

Marine Corps Air Station
Cherry Point
Integrated Natural Resources
Management Plan
2024 – 2028

June 2024

Prepared by:
Natural Resources Division
Marine Corps Air Station, Cherry Point

This page intentionally left blank.

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MARINE CORPS AIR STATION CHERRY POINT COMPLEX


Plan Years

2024–2028

Approving Officials:


MCAS Cherry Point Commanding Officer

7 August 2024
Date


MCAS Cherry Point Environmental Affairs Officer

15 APRIL 2024
Date


MCAS Cherry Point Natural Resources Manager

15 APRIL 2024
Date

Annual Review

Date

This page intentionally left blank.

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	2-1
1.1 Integrated Natural Resources Management Plans	2-1
1.2 MCAS Cherry Point Military Mission And Operations	2-6
1.3 MCAS Cherry Point Natural Resources Management	2-6
2.0 MCAS CHERRY POINT CURRENT CONDITIONS AND USE	2-1
2.1 Location	2-1
2.2 Physical Setting.....	2-1
2.3 Conservation Significance of the Area	2-42
2.4 Socioeconomic Setting.....	2-45
3.0 NATURAL RESOURCES PRIORITIES AND THEIR RELATIONSHIP TO GOALS AND MANAGEMENT ACTIONS	3-1
3.1 Mission Focused Natural Resources Priorities	3-1
3.2 Relationship of Natural Resource Priorities, Goals, and Management Actions	3-4
3.3 Funding Classes	3-5
3.4 Role of Monitoring	3-6
4.0 PROTECTED SPECIES MANAGEMENT	4-1
4.1 Threatened and Endangered Species	4-1
4.2 Threatened and Endangered Species Management.....	4-12
4.3 Threatened and Endangered Species Management Objectives and Actions	4-20
4.4 North Carolina Threatened, Endangered, and Species of Concern	4-21
4.5 Species At-Risk Management Objectives and Actions	4-26
5.0 MIGRATORY BIRD MANAGEMENT	5-1
5.1 Conservation Framework.....	5-1
5.2 Population Monitoring.....	5-2
5.3 Important Habitats	5-2
6.0 FOREST MANAGEMENT AND PROTECTION	6-1
6.1 General Forest Management.....	6-1
6.2 Restoration Efforts	6-3
6.3 Regeneration Practices.....	6-5
6.4 Wildland and Prescribed Fire Management	6-7
6.5 Forest Pest Management	6-10
6.6 Forest Management and Protection Objectives and Actions	6-11
7.0 AQUATIC RESOURCE AND WATER QUALITY MANGEMENT	7-1
7.1 Wetlands and Surface Water Protection	7-1
7.2 Watershed Protection.....	7-2
7.3 Floodplain Protection.....	7-3

7.4	Stormwater Management	7-4
7.5	Coastal Zone Protection	7-5
7.6	Aquatic Resources and Water Quality Management Objectives and Actions.....	7-7
8.0	LAND MANAGEMENT.....	8-1
8.1	Erosion and Sediment Control	8-2
8.2	Land Management Objectives and Actions	8-2
8.3	Landscape and Vegetation Management	8-3
8.4	Landscape and Vegetation Management Objectives and Actions.....	8-3
9.0	WILDLIFE AND FISHERIES MANGEMENT	9-1
9.1	Wildlife Management	9-2
9.2	Wildlife Management Objectives and Actions	9-7
9.3	Fisheries Management	9-8
9.4	Fisheries Management Objectives and Actions.....	9-10
10.0	PUBLIC ACCESS AND OUTDOOR RECREATION.....	10-1
10.1	Public Access	10-1
10.2	Natural Resource-Based Outdoor Recreation.....	10-1
10.3	Public Access and Outdoor Recreation Objectives and Actions	10-2
11.0	CONSERVATION LAW ENFORCEMENT.....	11-3
11.1	Conservation Law Enforcement Objectives and Actions	11-4
12.0	REGIONAL CONSERVATION	12-1
12.1	Overview of Regional Conservation.....	12-1
12.2	Regional Conservation Objectives and Actions	12-2
13.0	CONSERVATION OUTREACH AND EDUCATION.....	13-5
13.1	Overview of Conservation Outreach and Education	13-5
13.2	Conservation Outreach and Education Objectives and Actions	13-5
14.0	RESILIENCY AND CLIMATE CHANGE	14-7
14.1	Resiliency.....	14-7
14.2	Climate Change.....	14-7
14.3	Climate Adaptation	14-9
14.4	Resiliency and Climate Change Objectives and Actions.....	14-9
15.0	SUMMARY	15-1
15.1	INRMP Purpose.....	15-1
15.2	INRMP Provides Adequate Management of Species	15-1
15.3	INRMP Provides a Benefit to Known Species	15-2
15.4	Compliance with other Environmental Requirements.....	15-3
15.5	INRMP Benefits.....	15-3
15.6	Conclusion	15-5
16.0	LITERATURE CITED	16-1

