monitoring Avian Productivity and Survivorship (MAPS). Public outreach opportunities, such as Christmas Bird Counts and wildlife viewing opportunities will continue to be promoted on the installation.

Applicability of Other Management Issues and NSA Panama City Programs: Many transient bird species at NSA Panama City forage in coastal and wetlands habitats, so management of wetlands and water quality is pivotal to proper migratory bird management. Landscaping and grounds maintenance personnel should be aware not to remove active bird nests.

Ecosystem Management: Migratory bird management is one component of ecosystem management on NSA Panama City. Benefits of other management activities described in this INRMP, such as marine coastal management, wetland management, and nuisance animal control all benefit migratory bird management, and vice-versa. Many birds that migrate through the installation spread seeds, eat rodents, and perform other functions that benefit the health of the entire ecosystem.

Military Mission: Appropriate landscaping and management of migratory birds will help alleviate potential hindrances to the military mission. The integration of the various management actions described in this INRMP and an understanding of how they all relate to migratory bird management will enable the NSA Panama City to accomplish all its training objectives within the framework of the MBTA.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Migratory Bird Management:

Migratory Bird Treaty Act, as amended 16 U.S.C. 703-712, prohibits the taking or harming of a migratory bird, its eggs, nests, or young without the appropriate permit.

Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668c, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, describes specific actions 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 the MBTA.

2003 National Defense Authorization Act, exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.

Endangered Species Act, 16 U.S.C. 35, 32 CFR 190, provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. It requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.

Sikes Act, as amended 16 U.S.C. 670a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency.

Fish and Wildlife Conservation Act, 16 U.S.C. 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the

maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.

Fish and Wildlife Conservation Act, 16 U.S.C. 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.

OPNAVINST 5090.1D, 12-3.5(b)(1), discusses natural resources management relating to migratory birds.

OPNAVINST 5090.1D, 12-3.5(b)(2), discusses natural resources management relating bald and golden eagles.

Additional Sources of Information:

Smithsonian National Zoological Park, Migratory Bird Center
http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/

USFWS Division of Migratory Bird Management
http://www.fws.gov/migratorybirds/

Birds of Conservation Concern
www.fws.gov/migratorybirds/reports/BCC2002.pdf

East Gulf Coastal Plain Priority Bird Populations and Habitats
http://www.blm.gov/wildlife/pl_04sum.htm

Migratory Bird Treaty Act
http://www.fws.gov/permits/mbpermits/regulations/mbta.hml

The Nature Conservancy, Migratory Bird Program
http://www.nature.org/initiatives/programs/birds/

6.3.3 Prevention and Control of Wildlife Damage and Wildlife Disease

6.3.3.1 Prevention and Control of Wildlife Damage

The prevention and control of wildlife damages are actions to reduce a species conflict with people or other wildlife species.

Issue: Gray foxes (*Urocyon cinereoargenteus*), raccoons, white-tailed deer, gray squirrels, coyotes, opossums, feral dogs, and feral cats (*Felis catus*) are known to occur on the installation and at the Beach Sites. Feral cat colonies are particularly harmful to birds and small federally-listed species, as well as to public health. All of the animals mentioned above can damage vegetation and structures and potentially conflict with other wildlife and people. Such damages and conflicts must be monitored, discouraged, and remedied.

Goals, Objectives, Strategies, and/or Projects: Table 6-15 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to wildlife damage issues.

Table 6-15. Natural Resources Management Goals, Objectives, and Strategies Related to Wildlife Damage

Goals	Objectives	Strategies	Comments
2	2.1	2.1.2.	Public Awareness of nuisance wildlife

Long-Term Management: When NSA Panama City identifies a wildlife conflict, a damage control program is established. The program has four parts (Dolbeer et al. 1994):

1. Problem definition: to determine the species and number of animals causing the problem, the amount of loss or nature of the conflict, and other biological and social factors related to the problem. To accomplish this, NSA Panama City will keep records for the following:
    - White tailed deer. Determine the effects of browsing on native species.
    - Opossum and raccoon. Keep records of animals that are unafraid of people and the amount of garbage raiding by these animals.
    - Predators (e.g., coyotes and feral dogs). Keep records of animals that are unafraid of people, and, in cases of animal deaths on the installation due to predators, determine what type of predator killed the animal.
    - Squirrels. Keep records of damage to structures.
2. Ecology of the problem species: to understand the life history of the species, especially in relationship to the conflict.
3. Control method: takes the information gained from parts 1 and 2 and develops an appropriate management program to alleviate or reduce the conflict.
4. Evaluation of control: assesses the reduction in damage in relation to costs and impact of the control on target and non-target populations and the environment.

Information on damage prevention and control methods for wildlife species can be found in an article series provided by the University of Nebraska Cooperative Extension Service, Great Plains Agricultural Council, and the USDA. The series is located at: http://www.ces.ncsu.edu/nreos/wild/wildlife/prevent.html.

Environmental Considerations During Management Practices: Impacts on nontarget species and the environment.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of wildlife damage and will be consulted for additional management information or provided as additional training and education: NSA Panama City's existing Pest Management Plan (PMP).

6.3.3.2 Wildlife Disease

Diseases transferred between wildlife species and/or diseases transferred directly or indirectly from wildlife species to humans.

Issue: Diseases of wildlife can cause significant illness and death to individual animals and can significantly affect wildlife populations. Wildlife species can also serve as natural hosts for certain diseases that affect humans (zoonoses). The disease agents or parasites that cause these zoonotic diseases can be contracted from wildlife directly by bites or contamination or indirectly through the bite of arthropod vectors such as mosquitoes, ticks, fleas, and mites (McLean 1994).

Goals, Objectives, and Strategies: Table 6-16 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to wildlife disease issues.

Table 6-16. Natural Resources Management Goals, Objectives, and Strategies Related to Wildlife Disease

Goals	Objectives	Strategies	Comments
2	2.1	2.1.2.	Public awareness of wildlife diseases

Long-Term Management: There have been no reports of diseases affecting wildlife or humans on the NSA Panama City, or significant wildlife disease outbreaks in the region. However, NSA Panama City will have a long-term management policy of public awareness (e.g., informing employees and visitors). Management will focus on, but will not be limited to, the following issues:

- Knowledge of the diseases in the area and the specific times of year that present the greatest risk of exposure.
- Knowledge of and recognition of early symptoms of diseases and the condition of exposure.
- The use of extreme caution when approaching or handling a wild animal, especially one that looks sick or abnormal.
- The use of protective measures against fungal diseases where there is an accumulation of animal feces (e.g., under bird roost)
- Protection from vector-borne disease in high-risk areas using measures such as mosquito or tick repellent or wearing special clothing.
- Reduction in host populations and their ectoparasites.

Literature on wildlife diseases and humans can be found in a series of articles provided by the University of Nebraska Cooperative Extension Service, Great Plains Agricultural Council, and the USDA (see McLean 1994; http://www.ces.ncsu.edu/nreos/wild/wildlife/prevent.html).

Environmental Considerations During Management Practices: None.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of wildlife disease and will be consulted for additional management information or provided as additional training and education:

- Pest Management Plan;
- Habitat Enhancement – Section 5.3.1 – habitat improvement such as bat boxes for biological predators.

Ecosystem Management: Species damaging the human environment are frequently receiving supplemental food as part of the damage. This supports abnormally elevated populations of the damaging species, which has deleterious effects on other components of the ecosystem. Returning the species to normal population levels while controlling the damage is consistent with ecosystem management concepts.

Military Mission: Nuisance wildlife and/or the outbreak of disease on the installation could pose a threat to implementation of the military mission through the infection of military personnel, the consequent limitation of access to areas of the installation to control a problem, and/or direct damage to equipment, structures, and facilities on the installation.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Wildlife Damage and Disease:

Forest Pest Suppression Memorandum of Agreement between the Department of Agriculture and DoD, 11 December 1990, is the planning, coordination, and execution of field operations to prevent and suppress damaging forest insects and disease outbreaks.

Additional Sources of Information:

Telephone Contacts:

USDA NRCS, Chipley, Florida Service Center - (850) 638-1982

Internet Addresses:

Wildlife damage and diseases information provided by the University of Nebraska Cooperative Extension Service, Great Plains Agricultural Council, and the USDA: http://www.ces.ncsu.edu/nreos/wild/wildlife/prevent.html

Nuisance Wildlife Control Information: http://www.aphis.usda.gov/ws.

USGS National Wildlife Health Center Web: http://www.emtc.usgs.gov/nwhchome.html.

Wildlife Disease/Health Related Links: http://www.emtc.nbs.gov/http_data/whip/links.html.

6.4 Outdoor Recreation

Outdoor recreation is the public or military use of natural resources. These include interpretive (education) centers, where the focus is on understanding the natural environment. Activities may include, but are not limited to, nature trails, picnic and camping areas, consumptive and non-consumptive uses of natural resources, establishment and management of recreational trails and educational opportunities. It does not include highly developed outdoor uses such as golf courses, tennis courts, ball and athletic fields, marinas, or swimming pools.

Concentrated recreation opportunities are those activities that occur in a specific area (e.g., picnicking, camping, fitness trails, archery, interpretive centers).

Dispersed recreation opportunities refer to those activities in which the recreation enthusiast moves within and through a designated area (e.g., hiking, boating).

Public access is defined herein as the right of the general public to enter and use installation facilities. Opportunities are defined herein as the availability of natural resources to be used for recreational activities.

General Information: The MWR department of NSA Panama City is the primary entity responsible for maintaining and developing outdoor recreational activities on NSA Panama City. Most of the programs and facilities maintained by MWR have been established for many years. NSA Panama City's environmental office reviews and provides recommendations and guidance for all new projects proposed by MWR.

Issue: There are two issues related to recreational activities. First, when considering NSA Panama City's anticipated growth (NSA Panama City 1999), more and improved recreational facilities and services will be needed. As growth occurs, already limited recreational facilities and services will become more limited as demand increases and as additional NSA Panama City property is committed to non-recreation. The second issue involves how to provide outdoor recreational opportunities to the public in adherence with the security concerns of senior management. Currently, access to the installation's recreational resources is limited to uniformed military personnel and dependents, retired

military personnel, and DoD civilians (herein this group is referred to as DoD personnel). Public access to the installation is not permitted due to the following concerns expressed by senior management: (1) lack of transportation infrastructure to support additional traffic; (2) munitions storage and associated ESQD arcs on the southern end of the installation; and (3) mission security concerns.

Goals, Objectives, and Strategies: Table 6-17 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to recreational opportunities issues.

Table 6-17. Natural Resources Management Goals, Objectives, and Strategies Related to Recreational Opportunities

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages installation personnel participation through training and education
1	1.2	1.2.4	Uses citizen participation to educate
4	4.1	4.1.1	Supports the need for recreation planning
4	4.2	4.2.1	Develops trail and wildlife viewing and listening areas
4	4.2	4.2.2	Expands trail

Long-Term Management: St. Andrews State Recreation Area provides a variety of dispersed and concentrated outdoor recreational activities. Because of this, NSA Panama City will focus on providing public access facilities for educational and limited, concentrated recreational opportunities. Concentrated opportunities will generally be ancillary to educational opportunities. NSA Panama City will locate public access facilities in consideration of the concerns of senior management mentioned above. NSA Panama City will continue to provide concentrated and dispersed recreational activities on NSA Panama City for DoD personnel.