APPENDICES

	<u>Page</u>
APPENDIX A	2024–2028 INRMP EXTERNAL COMMENTS..... A-1
APPENDIX B	INRMP ACTIONS AND MONITORING TABLEB-1
	Table B-1. INRMP Course of Action and Monitoring Table and Funding Classes, MCAS Cherry Point Complex.
APPENDIX C	INRMP BENEFIT TO LISTED SPECIES AND SPECIES AT-RISKC-1
	Table C-1. Species-Specific Habitats and Flowering Periods for Federally Listed Plant Species with the Potential to Occur at MCAS Cherry Point Complex.
	Table C-2. Species-Specific Habitats for Federally Listed Bird Species with the Potential to Occur at MCAS Cherry Point Complex.
	Table C-3. Species-Specific Habitats and Flowering Periods for At- Risk Plant Species of MCAS Cherry Point Complex.
	Table C-4. Species-Specific Habitats for At-Risk Fish Species of MCAS Cherry Point Complex.
	Table C-5. Species-Specific Habitats for At-Risk Herpetofauna Species of MCAS Cherry Point Complex.
	Table C-6. Species-Specific Habitats for At-Risk Bird Species of MCAS Cherry Point Complex.
APPENDIX D	MARINE MAMMAL AND PROTECTED SPECIES MONITORING PLAN..... D-1
APPENDIX E	LIST OF NATIVE AND LOCALLY ADAPTED PLANT SPECIESE-1
	Table E-1. Native and Locally Adapted Tree, Shrub and Vine Species.
	Table E-2. Native and Locally Adapted Herbaceous Plant Species.

LIST OF FIGURES

	<u>Page</u>
Figure 1.1	General Location of MCAS Cherry Point and Surrounding Areas. 2-1
Figure 1.2	Natural Resources Division Organizational Chart..... 2-12
Figure 2.1	Observed Annual Precipitation from 1900 to 2020. 2-12
Figure 2.2	Total Hurricane Events in North Carolina from 1900 to 2020. 2-13
Figure 2.3	MCAS Cherry Point Significant Natural Heritage Areas and Landcover 2-16
Figure 2.4.	Piney Island (BT-11) and MCOLF Atlantic Significant..... 2-18
	Natural Heritage Areas (SNHAs) and Land Cover..... 2-18
Figure 2.6	MCALF Bogue and Cat Island Significant Natural..... 2-23
	Heritage Areas (SNHAs) and Land Cover..... 2-23
Figure 2.7.	Pamlico Point and MAW Point Significant Natural 2-25
	Heritage Areas (SNHAs) and Land Cover..... 2-25
Figure 2.8.	MCOLF Oak Grove Significant Natural Heritage Areas (SNHAs) and Land Cover..... 2-26
Figure 2.9.	Installation locations within major watersheds..... 2-28
Figure 2.10.	Air Station Water Resources..... 2-31
Figure 2.11.	Piney Island (BT-11) Water Resources. 2-33
Figure 2.12.	MCOLF Atlantic Water Resources..... 2-35
	Pamlico Point, Maw Point, Cat Island, and Brant Island Shoal (BT-9) 2-38
Figure 2.15.	MCOLF Oak Grove Water Resources..... 2-41