In the short-term, NSA Panama City will provide public access to natural based recreational activities through the development of an interpretive trail and open-air classroom at the southern boundary of the installation. To provide this opportunity to the public while maintaining military security and safety concerns, the project has been located outside the ESQD arc and NSA Panama City has constructed an additional fence line that separates the interpretive trail from the active part of NSA Panama City.

This project will provide the following wildlife and recreational opportunities to DoD personnel and the public:

- An opportunity to view and experience terrestrial wildlife and habitats. The interpretive trail will meander through upland and maritime hammock communities.
- Access the shoreline of St. Andrew Bay. This will provide the visitor an opportunity to view and experience aquatic wildlife.
- An opportunity to introduce the visitor to one of the installation's Indian middens sites.
- An educational opportunity for children and adults. The open-air classroom will provide opportunities for all ages to learn about the history and the environment of the area.

Other than the interpretive trail, NSA Panama City is not considering opening existing natural resources-based outdoor recreational facilities to the public because of concerns expressed by senior management. Over the long-term, NSA Panama City will consider providing recreational opportunities for DoD personnel and the public outside the boundaries of the ESQD arc on the southern portion of the installation adjacent to the interpretive trail. Any future recreational development in this area will not be permitted to adversely impact wildlife species or their habitats or NSA Panama City's military mission.

In the event that the right of public access to the installation changes and/or additional recreational facilities are constructed, NSA Panama City will separate outdoor activities that are noisy or hazardous to non-participants from more passive recreational activities. For instance, dispersed and concentrated recreational opportunities might conflict. Therefore, NSA Panama City will group concentrated activities to: (1) reduce potential for conflicts with dispersed activities; (2) minimize impacts to environmental resources by concentrating activities in a single area; and (3) reduce infrastructure expenditure (e.g., for restrooms, utilities) in support of the recreational activity.

Environmental Considerations During Management Practices: Environmental considerations will depend on the type and location of facility development, but may include impacts to terrestrial and aquatic wildlife species and habitats, water quality, and soils.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of outdoor recreation and will be consulted for additional management information or provided as additional training and education:

- Habitat Enhancement – Section 5.3.1 – watchable wildlife;

- Wetlands – Section 5.1.1 – buffers for watchable wildlife;
- Using volunteer groups, including local Scout troops, and interested installation personnel to offer hands-on training or individual participation in the development of outdoor recreational facilities.

Ecosystem Management: Ecosystem management practices are enhanced by environmental stewardship and by educating the general public about environmental conservation issues, problems, and solutions. By providing natural recreational and educational opportunities on the installation, NSA Panama City will help create and enhance public awareness of vital environmental resource issues, thus providing a regionally limited educational resource. In addition, using volunteer groups and/or installation personnel for the physical construction of recreational and educational facilities provides opportunities for educating group members on the values and characteristics of a healthy environment, and on some of the problems and solutions associated with human use of the environment.

Military Mission: Outdoor recreational opportunities are dependent upon the environment and the security and safety constraints of the military mission. Outdoor recreational opportunities must be developed and used consistently with the sustainability of the land. The over-utilization or improper location of an outdoor recreation area may impact natural resources and the military mission. Overall, outdoor recreational activities add to the quality of life for military personnel and dependents.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Outdoor Recreation:

Sikes Act and Improvement Act of 1997, 16 U.S.C. 670a(b)(1)(G), requires public access to a military installation for the necessary, appropriate, and sustainable use of natural resources by the public to the extent that the use is not inconsistent with the needs of the fish and wildlife resources or with safety and military security.

Outdoor Recreation – Federal/State Program Act, 16 U.S.C. 460 P-3, defines a program for managing lands for outdoor recreation.

OPNAVINST 5090.1D, 12-3.11, discusses natural resources management relating to the protection and management of outdoor recreational resources.

Additional Sources of Information:

Telephone Contacts:

Florida Department of Environmental Protection, Division of Recreation and Parks – (850-245-3029)

6.5 Land Impact Guidelines

Land impact is defined herein as an activity (e.g. construction of buildings, infrastructure facilities, training or other human-made structures) which has the potential for an adverse affect on the function of NSA Panama City's ecosystem.

Issue: Because of the small size of the installation and the anticipated demand for the future use of land to support the military mission, NSA Panama City needs to establish land improvement guidelines that support the military mission while minimizing adverse impacts to the installation's environmental and ecological resources.

Goals, Objectives, and Strategies: Table 6-18 presents the natural resources management goals, objectives, and strategies (see Section 4) that are most directly relevant to land impact guidelines.

Table 6-18. Natural Resources Management Goals, Objectives, and Strategies Related to Land Impact Guidelines

Goals	Objectives	Strategies	Comments
1	1.1	1.1.1	Planning
1	1.1	1.1.2	Integrate programs
3	3.1	3.1.4	BMPs for water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)
3	3.2	3.2.2	Habitat protection and enhancement

Long-Term Management: NSA Panama City will employ the following guidelines to minimize impacts to the installation's environmental and ecological resources.

Activity Site Selection Guidelines: Locations for new activities will occur in the order below. This ordering does not consider necessary infrastructure and military mission requirements.

1. Sites will be located on previously disturbed, buildable areas north of Alligator Bayou, as identified in the 2011 Master Plan;
2. Sites will be located on buildable areas north of Alligator Bayou, as identified in the 2011 Master Plan;
3. Sites will be located on previously disturbed areas south of Alligator Bayou, as identified in the 2011 Master Plan; and
4. Sites will be located on buildable areas south of Alligator Bayou, as identified in the 2011 Master Plan.

The above ordering does not consider necessary long-term measures for protecting the following areas: the 100-year floodplain, 50-foot wetland and shoreline buffer areas, archaeological areas, wetlands, ESQD arc, areas known to have occurrences of threatened or endangered species, and areas of high quality natural communities.

New building and training activities will be located so that habitat fragmentation does not occur or is minimized. Fragmentation undermines the ecological process through the separation of wildlife populations. Buildings and training activities will be located on the edges of forested areas and will not be arbitrarily located within the middle of forested areas. NSA Panama City needs to minimize additional edge effects and maximize habitat for forest interior species.

Transportation infrastructure will be located so that habitat fragmentation does not occur. A linear feature bisecting a marginally sustainable habitat has the potential to render the resulting pieces unsustainable.

Site Plan Activity Guidelines:

- A natural vegetation buffer of 30 feet will be maintained between the new facility or training area and roadway frontage to provide wildlife habitat and aesthetic value.
- New facilities or training activities will not be located within a 50-foot vegetative buffer surrounding an existing wetland or within the undeveloped 50-foot area adjacent to St. Andrew Bay in order to protect the water, wildlife, and vegetative habitat qualities.
- Wildlife habitat enhancements will be required for new activities that affects wildlife habitat. As part of the site planning and construction phase, NSA Panama City will:
  - provide nest boxes for birds and bats; and
  - leave brush material along woodland edge after necessary cuttings.
- Only the area necessary for the building footprint, parking, and security and safety of the site will be cleared for new development. This will help preserve the natural community, reduce future grounds maintenance costs, and minimize soil erosion.
- Xeriscaping will be used for all landscaping.
- Pervious surface will be evaluated for use in place of impervious surfaces. For example, NSA Panama City will evaluate the use of grass, wood chip, or gravel surfaces for vehicular parking instead of paved areas, or NSA Panama City will evaluate constructing wooden decks instead of concrete patios.
- Stormwater generated by new activity will be retained within the boundaries of the installation.

- Stormwater retention facilities will be developed as wetlands provided that funding and land area is available.
- BMPs will be implemented during site disturbance activities to avoid impacts to water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010).
- NSA Panama City will not engage in an activity in an area that might result in an impact to threatened and endangered species or their habitats.

Environmental Considerations During Management Practices: None.

Applicability of Other Management Issues and NSA Panama City Programs: The following management issues, programs, and actions are directly or indirectly related to the management of land impacts and will be consulted for additional management information or provided as additional training and education:

- Wetlands – Section 5.1.1 – buffers;
- Landscape and Maintenance – Section 5.1.5 – xeriscaping;
- Stormwater and water quality control – Section 5.1.4 – retention ponds with buffers for new development;
- Habitat Enhancement – Section 5.3.1 – enhancement practices for areas disturbed;
- Floodplain – Section 5.1.6 – outside the 100-year floodplain;
- Ground Maintenance Program; and
- Water Quality BMPs (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010).

Ecosystem Management: The inevitable need for development requires that site selection and site planning be implemented to minimize impacts to the installation's ecosystem.

Military Mission: Proper site selection and site planning will ensure that development activities do not occur in violation of federal or state law.

Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Facility Development:

Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, prohibits the discharge of dredged or filled materials into waters of the United States, including wetlands, without first obtaining a permit from USACE (Section 404 of the CWA).

Executive Order (EO) 11990, 24 May 1977, as amended, requires government agencies, in carrying out agency actions and programs affecting land use, provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Clean Water Act: Section 401 Water Quality Certification, 1986, 33 U.S.C. 1341, requires that States certify compliance of federal permits or licenses with state water quality requirements and other applicable state laws. Under Section 401, States have authority to review any federal permit or license that may result in a discharge to wetlands or other waters under State jurisdiction to ensure that the actions would be consistent with the State's water quality requirements.

Federal Noxious Weed Act of 1974, 7 U.S.C. 2801 et. seq., provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 136, requires that all pesticides, whether for commercial or private use, be applied in accordance with product labeling and that containers are properly disposed of. EPA is responsible under FIFRA for the registration of all pesticide active ingredients used in the United States.

Federal Plant Pest Act, 7 U.S.C. 150aa et seq., regulates the importation and interstate movement of plant pests and authorizes the Secretary of Agriculture to take emergency measures to destroy infected plants or materials.

Florida Statutes, Chapter 487, the Florida Pesticide Law, regulates the distribution and use of pesticides.

Florida Statutes, Chapter 482, Structural Pest Control Act, requires using pesticides for their intended purpose in accordance with the registered labels or as directed by the EPA.

Florida Statutes, Chapter 369.2, Florida Aquatic Weed Control Act, regulates noxious aquatic weeds on public lands.

Florida Statutes, Chapter 369.252, Invasive Exotic Plant Control, requires a program to be established to eradicate or maintain control of the species detrimental to the State's natural environment.

Executive Order 11988, Floodplain Management, May 24, 1977, requires federal service agencies to avoid construction or management practices that will adversely affect floodplains, unless it is found that: 1) there is no practical alternative and 2) the proposed action has been designed to minimize harm to or within the floodplain.

The President's April 16, 1994, Memorandum on Environmentally Beneficial Landscaping, requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.

Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.

Endangered Species Act, 16 U.S.C. 35, 32 CFR 190, provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. Requires federal agencies ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.

Florida Statutes, Chapter 370.072, Florida Endangered and Threatened Species Act, intends to conserve, protect, and manage the threatened and endangered species and their habitat.

Additional Sources of Information: None

7 Functional Areas and Management Focus

This section presents the functional areas of NSA Panama City and the focus of natural resources management in each functional area. This section also discusses other management practices that will occur within the functional area. Tables are provided showing the goals, objectives, and strategies that will be achieved through implementation of the resource management focus in each functional area on the installation.

Functional Areas. Functional areas are established in the plan to acknowledge the use of the area for its military purpose and for considering the opportunities to achieve natural resources management goals and objectives. In classifying a functional area, it is recognized that existing facilities and activities on the land are largely fixed. Property at an installation can be classified into one or more of the following functional areas.

Protected Areas (P). This classification will include land protected due to the unique natural, cultural or aesthetic value. Examples include rare geologic features, significant historical sites, natural heritage sites, threatened and endangered species critical habitat, unique high-value recreation areas, and exemplary natural communities.

Operational Protected Areas (OP). This classification will include areas vital to the continuance of the military mission, and that are intensively utilized for this purpose. Examples include intensively developed/built areas, dredge spoil sites; high security restricted areas, industrial support areas, and BASH areas.

Mixed-Use Management Areas (MU). Lands where low- or moderate-intensity military uses occur within areas that are largely in a natural condition, contain valued natural features, and/or have the potential to yield significant natural resources-based benefits through effective management practices. Consistent with the military mission, non-timber values such as wildlife habitat, water quality (wetland, stormwater and floodplains protection), recreational potential or urban forestry management is the bases for management decisions. Examples include streamside management zones, cypress domes and ponds, fresh water fisheries, shoreline; habitat for established conservation priorities, grounds maintenance and urban forestry.

Timber/Agricultural Areas (T/A). This classification includes land where timber management is the primary objective and includes areas that may be designated for commercial harvesting. However within each area the management intensity will be considered against factors such as regulations, economic and wildlife considerations, slope stability concerns, soils, inaccessibility, aesthetics or lower site productivity. Examples include bottomland hardwood stands, upland hardwood/softwood areas with natural regeneration, wildlife corridors, and stands with extended rotation ages.

Management Focus. The focus of natural resources management within a functional area provides geographic emphasis for the primary management practices necessary to achieve the long-term goals and objectives of the INRMP. The management focus for functional areas is determined not only with consideration for opportunities within each individual area, but also collectively for all functional areas so that the combined emphasis for all areas of the installation will achieve the ecosystem management goals and objectives established for the installation. The natural resources management focus for individual functional areas at an installation can be classified into one or more of the following: land management, forestry management, fish and wildlife management, and outdoor recreation management.

- *Land management* focuses on management issues for wetlands, invasive and exotic species and noxious weeds, soil conservation and erosion control, stormwater, grounds maintenance and landscaping, integrated pest management practices, and floodplains protection.
- *Forestry management* focuses on management issues for the improvement of timber stands for timber production and/or wildlife habitat.
- *Fish and wildlife management* focuses on management issues related to actions designed to preserve, enhance, and regulate indigenous wildlife and its habitats. These actions include the conservation of installation conservation priorities, protected species and non-game species, management and harvest of game species threatened or endangered species, and habitat improvements.
- *Outdoor recreation management* focus on the provision of natural resource based outdoor recreational opportunities where the emphasis is the understanding and appreciation of the natural environment.

Other Management Practices. Other management practices are natural resources practices that the installation will implement in a functional unit. These practices may be implemented to support the management focus for the area (e.g., cuttings and prescribed burns may be conducted to support the wildlife management focus objectives for a given functional area) or may be independent of the management focus. In most cases, the success of other management practices will be dependent on the effectiveness of the

management focus (e.g., the success of a watchable wildlife area may largely be dependent on the effectiveness of the wildlife management focus) or vice-versa. Other management practices are an important component of the multiple use concept of ecosystem management.

Based on the location of military uses on NSA Panama City, and the availability and suitability of natural resources, property at NSA Panama City is divided into three functional areas: OP-1, OP-2, and P-1 (see Figure 7-1).

7.1 Operational Protected Area 1 (OP-1)

As shown in Figure 7, OP-1 is the most widespread functional area and covers the greatest total area of land on NSA Panama City. OP-1 encompasses the entire area of the installation north of Alligator Bayou, with the exception of the P-1 areas along St. Andrew Bay and Alligator Bayou. OP-1 also includes the developed area immediately south of Alligator Bayou. The size of the area reflects the intense development that has occurred on NSA Panama City. OP-1 includes mission-related operational and family-support facilities. Intense human activities and fragmented natural resources characterize this area.

Management Focus. The management focus of OP-1 is land management due to the limited natural resources characteristics of the land, military mission requirements for the land, and the high concentration of human activities (Figure 7-1). Natural resources management issues will be dominated by activities related to soil erosion, grounds maintenance, urban forestry, and stormwater management for the protection of wetlands and water quality for fish and wildlife.

Management focus actions will include (Section 5.1):

- using environmentally beneficial landscaping practices (xeriscaping) to reduce the need for irrigation, fertilizer and pesticide use. Xeriscaping will include the use of native species, and will be required for all new buildings.
- controlling invasive and exotic species.
- maintaining 50-foot buffers adjacent to the wetlands will also be a basic management component for the protection of wetlands and water quality in OP-1. Buffer areas will provide the basic physical and chemical buffering needed to reduce siltation into the wetland, retain the natural attenuation and filtering.
- monitoring for and controlling soil erosion problem areas. Controlling erosion will minimize turbidity build-up in the wetland areas and St. Andrew Bay.
- minimizing the loss of floodplain habitat and attenuation capacity.

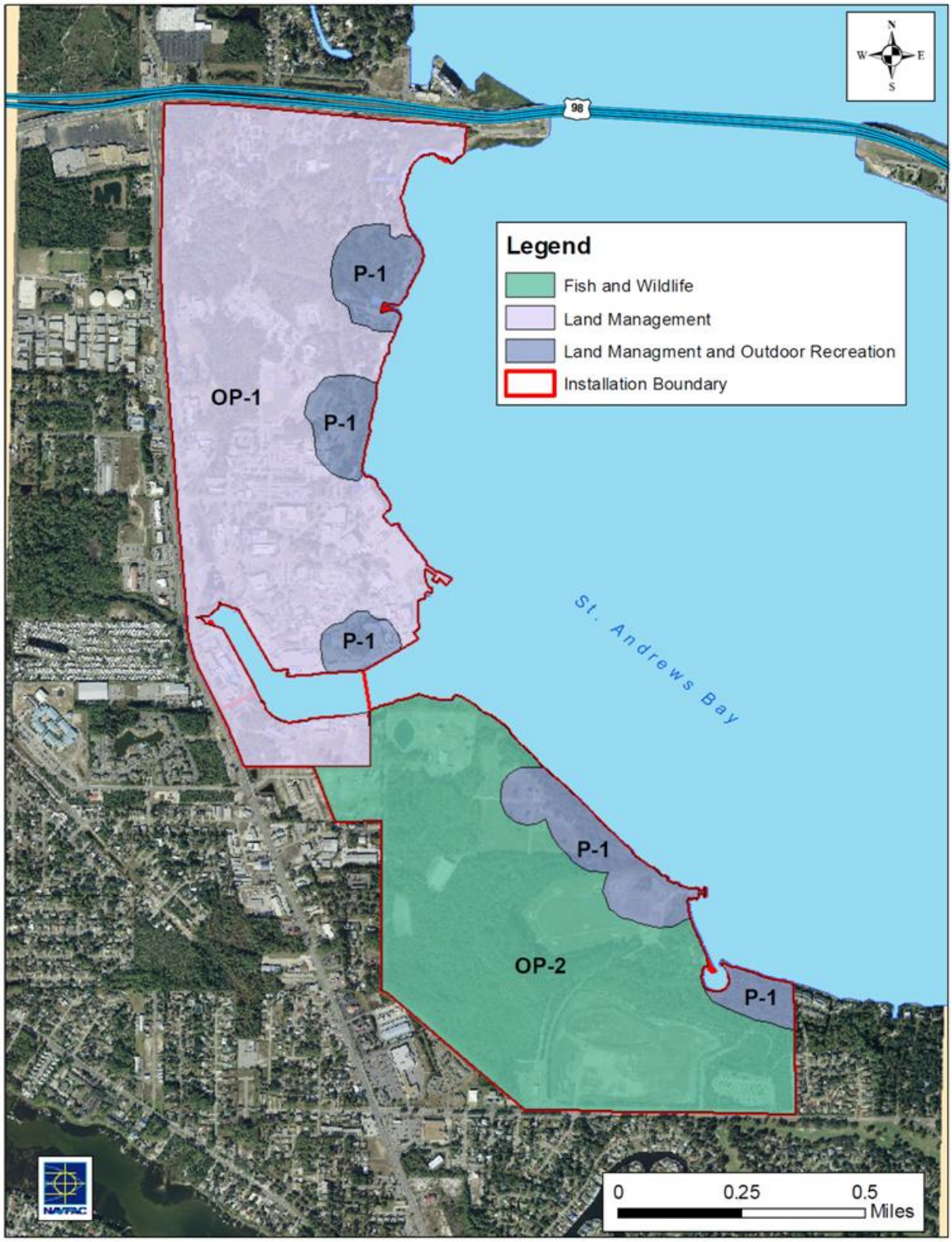

Figure 7-1. Functional Areas at NSA Panama City, Florida. OP-1 = Operational Protected Area 1; OP-2 = Operational Protected Area 2; P-1 = Protected Area 1.

- continuing the implementation of the installation's stormwater prevention pollution program to monitor the quality of water discharging into St. Andrew Bay.
- using urban forestry practices (e.g., planting trees in the industrial area) to stabilize soils, provide aesthetic value and possible habitats for wildlife.

Other Management Practices. Forestry management practices (e.g., intermediate cuttings and prescribed burns) will also be required in OP-1. For OP-1, prescribed burns will be conducted in order to reduce the fuel loads available to wildfires, which could threaten NSA Panama City mission activities, facilities, and housing. The scheduling of seasonal controlled burns and thinnings for wildlife benefit will not be the focus for this area. Practices such as snag retention – the practice of leaving dead trees standing in managed forest for wildlife species – will only be used in areas where there is no potential for harm to personnel or property.

Wildlife habitat enhancement projects will be consistent with the types of wildlife appropriate for the developed area. Habitat projects may include, but will not be limited to: (1) providing nest boxes for birds and bats; (2) leaving snags and downed logs for nesting, roosting, foraging, cover, perching, and/or territorial displays; (3) maintaining vegetative buffers around wetland areas and along undeveloped shoreline areas adjacent to St. Andrew Bay; and (4) where possible, using trees, shrubs, and dense groundcover between forest stands and/or shoreline areas to facilitate wildlife movement between areas. NSA Panama City will continue to implement management practices for the protection of the least terns, which is listed as a threatened species by the FWC.

Opportunities for natural resources-based outdoor recreation will be continuously considered as a part of the natural resources management actions for OP-1. The recreation planning board will address the means for providing additional recreational activities within the context of the concerns expressed by senior management (see Section 5.4).

NSA Panama City will use land improvement guidelines to minimize adverse impacts to the installation’s environmental and ecological resources during land disturbance activities. The guidelines include the recommendations for site selection and site planning discussed in Section 5.5.

Goals, Objectives, and Strategies: Table 7-1 presents the natural resources goals, objectives, and strategies (see Section 4) to be achieved by implementation of the management focuses for OP-1.