LIST OF TABLES

	<u>Page</u>
Table 2.1. Major Soils of MCAS Cherry Point.....	2-5
Table 2.2. Major Soils of Piney Island (BT-11).	2-7
Table 2.3. Major Soils of MCOLF Atlantic.....	2-8
Table 2.4. Major Soils of MCALF Bogue.	2-8
Table 2.5. Major Soils of Pamlico Point, Maw Point, and Cat Island.	2-9
Table 2.6. Major Soils of MCOLF Oak Grove.	2-11
Table 2.6. Natural Community Types of MCAS Cherry Point.	2-14
Table 2.7. Natural Community Types of Piney Island (BT-11).	2-17
Table 2.8. Natural Community Types of MCOLF Atlantic.....	2-19
Table 2.9. Natural Community Types of MCALF Bogue.	2-20
Table 2.10. Natural Community Types of Pamlico Point, Maw Point, and Cat Island.....	2-24
Table 2.11. Natural Community Types of MCOLF Oak Grove.	2-27
Table 2.12. Wetlands at MCAS Cherry Point.....	2-30
Table 2.13. Wetlands at Piney Island (BT-11).....	2-32
Table 2.14. Wetlands at MCOLF Atlantic.....	2-34
Table 2.15. Wetlands of MCALF Bogue.....	2-36
Table 2.16. Wetlands at Pamlico Point, Maw Point, Cat Island, and Brant Island Shoal (BT-9).	2-38
Table 2.17. Wetlands at MCOLF Oak Grove.	2-40
Table 4.1. Federal Threatened and Endangered Species and Marine Mammal Protection Act Species and their North Carolina Status that are Known or that have the Potential to Occur at MCAS Cherry Point Complex.	4-2
Table 4.2. North Carolina Threatened, Endangered, and Species of Concern for MCAS Cherry Point and Outlying Fields.....	4-22
Table 9.1. Essential Fish Habitat and Associated Fish and Invertebrate Species of MCAS Cherry Point Complex.	9-11

LIST OF ACRONYMS AND ABBREVIATIONS

%	percent
§	Section (of legal code)
°F	degrees Fahrenheit
2d MAW	2d Marine Aircraft Wing
ADC	Animal Damage Control
AECs	Areas of Environmental Concern
MCALF	Marine Corps Auxiliary Landing Field
AOI	area of interest
BASH	Bird/Wildlife Aircraft Strike Hazard
BCC	U.S. Fish and Wildlife Service Birds of Conservation Concern
BHWG	Bird Hazard Working Group
BirdRad	Bird-Radar
BMPs	best management practices
BO	Biological Opinion
BT	Bombing Target
BT-9	Brant Island Shoal Bombing Target
BT-11	Piney Island Bombing Target
CAMA	Coastal Area Management Act
CFR	Code of Federal Regulations
CLC 21	Combat Logistics Company 21
CLE	Conservation Law Enforcement
CNATT Marine Unit	Center for Naval Aviation Technical Training Marine Unit
CS	Candidate Species
CWA	Clean Water Act
CWG	Conservation Working Group
CZMA	Coastal Zone Management Act
CZMARA	Coastal Zone Management Act Reauthorization Amendment
DoD	Department of Defense
DoDI	Department of Defense Instruction
DMAP	Deer Management Assistance Program
E	Endangered Species
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EP	Encroachment Partnering
ESA	Endangered Species Act of 1973
ESCP	Erosion and Sediment Control Plan
FCLP	Field Carrier Landing Practice
FRC-East	Fleet Readiness Center-East
ft	feet
FY	Fiscal Year
G.S.	General Statute (North Carolina)
GIS	geographic information system

HAPC	Habitat Areas of Particular Concern
HQ USMC	Headquarters, Marine Corps
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resources Management Plan
IHA	Incidental Harassment Authorization
II MEF	II Marine Expeditionary Force
INRMP	Integrated Natural Resources Management Plan
ITS	Incidental Take Statement
IWDM	Integrated Wildlife Damage Management
LUP	Land Use Plan
MBTA	Migratory Bird Treaty Act
MCAS Cherry Point	Marine Corps Air Station Cherry Point Complex
MCB	Marine Corps Base
MCO	Marine Corps Order
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOUT	Military Operations on Urbanized Terrain
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
NABCI	North American Bird Conservation Initiative
NAVFAC Atlantic	Naval Facilities Engineering Command, Atlantic
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Waterfowl Management Plan
NCAC	North Carolina Administrative Code
NCDEQ	North Carolina Department of Environmental Quality
NCNPS	North Carolina Native Plant Society
NCWAP	North Carolina Wildlife Action Plan
NCWRC	North Carolina Wildlife Resources Commission
NDAA	National Defense Authorization Act of 2004
NEPA	National Environmental Policy Act
NGOs	non-governmental organizations
NHP	Natural Heritage Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NPLD	National Public Lands Day
NRCS	Natural Resources Conservation Service
NRD	Natural Resources Division
NRM	Natural Resources Manager
NWPs	Nationwide Permits
NWR	National Wildlife Refuge
OBCF	North Carolina Onslow Bight Conservation Forum
MCOLF	Marine Corps Outlying Airfield
OPNAVINST	Chief of Naval Operations Instruction
PAM	passive acoustic monitoring

PIF	Partners in Flight
RCW	red-cockaded woodpecker
SAIA	Sikes Act Improvement Act of 1997
SAMBI	South Atlantic Migratory Bird Initiative
SAV	submerged aquatic vegetation
SNHA	Significant Natural Heritage Area
SR	State Road
State	North Carolina
SPPP	Stormwater Pollution Prevention Plan
T	Threatened Species
TNC	The Nature Conservancy
TNT	trinitrotoluene
U.S.	United States of America
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
USSCP	U.S. Shorebird Conservation Plan
WFMP	Wildland Fire Management Plan
WWII	World War II

1.0 INTRODUCTION

The Marine Corps Air Station Cherry Point Complex (MCAS Cherry Point) is home to approximately 7,215 active-duty military personnel, 2,251 reserve/guard, and 5,498 civilian personnel (USMC 2019). MCAS Cherry Point functions as a leader in aviation support facilities and services in the Department of Defense (DoD), and is home to the Commanding General, 2d Marine Aircraft Wing (2d MAW). The MCAS Cherry Point Complex comprises nine widely dispersed properties located in Craven, Carteret, Jones, and Pamlico counties in eastern North Carolina (State), including several outlying airfields and bombing targets. These properties occur on approximately 26,073 acres of land and 18,000 acres of water and are strategically located to meet operational and training requirements of the United States Marine Corps (USMC).

MCAS Cherry Point provides a variety of environmental conditions and ecosystems for Marine training and maintaining combat-ready troops for expeditionary deployment. This objective is met in a way that provides for sustainable and healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military lands to support the military mission.

Integrated Natural Resources Management Plans (INRMPs) help installation commanders manage natural resources more effectively so that lands remain available and in good condition to support the installation's military mission. The original MCAS Cherry Point INRMP completed in 2001 was prepared as both an INRMP and an Environmental Assessment (EA). An environmental analysis of implementing the INRMP was included to satisfy requirements of the National Environmental Policy Act (NEPA). The document herein represents an update of the 2001 INRMP. The INRMP format for this update has been revised to accommodate new information, MCAS Cherry Point needs, and military guidance for preparation of INRMPs. Information provided in this INRMP includes a description of the physical and biological environment of MCAS Cherry Point; and specific natural resources management objectives and actions that will help ensure the natural resources are retained, restored, and conserved in a manner that also facilitates implementation of the military mission.