Table 7-1. Natural Resources Management Goals, Objectives, and Strategies Related to Management Focus for OP-1

Goals	Objectives	Strategies	Comments
1	1.2	1.2.2	Encourages participation of installation personnel through training and education
1	1.2	1.2.4	Uses citizen participation to educate people (e.g., use citizens for xeriscaping and buffer creation projects)
2	2.1	2.1.1	Invasive species removal
2	2.2	2.2.1	Water quality and wetlands protection
2	2.2	2.2.2	Stormwater management – water quality and wetland protections
2	2.2	2.2.3	Long-term erosion prevention measures – water quality protection
2	2.2	2.2.4	Reduction in fertilizer and pesticide use
2	2.3	2.3.1	Maintain attenuation capacity of 100-year floodplain – protect capacity of wetland areas.
2	2.4	2.4.1	Xeriscaping native species and reducing fertilizer and pesticide use
3	3.1	3.1.3	Urban forestry practices for implementation
3	3.1	3.1.4	BMPs for protection of water quality (FDACS 2003; FDOT and FDEP 2007; FDEP 2008; NSAPC 2010)

7.2 Operational Protected Area 2 (OP-2)

As shown in Figure 7-1, OP-2 covers most of the area south of Alligator Bayou, with the exception of P-1 areas along St. Andrew Bay and the southern boundary of the installation. This area is designated as an OP area because it is considered vital to the continuance of the military mission on NSA Panama City. The ordinance storage area and the associated ESQD arcs dominate the military mission use of the area. Other mission-related activities in the area are limited to intermittent training exercises and depositing dredged spoil material. There are no family-support activities or outdoor recreation opportunities in the area, primarily due to security and safety constraints. The area is largely forested with slash pine being the dominate species.

Management Focus. The management focus of OP-2 is for wildlife due to the suitability and availability of natural resources to support a limited wildlife population (Figure 7-1). No other areas on NSA Panama City have the natural resources to support any

meaningful wildlife population. The area is not suitable for outdoor recreational activities because of security and safety constraints. Because the timber resources of OP-2 are limited in their suitability to provide wildlife habitat, harvesting the stands for commercial production will not be employed.

The management focus of wildlife will be largely accomplished through stand improvement practices. The prescribed burn and thinning stand improvement practices for wildlife habitat enhancement will be implemented for pine stands located outside the ordinance storage fire safety area. Management practices for stands dominated by hardwoods will be primarily for salvage cuttings, and for the removal of species identified as invasive and exotic.

Prescribed Burns. As conditions for prescribed burns permit, NSA Panama City will attempt to use late winter (mid-January to mid-March) low intensity backfire burns to leave small pockets of unburned areas. This creates a mosaic of burned and unburned areas to stimulate the growth of new vegetation while retaining adequate cover. Prescribed burns will be conducted in close coordination with thinnings because the combination of the two stimulates the production of herbaceous growth. To stimulate new growth, prescribed burns will be conducted at the earliest age that the pine trees can tolerate fire. Loblolly (*Pinus taeda*), longleaf (*Pinus palustris*), shortleaf (*Pinus echinata*), and slash pine (*Pinus elliottii*) can be prescribed when trees are more than 15 feet tall, usually at 8 to 10 years of age. Unique areas within burn units that provide valuable habitats (snags, thickets, old structures) will be protected from fire. Adjoining units will not be burned in the same year in order to create different stages of growth, and a mosaic of habitats for wildlife.

Thinnings. To balance the benefits of thinning for tree growth and wildlife, pine stands will be thinned to a basal area between 60 and 70 square feet per acre. Thinning will be used to minimize crown closure and will be dispersed throughout the forest in order to achieve an open understory mixed with dense shrub growth. Thinning for wildlife will not include the removal of snags or other non-merchantable, poor quality trees that may provide food and cover for wildlife. Selective thinning will be the preferred method for the support wildlife. To provide maximum benefit to wildlife, pines will be thinned as soon and as often as possible. The need for thinning hardwood areas will be determined by the Natural Resources Manager.

Reforestation. When reforestation of areas in OP-2 is required, longleaf pine will be the preferred species for forest regeneration – within soil limitations – due to its ecological

value. In wetter soil not suitable for longleaf pine, slash pine will be used for reforestation. In general, both pine communities, when properly managed, will support various populations of birds, amphibians and reptiles, small and large mammals. Regeneration of hardwood areas will be accomplished by natural seeding or direct planting.

Habitat. NSA Panama City will implement the following habitat improvement practices (Section 5.3.1) in OP-2, as conditions permit.

- Preserve portions of stands to provide suitable large snags and trees for den and cavity activities.
- Leave brush material along woodland edges after necessary clearing (e.g., military mission).
- Plant trees and shrubs, or seeding open areas for soil stabilization, and to provide wildlife feeding plots.
- Create or enhance connections between habitats to facilitate wildlife movement between areas.
- Create brush piles in clear-cuts and other open areas.
- Maintain vegetative buffers around wetland areas and along undeveloped shoreline areas adjacent to St. Andrew Bay.
- Leave snags and downed logs for nesting, roosting, foraging, cover, perching, and/or territorial displays.
- Maintain hardwood areas for foraging activities.

Other Management Practices. Land management practices will be implemented in OP-2, as necessary. Grounds maintenance practices will be required to maintain the ordinance storage area. Soil erosion and stormwater management activities will be implemented in association with stand improvement and reforestation activities. Invasive and exotic species, as identified, will be removed to ensure the continuation of native communities necessary to support the area's wildlife.

In areas not subject to ESQD arc restrictions, the Natural Resources Manager may permit future outdoor recreation activities after consulting with installation commands and departments, such as MWR. The Natural Resources Manager will also consult with foresters, and fish and wildlife biologists from the Land Management Department of NAVFAC SE, and with federal, state, and county wildlife biologists, foresters, and land managers. Any future recreational development in the wildlife management area will not be permitted to adversely impact wildlife species or their habitats or the NSA Panama City's military mission.

NSA Panama City will use land improvement guidelines to minimize adverse impacts to the installation's environmental and ecological resources during land disturbance activities. The guidelines include the recommendations for site selection and site planning discussed in Section 5.5.

Goals, Objectives, and Strategies: Table 7-2 presents the natural resources goals, objectives, and strategies (see Section 4) to be achieved from implementation of the management focuses for OP-2.

Table 7-2. Natural Resources Management Goals, Objectives, and Strategies Related to Management Focus for OP-2

Goals	Objectives	Strategies	Comments
2	2.3	2.3.1	Maintaining the 100-year floodplain
3	3.1	3.1.1	Using prescribed burns and thinnings for the protection of wildlife
3	3.1	3.1.2	Longleaf pine for reforestation
3	3.2	3.2.1	Protection of threatened and endangered species
3	3.2	3.2.2	Habitat enhancements

7.3 Protected Area 1 (P-1)

As shown in Figure 7-1, P-1 occupies much of the non-developed area along the NSA Panama City shoreline and the southern boundary area of the installation. P-1 also occupies an area along the north side of Alligator Bayou. The area is a designated protected area because of its unique cultural resources and high quality maritime hammock community.

Management Focus. The management focuses for the P-1 areas are land management and outdoor recreation (Figure 7-1). Land management practices will focus on BMPs for the protection of cultural resources sites from activities that may cause them damage. NSA Panama City will actively manage the cultural resource sites to ensure the protection of the sites from erosion. NSA Panama City will implement grounds maintenance practices consistent with the need for and the suitability of the site for such practices. NSA Panama City will manage the developed parts of the archaeological buffer areas consistent with practices discussed in Section 5.1.

The management focus of outdoor recreation will be for the cultural resources area and maritime hammock community along the southern boundary of the installation. This area will provide recreational and educational public access opportunities. To sustain the outdoor-recreational resources, NSA Panama City will implement land management activities that contribute to sustainability of and safety of visitors to the watchable wildlife area, cultural resources sites, and interpretive trials.

Other Management Practices. Stand improvement practices will be implemented, as need, for the forested pine areas located within P-1. Stand improvement practices will be implemented at the discretion of the Natural Resources Manager to ensure the protection and sustainability of the cultural resource sites. As conditions permit, the management intensity of the pine areas of P-1 located adjacent to OP-2 will be for the enhancement of wildlife habitat. Similarly, the management intensity of the pine areas of P-1 located adjacent to OP-1 will be for the reduction of fuel loads available to wildfires which could threaten NSA Panama City mission activities, facilities, and housing. Prescribed burns and scheduled thinnings will not be used in maritime hammock communities, prescribed burns in adjacent communities will be permitted to naturally extinguish at the hammock's edge. Salvage cuttings will be used in the maritime hammock community to protect the health and safety of visitors.

Goals, Objectives, and Strategies: Table 7-3 presents the natural resources goals, objectives, and strategies (see Section 4) to be achieved from implementation of the management focuses for P-1.

Table 7-3. Natural Resources Management Goals, Objectives, and Strategies Related to Management Focus for P-1

Goals	Objectives	Strategies	Comments
1	1.2	1.2.4	Citizen participation in ecosystem education and stewardship
4	4.2	4.2.1	Provides access to and protects areas with unique cultural or natural resources value
4	4.2	4.2.1	Provides recreational opportunities

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A INRMP Projects

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INRMP Projects

Appendix A describes the projects to be implemented by NSA Panama City. Projects were identified by the NSA Panama City Natural Resources Manager in consultation with foresters, fish and wildlife biologists, and soil conservationists with the Land Management Department of NAVFAC SE, as well as with federal, state, and county wildlife biologists, foresters, and land managers. For each project, Appendix A discusses the purpose, location, description, cost, relevance to the goals and objectives listed in Section 4, baselines, monitoring and legal requirements. It is the intent of NSA Panama City to implement the projects as described in Appendix A to the greatest extent possible.

The implementation of projects is largely dependent upon availability of funds. Funding for implementation of the INRMP will come from the Commander Navy Installations or Naval Facilities Engineering Command natural resources fund sources. The natural resources programs and projects described in this INRMP are divided into mandatory and stewardship categories to reflect implementation priorities. Every effort will be made to acquire O & M(N) Environmental, or other funding to implement DoD mandatory projects, in the most timely manner possible. Stewardship-type projects will be funded through forestry, fish and wildlife, Legacy, or other fund sources as funding and personnel resources become available. Table A-1 summarizes the projects.

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Table A-1
Summary of Recommended Projects

Project No.	Project Description	Scheduled Implementation (FY)	Funding Priority[a]	Prime Legal Driver	Guidebook[b]	NEPA Require -ment	Source of Funds
1	Invasive and Exotic Species Removal	2013 - 2018	M	1,10	12106	No	ENV
2	Prescribed Burns	2015 - 2018	M	8	12108	No	FR, FOR
3	Soil Erosion Control	2013 - 2018	M	4, 8, 9	12107	No	ENV
4	Wetlands Delineations	2012 and 2017	M	4, 6, 7, 11	12105	No	ENV
5	Nature Trail Development	2013 - 2018	S	2, 12	12109	No	STA, AO, NRR, MWR
6	Survey and Inventory of Biological Resources	2014 and 2017	M	2, 3, 5	12101	No	ENV, STA
7	Forest Management Inventory	2018	M	3, 10	12101	No	FR, FOR
8	Urban Forestry Plan	2016	M	2, 10	12101	No	ENV, STA
9	INRMP Update and Revision	2013 - 2018	M	2	12103	Yes	ENV

Notes:
[a] From DOD Instruction 4715.3, Enclosure (4)
[b] Guidebook Number is from Chapter 12 of EPR Guidebook

Key:

Source of Funds
ENV = Environmental O&MN.
FOR = Forestry.
FR = Forestry Reserve.
FY = Fiscal year.
MWR = Moral, Welfare & Recreation.
NEPA = National Environmental Policy Act.
NRR = Natural Resources Reserve.
STA = Station O&MN.

Primary Legal Drivers
1 = 7 USC 2814 Management of undesirable plants on Federal lands
2 = 16 USC 670a-f Sikes Act Improvement Act
3 = 16 USC 1531 & 1536 Endangered Species Act
4 = 33 USC 1251 Clean Water Act
5 = 6 USC 703 Migratory Bird Treaty Act
6 = 16 USC 2912 North American Wetland Conservation Act
7 = 16 USC 4808 North American Wetland conservation Act
8 = 32 CFR 190 Natural Resources Management Program
9 = EO 13148 Greening the government through environmental management
10 = EO 13112 Invasive Species
11 = EO 11990 Protection of Wetlands
12 = DOD INST 4715.3 Environmental Conservation Program

Project No. 1: Invasive and Exotic Species Removal

Purpose: The removal of invasive and exotic species to ensure continuation of native species and wildlife habitat ecosystem.

Goal and Objective:
Goal 1, Objective 1.2, Strategy 1.2.2 – Training and Education
Goal 1, Objective 1.2, Strategy 1.2.4 – Citizen Participation
Goal 2, Objective 2.2, Strategy 2.1.1 – Invasive Species Removal
Goal 2, Objective 2.4, Strategy 2.4.1 – Xeriscaping (Native)
Goal 3, Objective 3.1, Strategy 3.1.4 – BMPs
Goal 3, Objective 3.2, Strategy 3.2.2 – Habitat Enhancement

Location: Installation-wide.

Description: The objective of this project is to control invasive and exotic species to protect and enhance native ecosystems. Invasive and exotic plants identified at the installation include Japanese climbing fern (*Lygodium japonicum*), Chinese tallow tree (*Triadica sebifera*), mimosa, Chinese privet (*Ligustrum sinense*), Taro, Chinaberry (*Melia azedarach*), Sesbania, and the camphor tree (*Cinnamomum camphora*). These species out-compete native species, reduce biodiversity, and disrupt ecosystem relationships. This project will fund invasive and exotic species removal using chemical and mechanical methods.

Baseline: 375 acres where invasive and exotic plants need to be treated.

Monitoring: NSA Panama City will inventory previously treated areas annually to determine the effectiveness of the implemented removal method(s). NSA Panama City will conduct an installation-wide inventory every three years to ensure no new establishment of invasive and exotic species.

Hours: This project will use NSA Panama City's private contractors. Estimated NSA Panama City staff hours = 40-80.

Legal Driver(s): 7 USC 2814(a)… "Each Federal agency shall – (1) designate an office or person adequately trained in the management of undesirable plant species to develop and coordinate and undesirable plants management program (2) establish and adequately fund an undesirable plants management program; (3) complete and incorporate cooperative agreements with State agencies regarding the management of undesirable species; (4) establish integrated management systems to control or contain undesirable plant species targeted under cooperative agreements."

EO 13112 " Each Federal agency… shall, to the extent practicable and permitted by law,…subject to the availability of appropriations, and within Administrative budgetary limits, use relevant programs and authorities to: prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species…; monitor invasive species populations accurately and reliably; provide for restoration of native species…; conduct research on invasive species…; and promote public education on invasive species…"

Related Legal: 16 USC 670 a-f

Accomplishments: Treatments for the following species were added to RBOS contract in 2010: Chinese tallow, camphor tree, Chinese privet, Japanese climbing fern, wild taro, Chinaberry, Sesbania, and torpedo grass (*Panicum repens*) along wetlands only. A modification for a one-time removal of air potato (*Dioscorea bulbifera*) was completed in August 2010. Japanese honeysuckle (*Lonicera japonica*), Lantana, Mimosa should also be included in removals.

Project No. 2: Prescribed Burns

Purpose: NSA Panama City forest stands require prescribed burns to promote healthier more sustainable forest resources, to reduce fuel loads and the associated potential for wildfires, and to ensure the continuation of fire-dependent plant and wildlife species.

Goal and Objective:
Goal 2, Objective 2.1, Strategy 2.1.1 – Removal of Nuisance Plants and Wildlife Animals and Diseases

Goal 2, Objective 2.2, Strategy 2.2.2 – Wetland Enhancement

Goal 2, Objective 2.3, Strategy 2.3.1 – Floodplain Enhancement.

Goal 3, Objective 3.1, Strategy 3.1.2 – Site Preparation

Goal 3, Objective 3.2, Strategy 3.2.2 – Habitat Enhancement

Location: Prescribed burns will be completed in all forest stands. Urban forest prescription precautions will be in effect when burning close to base housing, administrative areas, and training areas.

Description: NSA Panama City will attempt to burn on a three-year rotation (one third of the forest stand will be burned every year), or burns will be scheduled at the discretion of the Natural Resources Manager. Prescribed burns will occur through wetland areas from April to August after the understory fuels have been burned using a backing fire during the first prescribed burn. Dormant season burns can be alternated with growing season burns as long as hardwoods are eliminated by a growing season burn before they reach a size that is more fire resistant. Prescribed burns will not be used in maritime hammock communities.

Baseline: 200 Forested Acres

Monitoring: Creation of a pine-wiregrass community will be the focus of the prescribed burn activity. Ideal or target vegetative community structure will be a canopy of pine, an herbaceous layer, and no significant woody under- or mid-story.

NSA Panama City will monitor for herbaceous plant species appropriate to the target vegetative community; these may include, but are not limited to, wiregrass, lichens, yuccas, palmetto, wildflowers, gopher apple, and prickly pear cactus. During monitoring and evaluation of project success, the successful introduction of animal species consistent with the habitat established may not occur because of the small size of the installation. Species that NSA Panama City will monitor for include the gopher frog, gopher tortoise, pine snake, Bachman's Sparrow, and Henslow’s Sparrow.

Hours: Estimated NSA Panama City staff hours = 40 to 180 per year.

Legal Driver(s): 32 CFR 190 App B.3.a "Lands and waters suitable for management of fish and wildlife resources shall be managed to conserve wildlife resources for the benefit of the public."

Related Legal: 16 USC 670 a-f

DOD INST 4715.3.D.2.n & F.2.b (3) "Fire is an integral element of natural processes. All DoD Components shall manage fire in a manner to preserve health and safety, protect facilities, and facilitate the health and maintenance of natural systems."

Historical Notes: Burns were conducted in 2001, 2003, 2005, 2006, 2008 (30 acres), and 2009 (30 acres).

No favorable weather or support was available to burn in 2010-2011.

Accomplishments: NSA Panama City has executed at least seven projects in support of prescribed burns since 2010, totaling more than $50,000. These projects have funded equipment purchases, fire line maintenance, and actual prescribed burns. Funds are programmed to continue supporting prescribed burns into the future.

Project No. 3: Soil Erosion Control

Purpose: Conservation of soil and protection of water quality.

Goal and Objective:
Goal 2, Objective 2.1, Strategy 2.1.1 – Wetland Protection
Goal 2, Objective 2.2, Strategy 2.2.2 – Stormwater Pollution Prevention
Goal 2, Objective 2.2, Strategy 2.2.3 – Long-Term Erosion Control Measures
Goal 3, Objective 3.1, Strategy 3.1.4 – BMPs - Water Quality
Goal 3, Objective 3.2., Strategy 3.2.2 – Habitat Protection

Location: Approximately 60 to 70 soil erosion areas throughout NSA Panama City that have been identified by the NSA Panama City Public Works Division.

Description: Construction or modification of physical features and/or introduction of vegetative plantings to effectively control erosion.

Baseline: Condition of soil erosion areas identified in NSA Panama City's 1999 soil erosion study conducted by the NSA Panama City Public Works Division.

Monitoring: Monitoring will be completed by NSA Panama City's stormwater pollution prevention team. The effectiveness of the soil erosion control methods will be documented and used to determine future erosion control practices.

Hours: This project will use contract personnel. Estimated NSA Panama City staff hours = 80.

Legal Driver(s): 32 CFR 190 (App. B.1.a) " DoD lands shall be managed to control erosion"

EO 13148, Sec. 202 Environmental Compliance "Each agency shall comply with environmental regulations by establishing and implementing environmental compliance audit programs and policies that emphasize pollution prevention as a means to both achieve and maintain environmental compliance."

Related Legal: 16 USC 670 a-f

Accomplishments: More than $235,000 has been spent on erosion control at NSA Panama City since 2001.

Project No. 4: Wetland Delineations

Purpose: To ensure the conservation and protection of wetlands on the installation.

Goal and Objective: Goal 2, Objective 2.2, Strategy 2.2.1 – Wetland Protection and Assessment

Goal 3, Objective 3.2, Strategy 3.2.2 – Wetland Habitat Monitoring

Location: Installation-wide.

Description: NSA Panama City will complete wetland delineations every five years. Wetlands delineations will address the quality, type, and size of wetlands and recommended future management practices.

Baseline: The locations and quality of the 102 acres of wetlands identified in the most recent wetland inventory.

Monitoring: Between each formal wetland delineation, NSA Panama City staff will, at least once, use the WRAP to evaluate wetland quality. The WRAP is a wetland-rating index developed by the South Florida Water Management District[1].

Hours: The formal wetland delineation project will use contract personnel and an estimated 80 hours of NSA Panama City staff time. The WRAP survey will be conducted by NSA Panama City staff and use an estimated 60 hours of staff time. The cost for evaluating all installation wetlands using the WRAP is approximately $8,000.

Legal Driver(s): EO 11990 (no net loss of wetlands),

33 USC 1251 et seq. “The head of each Federal agency responsible for acquiring, managing, or disposing of federal lands and waters shall, to the extent consistent with the mission of such agency and existing statutory authorities, cooperate with the Director of the United States Fish and Wildlife Service to restore, protect, and enhance the wetland ecosystems and other habitats for migratory birds, fish and wildlife within the lands and waters of each such agency.”

[1] Wetland Rapid Assessment Procedure (WRAP) is a wetland-rating index developed by the South Florida Water Management District to assist the regulatory evaluation of mitigation wetland sites (wetlands created, restored, enhanced, or preserved). The rating is used to evaluate a wide range of wetlands, but is not intended to compare different wetland community types to each other. See: http://www.sfwmd.gov/org/reg/wrap99.htm

Related Legal: 16 USC 4408; 16 USC 670 a-f, ONAVINST 5090.1B, Change 2, Chapter 22-6.7.o & DoD INST 4715.3.D.2.c&j

Accomplishments: This project has not funded any wetlands delineations, but delineations and surveys have been completed under other projects. For example, a formal delineation of the wetland jurisdictional boundaries on NSA Panama City was completed in 1998 using the USACE Wetlands Delineation Manual (1987) and the FDEP methods identified in Chapter 62-340, FAC. This delineation was recertified in 2003 and expired in 2009. In 2010, a new delineation was completed for planning purposes[2]. Since the new delineation was not a certified survey, a jurisdictional determination was received by USACE, but not by FDEP. Since a jurisdictional determination could be obtained from both agencies, guidelines for activities taking place in the wetland 50-foot buffers require that the wetland line be surveyed and flagged so that no wetland encroachment will take place.