1.1 Integrated Natural Resources Management Plans

1.1.1 Goals and Objectives for Natural Resources and Military Readiness

This INRMP outlines conservation efforts and establishes procedures to ensure compliance with related environmental laws and regulations for Fiscal Year (FY) 2024 through FY 2028. National Historic Preservation Act requirements will be addressed as site specific management actions are identified (e.g., annual prescribed burn plan or timber management actions) consistent with MCAS Cherry Point's Integrated Cultural Resources Management Plan (ICRMP).

Development of this INRMP included input from diverse stakeholders including federal, State and local agency representatives, conservation organizations and interested individuals. As required under SAIA, this INRMP reflects mutual agreement of agencies

concerned with the conservation, protection, and management of fish and wildlife resources, including the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), and the North Carolina Wildlife Resources Commission (NCWRC). This INRMP provides the direction for natural resources management at all eight MCAS Cherry Point parcels; however, it does not replace or affect any federal laws, or State responsibility and authority for protecting fish and wildlife resources.

MCAS Cherry Point does not have any leased properties or agricultural outleases. There are several areas that are licensed for use by private entities, such as the skeet range. License agreements are in place for these areas that allow access privileges to club members in exchange for their management of the designated areas.

1.1.2 Authority

The primary purpose of this INRMP is to provide guidance to the MCAS Cherry Point natural resource management program in accordance with the following:

- Sikes Act Improvement Act (SAIA) of 1997
- 16 United States Code (USC) 670a et seq.
- Department of Defense Instruction (DoDI) 4715.3
- Environmental Conservation Program (3 May 1996)
- Marine Corps Order (MCO) P5090.2A
- Environmental Compliance and Protection Manual (10 July 1998)
- Endangered Species Act (ESA) of 1973, USC 1531 et. seq.
- Migratory Bird Treaty Act (MBTA 16 USC 703-712)
- Clean Water Act (CWA 33 USC 1251 et. seq.)
- National Defense Authorization Act of 2004 (NDAA)

Development and implementation of this INRMP will fulfill the statutory requirements under SAIA. The SAIA states: “*The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation...*” (16 USC §670a). Consistent with use of military installations to ensure preparedness of the Armed Forces, the SAIA requires that each INRMP shall, where appropriate and applicable, provide for the following:

- Fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- Fish and wildlife habitat enhancement or modifications;
- Wetland protection, enhancement, and restoration where necessary to support fish and wildlife;
- Integration of, and consistency among, the various activities conducted under the INRMP;
- Establishment of specific natural resources management objectives and time frames for proposed action;
- Sustained use by the public of natural resources to the extent such use is not

inconsistent with the needs of fish and wildlife resources management;

- Public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources, to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- Enforcement of natural resource laws and regulations;
- No net loss in the capability of military installation lands to support the military mission of the installation; and
- Other activities as the Secretary of the military department considers appropriate.

SAIA is viewed as an “umbrella” law with regard to management of natural resources on military lands. Thus, this INRMP helps ensure that MCAS Cherry Point complies with other federal and State laws, such as the federal and State ESAs, Migratory Bird Treaty Act (MBTA), Clean Water Act (CWA), Sedimentation Pollution Control Act, and North Carolina Surface Water and Wetlands Standard that require military installations to manage and protect sensitive biological and other natural resources.

DoDI 4715.3 requires protection and enhancement of natural resources for multiple use, sustainability, and biological integrity. INRMP requirements include inventory of significant or sensitive natural resources, restoration or rehabilitation of altered or degraded landscapes, provisions for outdoor recreational activities, and application of the principles of ecosystem management.

Chapter 11 of MCO P5090.2A describes Marine Corps policies on natural resources management, including land management, fish and wildlife management, forest management, outdoor recreation, and environmental restoration. Appendix A of MCO P5090.2A summarizes all relevant federal environmental statutes, regulations, executive orders (EOs), and military mandates for environmental compliance.