[2] Aerostar Environmental Services, Inc (Aerostar). 2010. Final wetland and stream delineation report, Naval Support Activity Panama City, Panama City, Bay County, Florida. Prepared for NAVFAC Southeast. Prepared by Aerostar. Mobile, Alabama. 253 pp.

Project No. 5: Nature Trail Development

Purpose: Design and construct integrated, multi-purpose trail network to enhance the quality of life for all military personnel by providing additional outdoor recreation activities and creating opportunities to experience nature.

Goal and Objective: Goal 1, Objective 1.2, Strategy 1.2.2 – Training/Education
Goal 1, Objective 1.2, Strategy 1.2.4 – Citizen Participation
Goal 4, Objective 4.2, Strategy 4.2.2 – Expanded Recreational Facilities

Location: The trail originates at the base enlisted quarters (Building 484); travels throughout the urban areas, forest areas, and other recreation sites (e.g., recreational fields); and ends at the installation marina and campground.

Description: The trail will be completed through private contract and volunteers.

Baseline: None.

Monitoring: There are no requirements directly associated with this project; however, the installation will closely monitor the provision of outdoor recreational opportunities and the carrying capacity of the resources being utilized.

Hours: This project will use contract personnel and volunteers. Estimated NSA Panama City staff hours = 100.

Legal Driver(s): 16 USC 670 a-f, 32 CFR 190 App B.4.a, "Wherever practicable, DoD lands with suitable resources shall be managed to conserve and use natural resources for outdoor recreation opportunities."

Related Legal: None.

Accomplishments: This project is programmed for funding.

Project No. 6: Survey and Inventory of Biological Resources

Purpose: To monitor the health and population of all plant and animal species present on the installation.

Goal and Objective: Goal 3, Objective 3.2, Strategy 3.2.1 – Monitoring for Threatened and Endangered Species

Location: Installation-wide**.**

Description: Surveys/inventories every three-to-five years will analyze the health and numbers of species and will help identify changes in wildlife presence and abundance throughout the installation. The projects will be completed in accordance with the cooperative agreement between the DoN and the FNAI and FWCC.

Baseline: RTE surveys completed in 2001, 2008-09, and 2014.

Monitoring: The entire project is to monitor the health and population of species to ensure that appropriate management practices are established. The success of these species is largely dependent upon human activities. Prescribed burns and forest stand thinnings should help maintain the large-leaved jointweed, regulation of boat traffic and protection of water quality and coastal areas should help protect the least tern, and the large-leaved jointweed should be protected by water quality improvement efforts and reductions in the use of pesticides and fertilizers. The frequency of survey will be at the discretion of the Natural Resources Manger.

Hours: The three-to-five-year interval survey will use contract personnel and require an estimated 30 hours of NSA Panama City staff time. The annual monitoring surveys for least terns and large-leaved jointweed will require an estimated 50 hours of NSA Panama City staff time.

Legal Driver(s): 16 USC 1536 (a) (2) “Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency… is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of (critical habitat) of such species.”

Related Legal: DoD INST 4715.3.D.2.c “Biologically or geographically significant or sensitive natural resources or species shall be inventoried and managed to protect these resources and to promote biodiversity.”

Accomplishments: Biological surveys of flora and fauna were completed at NSA Panama City in 2001[3]. Gulf South Research Corporation (GSRC) was contracted to conduct a survey of plants, neotropical birds, and RTE species in 2008-09[4]. NSA Panama City also contracted GSRC to conduct an inventory of plant and animal species, especially RTE species, along with any potentially-occurring migratory birds present on the installation, in 2014[5]. A dolphin survey and density estimate was completed in 2015-16[6]. An assessment of nearshore fish habitats was also completed in 2015-16[7].

NAVFAC Southeast performed a comprehensive census of gopher tortoises on NSA Panama City in 2010. An abandoned burrow was located and it was determined that no gopher tortoises were present on the installation[8].

[3] Keppner Biological Services. 2002. A Biodiversity Study and Inventory of the Biological Resources at the Naval Surface Warfare Center, Naval Coastal Systems Station, Bay County, Florida. Prepared for Naval Coastal Systems Station. Prepared by Keppner Biological Services. Panama City, Florida. 20 pp.

[4] Gulf South Research Corporation (GSRC). 2011. Field summary report inventory of species of interest, Naval Support Activity Panama City, Panama City, Florida. Prepared for Department of the Navy NAVFAC Southeast. Prepared by GSRC. Baton Rouge, Louisiana. 85 pp.

[5] GSRC. 2015. Field summary report inventory of rare, threatened, and endangered species, Naval Support Activity Panama City, Panama City, Florida. Prepared for Department of the Navy NAVFAC Southeast. Prepared by GSRC. Baton Rouge, Louisiana.

[6] GSRC. 2016. Dolphin survey and density estimate report, Naval Support Activity Panama City, Florida. Prepared for Department of the Navy. Prepared by Gulf South Research Corporation, Baton Rouge, Louisiana.

[7] GSRC. 2017. Habitat assessment report, Naval Support Activity Panama City, Florida. Prepared for Department of the Navy. Prepared by Gulf South Research Corporation, Baton Rouge, Louisiana.

[8] Naval Facilities Engineering Command, Southeast (NAVFAC SE). 2010. A survey of NSA Panama City for gopher tortoises. 6 pp.

Project No. 7: Forest Management Inventory

Purpose: To inventory/survey all forest stands on the installation to determine size, type, and quality of forest stands, and appropriate management practices.

Goal and Objective: Goal 3, Objective 3.1, Strategy 3.1.1 – Information for Timber Stand Improvement Program

Goal 3, Objective 3.2, Strategy 3.2.2 – Information for Habitat Management

Location: Installation-wide.

Description: NSA Panama City will continue the forest survey/inventory to determine the size, type, and quality of NSA Panama City forest resources. Originally, this project projected that NSA Panama City will have completed a forest survey by January 2003 and will update the survey every 5 years. No funding has been received for this project.

Baseline: None.

Monitoring: Information obtained from stand survey will be used, in part, to monitor the success of NSA Panama City's prescribed burns and thinning activities.

Hours: This project will use contract personnel. Estimated NSA Panama City staff hours = 40.

Legal Driver(s): 32 CFR 190

Related Legal: Endangered Species Act, 16 U.S.C. 35,; Federal Noxious Weed Act of 1974, 7 U.S.C. 2801; Executive Order (EO) 13112, Invasive Species; DODINST 7310.5.

Accomplishments: The Florida Fish and Wildlife Conservation Commission Landowner Assistance Program prepared a forest inventory of 187 acres of timber at NSA Panama City between October 2012 and August 2013[9].

[9] Lee, A., A. Kane, and J. Martin. 2013. Naval Support Activity Panama City forest inventory report. Prepared for Naval Support Activity Panama City. Prepared by Florida Fish and Wildlife Conservation Commission. 37 pp.

Project No. 8: Urban Forestry Plan

Purpose: Address urban forestry needs and strategies.

Goal and Objective: Goal 1, Objective 1.2, Strategy 1.2.2 – Training and Education
Goal 1, Objective 1.2, Strategy 1.2.4 – Citizen Participation
Goal 3, Objective 3.1, Strategy 3.1.2 – Reforestation
Goal 3, Objective3.2, Strategy 3.2.2 – Habitat Enhancement

Location: Installation-wide in developed areas.

Description: Prepare a management plan to address urban forestry needs, including the eradication and abatement of exotic invasive plants, selection of appropriate tree species, maintenance, tree inventories, and annual work plans. Proper selection and care will prevent introduction of exotic or invasive species, reduce installation long term maintenance costs and provide an improved and safer quality of life. Properly placed and maintained urban trees reduce installation building energy costs through shading.

Baseline: Existing urban forest resources.

Monitoring: Information obtained will be used to track the success of NSA Panama City's invasive plant control and urban forestry objectives.

Hours: This project will use volunteers for tree planting. Estimated NSA Panama City staff hours = 60.

Legal Driver(s): Sikes Act 670a(a)(2) requires military installation management plans to conserve, protect and manage fish and wildlife resources.

EO13112 Invasive Species requires federal agencies to restrict the introduction of exotic organisms into natural ecosystems.

Related Legal: EO13148 Green the Environment through Leadership requires federal agencies to ensure that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning processes across all missions, activities, and functions.

Accomplishments: This project is programmed for funding.

Project No. 9: Panama City INRMP

Purpose: To update and revise the INRMP.

Goal and Objective: Goal 1, Objective 1.1 – Incorporate the concept of ecosystem management into all planning and management processes.

Goal 1, Objective 1.1 – Review and update the INRMP in accordance with OPNAVINST5090.1C 24-5[e]

Location: Installation-wide.

Description: In accordance with OPNAVINST5090.1C 24-5[e], the INRMP will be reviewed on a yearly basis and re-approved every five years. The review process will take into account changes in military mission requirements and legal mandates and information obtained from monitoring programs and surveys. Revisions will be reviewed for consistency with the military mission, federal and state laws, and the ecosystem management goals and objectives of the INRMP.

The revision process will be conducted under the direction of the NSA Panama City CO; revisions will require consultation with and approval by the NSA Panama City CO, the NSA Panama City NRM, the Regional NRM, the USFWS, and the FWC.

Baseline: Existing INRMP; current surveys.

Monitoring: Survey projects as outlined in the INRMP.

Legal Driver(s): Sikes Act Improvement Act of 1997, 16 U.S.C. 670 et seq.; Executive Order 11990 – *Protection of Wetlands*; Executive Order 13112 – *Invasive Species*; Executive Order 12962 – *Recreational Fisheries*; Section 404 of the Federal Water Pollution Control Act (Clean Water Act), as amended, 33 U.S.C. 1251; DODINST 7310.5; OPNAVINST 5090.1C, par 24-5.c; USMC-MCO P5090.2.

Accomplishments: This INRMP was updated in 2016-17 to better reflect guidance issued by the OSD and to ensure that management actions are included to benefit all species of concern in the area. The INRMP continues to be updated on an annual basis to keep it current in these regards. Funds are also provided annually to support reviews of INRMP conservation metrics with NSA Panama City's conservation partners.

B USFWS and FWC Letters of Concurrence

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FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

OFFICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
(850)488-6661 TDD (850)488-9542
FAX (850)922-5679

April 4, 2001

Mr. David Helter
Ecology and Environment, Inc.
1950 Commonwealth Lane
Tallahassee, FL 32303

RE: Integrated Natural Resources Management Plan for the Naval Systems Warfare Coastal Systems Station, Panama City, FL, Bay County

Dear Mr. Helter:

I have reviewed the referenced integrated natural resources management plan for the Navy's Coastal Systems Station (CSS) on behalf of the Florida Fish and Wildlife Conservation Commission (FWC). I previously provided comments, dated 3 August 2000, on a preliminary draft copy of the plan. Concerns identified in those comments were subsequently adequately addressed in a revised draft plan text. Therefore, I conclude that the proposed integrated natural resources management plan for the Navy's Coastal Systems Station is sufficient.

I appreciate the opportunity to comment on the submitted draft integrated management plan for the CSS installation. Please contact me if you have any questions regarding this letter.

Sincerely,

Rick McCann
Biological Scientist IV
Office of Environmental Services

RDM
ORG 1-1
cssintdf.mg2
cc: Ms. Karen Lamonte, FWC, Panama City
Mr. Hildreth Cooper, USFWS, Panama City

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1875 Century Boulevard
Atlanta, Georgia 30345

JUL - 2 2001

In Reply Refer To:
FWS/R4/F

Mr. David Helter
Ecology and Environmental, Inc.
1950 Commonwealth Lane
Tallahassee, Florida 32303

Dear Mr. Helter:

The Fish and Wildlife Service's Panama City Field Office and Southeast Regional Office have reviewed the latest revision of the Integrated Natural Resources Management Plan (INRMP) for Coastal System Station, Panama City, Florida, and have found that, pursuant to Paragraph (a) (2) of the Sikes Act (16 U.S.C. 670a et seq.), the Service and the Station are now in mutual agreement as to the plan's content.

We are providing this letter as recognition of our mutual agreement with regard to the INRMP. As requested in your June 1, 2001, letter, we are also enclosing a signed Agency Approval Page.

Thank you again for the opportunity to comment on the INRMP. Your concern for and efforts to protect endangered and threatened species are greatly appreciated. If you have any questions, please feel free to contact me at 404/679-4000 or Mr. Tom Sinclair, Regional Sikes Act Coordinator, at 404/679-7324.

Sincerely yours,

for Sam D. Hamilton
Regional Director

Enclosure

C

Listed Federally and/or State-Protected Plants and Terrestrial Vertebrates

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Table C-1
Rare Plant Species Occurring at NSA Panama City

Scientific Name (Common Name)	Federal Status	State Status	Community	Location/Notes
Lilaeopsis carolinensis (Carolina Lilaeopsis)	N	R	Wetlands	
Polygonella macrophylla (Large-leaved jointweed)	N	T	Primarily scrub on the edge of roadways or on the beach	
Chrysopsis godfreyi (Godfrey's Golden Aster)	N	E	Primarily scrub on the edge of roadways	

Key:

Federal Status:

N = Not currently listed, nor currently being considered for listing
TSA = Threatened due to similarity of appearance
T = Listed as Threatened species

State Status:

S = Listed as a species of special concern by the FWCC
T = Listed as threatened species by the FWCC.
E = Listed as endangered species by the FWCC.
R = Rare

Table C-2 Rare Fauna Potentially Occurring at NSA Panama City				
***Scientific Name* (Common Name)**	**Federal Status**	**State Status**	**Habitat**	**Location/Notes**
Acipenser oxyrinchus desotoi (Gulf Sturgeon)*	T	T	St. Andrew Bay, Sep-Oct	
*Alligator mississippiensis (*American Alligator)**	T	T	Estuarine Open Water	
Anguilla rostrata (American Eel)	P	N	St. Andrew Bay	
Calidris canutus ssp. Rufa (Red Knot)*	T	T	St. Andrew Bay Shoreline	
Caretta caretta (Loggerhead Sea Turtle)	T	T	Gulf Beach Sites and St. Andrew Bay	
Charadrius melodus (Piping Plover)***	T	T	Gulf Beach Sites	
Charadrius nivosus (Snowy Plover)***	T[c]	T	Gulf Beach Sites	
Chelonia mydas (Green Sea Turtle)	T	T	Gulf Beach Sites and St. Andrew Bay	
Crotalus adamanteus (Eastern Diamondback Rattlesnake)	P	N	Shrub, Mesic Flatwoods, and Pine Plantation	
*Danaus plexippus (*Monarch Butterfly*)*	P	N	Salt Marsh, Mesic Flatwoods, Shrub, and Urban Lawns	
Dermochelys coriacea (Leatherback Sea Turtle)***	E	E	Gulf Beach Sites	
Eretmochelys imbricata (Hawksbill Sea Turtle)***	E	E	Gulf Beach Sites	
Egretta caerulea (Little Blue Heron)	N	SSC	Salt Marsh	

Table C-2
Rare Fauna Potentially Occurring at NSA Panama City

Scientific Name **(Common Name)**	**Federal Status**	**State Status**	**Habitat**	**Location/Notes**
Egretta thula (Snowy Egret)	N	SSC	Salt Marsh	
Falso sparverius (American Kestrel)	N	T	Mesic flatwoods with slash pine	
Haliaeetus leucocephalus (Bald Eagle)	N	T	St. Andrew Bay Shoreline	
Hippocampus zosterae (Dwarf Seahorse)	P	N	St. Andrew Bay	
Lepidochelys kempii (Kemp's Ridley Sea Turtle)***	E	E	Gulf Beach Sites	
Macrochelys temminckii (Alligator Snapping Turtle)	P	SSC	Salt Marsh	
Manta birostris (Giant Manta Ray)	C	N	St. Andrews Bay	
Pelecanus occidentalis (Brown Pelican)	N	SSC	St. Andrew Bay	
Peromyscus polionotus allophrys (Choctawhatchee Beach Mouse)	E	E	Beach Sites	
Sterna antillarum (Least Tern)	E****	T	Building Rooftop	
Trichechus manatus latirostris (Florida Manatee)**	T	T	Alligator Bayou	

Key:

Federal Status:

N = Not currently listed, nor currently being considered for listing
P = Petitioned for Listing as Threatened or Endangered
C = Candidate for Listing as Threatened or Endangered
T = Listed as Threatened species
E = Listed as Endangered species

State Status:

N = Not currently listed
SSC = Listed as a species of special concern by the FWC
T = Listed as threatened species by the FWC
E = Listed as endangered species by the FWC

* Historically Observed ** Periodically Observed ***Potentially Observed at Beach Sites ****Federally listed elsewhere, but not in Florida

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D Urban Forestry Plan

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Urban Forestry Plan

D.1 Issue

The NSA Panama City should plant additional tree species within the industrial areas of the installation. These trees will provide a variety of benefits, including aesthetic, social, community, environmental, and economic benefits, when used appropriately. This section considers applicable long-term management concerns and identifies measures for selecting appropriate tree species. Implementation of urban forestry projects will be carried-out consistent with the principles of xeriscaping practices described in Section 5.1.5.

D.2 Long-Term Management

The primary components of consideration in the preparation of an Urban Forestry Plan for NSA Panama City are listed below.

1) Selection of the appropriate tree species.

2) Utilization of appropriate maintenance measures (pruning, fertilizer, watering etc.) for new plantings and established trees.

3) Completion of inventories and annual work plans to implement the overall urban forestry plan.

4) Use of volunteer organizations for assistance with planting and maintenance activities.

D.3 Tree Species

D.3.1 Selection of Appropriate Tree Species

One of the most important and challenging aspects of urban forestry is the selection of the appropriate tree species. Finding the best tree species requires research of site characteristics, tree design, and maintenance requirements. Nursery catalogues are one source of information, and the book *Plants that Merit Attention Volume 1, Trees* (Janet Meakin Poor, 1984), may identify nursery sources for a selected group of species. Other sources (telephone, written, and internet) have been provided below for additional research.

Recommended Plant Species

Table D-1 identifies numerous native species for potential use on the NSA Panama City and provides estimated size, shape, and preferred habitat for each species, and comments relating to wildlife value and other characteristics. Note that Table D-1 is not an exhaustive list; other plant species may be identified by utilizing sources identified within this appendix.

Table D-1

Recommended Native Plant Species for NSA Panama City

Scientific Name (Common Name)	Size (height in feet)	Shape	Habitat	Comments (value to wildlife and other issues)
Acer Rubrum (Red Maple)	50-80	Large tree with a narrow or rounded compact crown.	Wet soils of stream banks, floodplains, and swamps, and in uplands and sometimes on dry ridges; with other hardwoods.	Rapid growth and handsome appearance makes it a popular shade tree. Its red colors through various seasons make it aesthetically pleasing.
Acer barbatum (Florida maple)	60	Medium sized tree with spreading, rounded crown.	Moist soils of valleys and upland slopes.	Southeastern relative of the Sugar Maple. Flowers in early spring producing yellow green hanging flowers
Aesculus parviflora (Bottlebrush)	10	A spreading, multi-stemmed shrub. The plant is bothered very little by foliage diseases and insects compared to other species of Aesculus.	Sun or shaded areas.	Produces nectar very valuable to bird and butterfly species.
Amelanchier arborea (Downy Serviceberry)	40	Tree with narrow rounded crown or an irregularly branched shrub with star shaped white flowers.	Moist soils in hardwood forests.	Sometimes planted as an ornamental for the white flowers. Provides small berries in summer time which provide food for bluebirds, catbirds, chickadees, downy woodpeckers, kingbirds, flickers, mockingbirds, orioles, titmice, towhees, wood thrushes, and others.
Aquilegia canadensis (Columbine)	2-4	This flower has blue, pink, purple, red, white, and yellow flowers.	This plant species prefers full sun, part sun/shade and sandy well-drained soils.	Provides an excellent border for garden; provides no fruit for other wildlife.

Table D-1

Recommended Native Plant Species for NSA Panama City

Scientific Name (Common Name)	Size (height in feet)	Shape	Habitat	Comments (value to wildlife and other issues)
Betula nigra (River birch)	40-80	Often slightly leaning and forked tree with irregular, spreading crown.	Wet soils of stream banks, lakes, swamps, and floodplains with other hardwoods.	Its ability to thrive on moist soils makes it useful for erosion control measures.
Carya glabra (Pignut Hickory)	60-80	Tall tree with irregular, spreading crown.	Dry and moist uplands of hardwood forests.	Produces thick-shelled bitter or sweet seeds. Pigs have been known to consume the nuts.
Castanea alnifolia (Florida Chinkapin)	40	Low spreading shrub or small tree with irregularly shaped crown.	Uplands, including dry sandy soils in oak forests.	This species is typically a low shrub that forms thickets from underground root stalks. Chinkapins or nuts of this species are eaten chiefly by wildlife.
Cliftonia monophylla (Black titi)	20	Evergreen, thicket-forming shrub or small tree with short often crooked trunk, many branches and a narrow crown.	Wet, sandy, acid soils of bays and swamps.	Grown as an ornamental for the fragrant early flowers, shiny evergreen foliage, and showy fruit; it is also a honey producer.
Ulmus alata (Winged elm)	40-80	Tree with short trunk and open rounded crown.	Dry uplands including abandoned fields; also in moist valleys and hardwood forests.	Winged elm seeds provide food for squirrels, rabbits, and various birds. Bird species include cardinals, Carolina chickadees, finches, grosbeaks, sparrows, and other songbirds.
Sabal palmetto (Cabbage palmetto)	30-50	Medium sized, spineless evergreen palm with stout unbranched trunk and very large fan-shaped leaves.	Sandy shores, crowded in groves; inland in hammocks.	Cabbage palm trees provide excellent fruit for many bird and wildlife species and nesting habitat.
Cornus florida (Flowering dogwood)	30	Small flowering tree with short trunk and crown of spreading or horizontal branches.	Both moist and dry soils of valleys and uplands, in understory of hardwoods forests and also in fields and along roadsides.	Food for blue jays, bluebirds, brown thrashers, cardinals, catbirds, cedar waxwings, kingbirds, mockingbirds, purple finches, tanagers, thrushes, towhees, woodpeckers, and others.