The *Handbook for Preparing, Revising, and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (Headquarters [HQ], USMC 2007) also served as a guidance document for this INRMP revision. The 2007 Handbook provides the most current information on the requirements of the SAIA, purpose of natural resources management on Marine Corps lands, and general guidance on preparation and revision of INRMPs for Marine Corps installations.

1.1.3 Internal Coordination

The MCAS Cherry Point Natural Resources Division (NRD) is responsible for INRMP development, implementation, and revision, as well as development of long-range planning goals and objectives. The Natural Resources Manager (NRM) and staff from the Environmental Affairs Department and Operations Directorate (Range Operations) were primarily responsible for coordinating development of this revised INRMP. This INRMP team obtained focused input and guidance from individuals representing various critical interests of natural resources management at MCAS Cherry Point. This group helped identify issues and data needs, reviewed and commented on statements and objectives, and assisted in development of recommendations and proposed projects developed for the

INRMP. Representatives from other air station sections were consulted during INRMP development as necessary.

1.1.4 Resource Agency Coordination

The SAIA requires that military installations prepare INRMPs in cooperation with, and reflect mutual agreement of, the USFWS, NMFS, and appropriate state fish and wildlife agencies. A copy of the Pre-final INRMP was submitted to all federal and State agency stakeholders for review and comment in June 2023 and a meeting was held on July 21, 2023 to discuss agency comments. Agency comments on the Pre-final INRMP have been addressed in this INRMP, and a copy of all comments received is included in Appendix A.

The involvement of State and federal agencies such as the USFWS, NMFS, and NCWRC is expected to continue indefinitely during INRMP implementation. Planning and coordination sessions between MCAS Cherry Point and these agencies will be ongoing throughout the period covered by this INRMP. In addition, agencies will be provided an opportunity to submit comments, recommendations, and input on the status of regional processes, surveys, and species with regards to the management of natural resources of MCAS Cherry Point.

1.1.5 Scoping and Public Involvement

NEPA is an essential part of the planning process for ecosystem management on federal lands. Not only does it require extensive review of environmental impacts of all federal actions, it encourages interdisciplinary thinking and processes among Air station offices. The MCAS Cherry Point NEPA Program resides within NRD and provides in-house support for military projects, and other NEPA actions to facilitate current and future military training requirements. This relationship contributes to an interdisciplinary, ecosystem management approach, and helps ensure that each action is thoroughly considered and reviewed.

INRMPs are action-forcing documents that trigger NEPA compliance. An INRMP and EA share similar contents, both of which describe a course of action, describe the existing environment, and predict the outcome of actions being taken. An EA is an analysis of the environmental effects of a proposed action and any alternatives to the proposed action. It provides sufficient evidence and analysis for determining whether or not an environmental impact statement (EIS) should be prepared. It was determined that an EIS was not required for the 2001 INRMP/EA.

Section (§) 2905(d)(1) of the SAIA mandates that the public be provided a meaningful opportunity to comment on the MCAS Cherry Point INRMP. This opportunity was provided through the 30-day review and comment period for the 2001 INRMP/EA. In addition, North Carolina State agencies, including North Carolina Department of Environmental Quality (NCDEQ) and the 95-day clearinghouse in the Governor's office, were invited to comment. External stakeholders, including non-governmental organizations (NGOs) such as the North Carolina Chapter of The Nature Conservancy (TNC), Endangered Species Coalition, North Carolina Coastal Land Trust, and others, were also afforded an opportunity to comment during the public comment period. Notifications of availability of the INRMP and the public review and comment period were made by mailing letters to State, federal, and local agencies, as well as individuals and

organizations who had expressed an interest in natural resources management at MCAS Cherry Point. In addition, a legal notice was published in The Windsock, MCAS Cherry Point's "newspaper of record" for NEPA purposes. Copies of all comments received during the 30-day comment period are included in the EA.