Table D-1

Recommended Native Plant Species for NSA Panama City

Scientific Name (Common Name)	Size (height in feet)	Shape	Habitat	Comments (value to wildlife and other issues)
Quercus virginiana (Live oak) *Quercus geminata* (Sand Live Oak)	40-50 (Live Oak) 10-25 (Sand Live Oak)	The Live Oak is a medium-sized evergreen tree with short broad trunk, and very broad, spreading dense crown. Although the Sand Live Oak is very similar to this shape, it tends to be smaller in size depending on its proximity to the coastal sands.	Sandy soils including coastal dunes and ridges near marshes; often in pure stands.	Very valuable to wildlife by producing acorns. Acorns eaten by blue jays, bobwhites, thrashers, clapper rails, crows, goldfinches, grackles, mallards, sandhill cranes, scrub jays, sparrows, titmice, white-breasted nuthatch, towhees, wild turkeys, wood ducks, woodpeckers, wrens, and others.
Juniperus silicicola (Southern Redcedar)	50	Evergreen aromatic tree with narrow or spreading crown; lower branches droop sometimes forming thickets.	From dry uplands especially on limestone to wet soils of river banks and swamps and sandy soils near beaches; often in old fields and along fence rows.	Valuable to bluebirds, brown thrashers, cedar waxwings, flickers, mockingbirds, purple finches, robins, sapsuckers, tree swallows, and yellow-rumped warblers. Also provides food for armadillos and opossums.
Magnolia grandiflora (Southern Magnolia)	60-80	One of the most beautiful native trees, evergreen with straight trunk, conical crown, and very fragrant flowers.	Moist soils of valleys and low uplands with various other hardwoods.	Planted as a shade tree, it provides excellent cover for wildlife.
Fagus grandifolia (American beech)	60-80	Large tree with rounded crown of many long, spreading, and horizontal branches producing edible beechnuts.	Moist rich soils of uplands and well drained lowlands; often in pure stands.	These nuts are consumed in quantities by wildlife (e.g., raccoons, squirrels, bears, other mammals, and game birds.

Source: Association of Florida Native Nurseries (AFNN) 1999.

Site Considerations

1) Consider the space available for trees, the growth characteristics of the tree species, and the way the species will interact with its surroundings. Remember that trees occupy space below the ground, at ground level, and above the ground.

2) Consider climate (heat and light stress may be addressed by planting shrubs and/or ground cover or planting trees in groups).

3) Analyze existing soil conditions.

Design Considerations

Trees' various shapes and sizes can be best suited for particular landscapes.

1) *Oval* - Oval trees fit nicely into street plantings because they grow upward and do not interfere with vehicular traffic. The general upward growth allows these trees to be planted more closely. However, these trees tend to grow tall, which can restrict them from use under power lines or other overhead structures.

2) *Round* - Round trees have a spreading growth habit. Trees with an ascending lateral branch pattern will be more compatible with street plantings where large trucks might pass. Trees with a descending branch pattern may require more pruning.

3) *Columnar* – Columnar trees usually have tightly ascending short branches with narrow branch angles. These trees are valued for their narrow width and ability to be planted in tight spaces.

4) *Pyramidal* – Pyramidal trees often begin as columnar. However, with age, lower branches begin to droop from their own weight.

5) *Vase shaped* - These species grow up and out, forming a canopy while maintaining visual clearance and vehicular access.

D.3.2 Maintenance Considerations

Maintenance will be required for all tree species; however, some will require more maintenance than others. Pruning needs, fertilizing, watering, and pest management are addressed in detail in the following section both for new plantings and established plants.

Maintenance Measures for New Plantings

Pruning Issues

The main reasons to prune ornamental trees are safety, tree health, and aesthetics. Pruning may also stimulate fruit production and increase the value of the tree.

Safety measures include: 1) the removal of limbs that might fall and injure person or damage property; 2) trimming branches that interfere with line of sight; and to protect utility lines. Pruning may be avoided by considering the sizes and shapes of preferred tree species.

Health measures include: 1) the removal of diseased wood; and 2) thinning the crown to increase air flow and reduce potential pest problems.

Aesthetics measures include improving the shape and form of the tree.

Trees have many forms; the most common are pyramidal or spherical. Trees with pyramidal crowns (e.g., most conifers), have a strong central stem and strong lateral branches that are more or less horizontal and do not compete with the central stem for dominance and, therefore, require less pruning. On the contrary, hardwoods produce more branches off the central stem that compete for dominance and must be pruned. To reduce the need for pruning, the tree's natural form should be carefully considered.

Watering Issues

Young trees require adequate water to become established. Although rainfall may be adequate within some areas and in some seasons, additional water may be needed, particularly after planting when root systems are limited. Limited root systems reduce the ability of new plantings to absorb water; there fore, constant monitoring of soil moisture content will be required. Monitoring of soil moisture content is best achieved by utilizing a hand trowel or soil probe and probing two inches below the surface. If soil is dry, the tree will require watering generally equivalent to one inch of rain per week or at least five gallons of water per tree.

Balled and burlapped (B&B) plants require more water during their first growing season than in the nursery. After the first few weeks, lengthen the irrigation interval. By the end of the growing season, the irrigation interval will be three to four weeks. If winter rainfall has been adequate, the tree will need watering once a month during the second year. After this, most trees will survive with only one or no irrigations, although most species probably do better with monthly applications.

Fertilization

Fertilization of newly planted trees is preferred after planting. Most soils are nitrogen deficient and nitrogen is the only added nutrient to which trees respond. Slow release forms of nitrogen are recommended in sandy soils. Additional information on slow release fertilizers may be found in Section 5.1.4.

Soil Management

It is essential to maintain an area free from turf and weeds around newly planted tree trunks because turf and weeds compete for water and nutrients, and some produce chemicals toxic to other plants. Maintaining an area free from turf and weeds around the tree trunk also reduces the need for mowers to approach the tree and risk injuring the tree. The turf-free area should be at least 1-foot in radius. After four or five years, tree root systems are extensive

enough that other plants close to the trunk of the tree are not problematic. Mower operators should still exercise caution.

A 3- to 4-inch mulch layer is enough to control most weed seedlings. In addition, mulch protects the soil from compaction and erosion, conserves moisture, moderates soil temperature, provides an all-weather surface for walking, and allows plants to root in the fertile and well aerated surface soil.

Maintenance Measures for Established Trees:

Maintenance of established trees differs significantly from that for new plantings. Improper maintenance of established trees may result in a safety risks or property damage. Tree maintenance practices include scheduled inspections, pruning, controlling insects and disease, fertilizing and aerating, and appropriate removal of trees and stumps.

Inspections

Most tree hazards can be reduced by conducting regular inspections. A field survey should answer the following 13 questions from *Tree Hazards: Your Trees Can Kill* (Alex Shigo 1991):

1. Target - If the tree falls, will it fall on cars, power lines, houses, or people?
2. Architecture - Has the tree grown beyond its normal form?
3. History - Has the tree lost large branches recently?
4. Edge Tree - Were large trees cut away recently leaving tall trees at the edge?
5. Dead Branches - Are there dead tops or branches? Is the tree dead?
6. Cracks - Are there deep open cracks in the branches?
7. Crotch cracks - Are there deep open cracks below joining stems?
8. Living Branches - Do living branches bend abruptly upward or downward where tips of large branches were cut off?
9. Topping - Are large branches growing rapidly from topping cuts on trees?
10. Storm Injury - Are there broken branches, split trunks, or injured roots?
11. Root rot - Are there fungus fruit bodies on roots?
12. Rots and Cankers - Are there hollows or cankers, some with fungus fruit bodies? Is the tree leaning?
13. Construction Injury - Have roots, trunks, or branches been injured?

Tree maintenance inspections are usually done in response to crisis situations or following a well planned tree maintenance program.

Pruning Guidelines

The purpose and scope of pruning activities must be clearly defined if this work is to be contracted out. The Western Chapter of the International Society of Arboriculture has developed pruning standards and general guidelines.

Insect and Disease Control

Because trees are often planted in hostile conditions, they are not always in the best of health. Trees under stress are much more susceptible to attack by harmful insects and disease and are more likely to exhibit symptoms of the adverse environment. To determine the health of trees, complete routine inspections to identify the problem early and reduce potential damage to the tree. Several entities can provide technical assistance, including the County Cooperative Extension Service, Agricultural Commissioners Office, and Forestry Office. In addition, information can be obtained from local nurseries, tree services, pest control contractors, or arboriculture or horticulture experts for a nominal fee.

Fertilizing and Aeration

The physical, chemical, and biological conditions of the soil may need to be managed. The fertilization and aeration of soils are necessary to maintain the appropriate soil conditions. The County Cooperative Extension Service will sample each specific tree site and make fertilizer recommendations for that site. For additional information see Section 5.1.2 and Section 5.1.5.

In generally, the best time of year to fertilize is the late summer or fall. Fertilizer may also be applied after leaves open fully and into early July. There are various methods for fertilizing trees: fertilizer may be broadcast over the surface of the ground, poured into holes drilled into the soil, injected as liquid into the soil, sprayed onto the leaves, or injected directly into the trunk.

D.3.3 Tree Inventories

Tree inventory systems are a major component of an effective urban forestry program. Tree inventories are necessary to obtain and organize information about the number, condition, and distribution of tree species. Information that is accurate and accessible is one of the best

tools for planning and management decisions. Tree inventories facilitate the effective allocation of program resources among the various tree functions.

Several inventory systems have been developed by universities, cities, agricultural extension services, and consulting firms Inventory systems range from very quick, inexpensive survey methods that provide basic overview information to sophisticated computerized systems. For example, *A Guide to Urban Tree Inventory Systems* (1979) was developed by the School of Forestry Resources at Pennsylvania State University. It contains a general review of the characteristics of urban tree inventory systems, profiles 25 different systems, and references 24 other inventories.

In addition to tree inventories, the installation should annually update the Urban Forestry Plan to discuss maintenance, new plantings, budget issues, and other considerations. The annual update should provide specific timeframes, guidelines, and estimated costs for each action to assist with budget development.

D.3.4 Volunteer Organizations

NSA Panama City will use volunteer organizations to assist with the planting and maintenance on the installation. These organizations include Scout troops or other local conservation organizations (see Section 1.4). The benefits of volunteer assistance are two-fold. The activity will provide opportunities to encourage environmental stewardship and to promote the public image of the DoN. Furthermore, grounds maintenance costs will be reduced by using volunteer labor.

Additional Sources of Information:

Written Sources:

Western Chapter of the International Society of Arboriculture (Pruning Standards)
P.O. Box 424
St. Helena, California 94574

Safety Requirement for Tree Pruning, Trimming Repair or Removal
American National Standards Institute, Inc.
1430 Broadway
New York, New York 10018

Internet Addresses:

http://www.growit.com

http://www.nsis.org

D.4 References

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Diekelmann, J. and C., 1982, *Natural Landscaping, Designing with native plant communities,* McGraw Hill, New York, 276 pp.

Gill, J.D. and W.M. Healy, 1974, *Shrubs and Vines for Northeastern Wildlife,* NE Forest Expt. Station, Upper Darby, Pensylvanie, 180 pp.

Henderson, Carol L., 1987, *Landscaping for Wildlife,* Minnesota Department of Natural Resources, St. Paul, Minnesota, 145 pp.

McKinley, Michael, 1983, *How to Attract Birds,* Ortho Books, San Francisco, California, 96 pp.

National Audobon Society *Field Guide to North American Trees Eastern Region,* 1980, Alfred A. Knopf.

Terres, John K., 1987, *Songbirds in Your Garden,* Harper and Row Publishers, New York, New York, 306 pp.