Updates to the existing INRMP that are included in this document are not deemed to be substantial enough to warrant additional NEPA review of the INRMP. No additional public comment period has been provided for this INRMP update, as the EA prepared for the 2001 INRMP satisfied this NEPA requirement.

1.1.6 Review and Revision

Section 101(b)(2) of SAIA requires that each INRMP be reviewed "on a regular basis, but not less often than every five years." MCAS Cherry Point recognizes that natural resource management is a dynamic process and that this INRMP will need to be evaluated and revised frequently. Consistent with Marine Corps and DoD guidance, MCAS Cherry Point intends to review the INRMP annually in cooperation with the USFWS, NMFS, and NCWRC, and revise the INRMP as necessary. Continuous involvement of these agencies and the public, through ongoing availability of this INRMP on MCAS Cherry Point's website, is expected to assist in determining the need for future reviews and revisions.

The Environmental Affairs Department is responsible for conducting annual INRMP reviews and acts as the liaison with cooperating fish and wildlife agencies. During annual reviews natural resource management objectives, completed actions, and proposed actions will be reviewed with appropriate managers to document progress, identify additional actions as desired, and revise implementation schedules and priorities. As part of these reviews agencies will be involved in evaluation of processes, results, and implementation of established timelines for specific projects and programs. They will also consider ecosystem, species, and habitat goals contained in existing conservation management plans. Following each INRMP review new data and lessons learned will be incorporated into the INRMP as appropriate.

1.1.7 Environmental Compliance

Implementation of this INRMP will help ensure that the Commanding Officer of MCAS Cherry Point complies with federal, State, regional and local statutes, regulations and initiatives. Some examples are the following:

- Clean Water Act, EO 11990 - Protection of Wetlands
- North American Wetlands Conservation Act
- Endangered Species Act,
- Fish and Wildlife Coordination Act
- Lacey Act
- Migratory Bird Treaty Act
- Coastal Zone Management Act Reauthorization Amendment (CZMARA)

1.1.8 INRMPs, the NDAA, and Critical Habitat Designation

The NDAA made a significant revision to the ESA that allowed military installations to be precluded from critical habitat requirements, as long as an INRMP is being implemented that provides the needed protection of critical habitat designated at the installation for federally protected species. The NDAA states: “The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under §101 of the Sikes Act (16 USC 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.” (Public Law 108–136, 24 November 2003).

Under the NDAA, an INRMP may eliminate the need for critical habitat designation if it provides benefit to listed species and manages for the long-term conservation of the species. If a Marine Corps installation has federally listed threatened or endangered species, proposed federally listed threatened or endangered species, and/or candidate species on the installation, or unoccupied habitat for a listed species where critical habitat may be designated, the INRMP must specifically address benefits of management actions to these species or their habitats. Benefits should be clearly identified in the document and included in the table of contents of the INRMP.

In this INRMP, proposed actions are provided in Appendix B, which lists the actions along with their applicable units of measure and measures of success. Appendix C provides a summary of species benefits provided by this INRMP to listed, proposed, or candidate species, and species at-risk known to occur at MCAS Cherry Point.

1.2 MCAS Cherry Point Military Mission And Operations

1.2.1 Mission

The goals and required management actions needed to meet the objectives of this INRMP are shaped by the military facilities and missions of MCAS Cherry Point properties and natural resources present on each. The Marine Corps mission is national defense. The mission of MCAS Cherry Point is to provide the highest quality aviation facilities, support and services to promote the readiness, sustainment and quality of life for Marines, Sailors, Civilian Marines, Family Members and others associated with MCAS Cherry Point (USMC 2010b).

1.2.2 Area of Responsibility

The military mission at MCAS Cherry Point is met through the operation of eight land parcels and a single water-based property that make up the MCAS Cherry Point Complex. These areas and their diversity of training components are described below. Detailed maps and descriptions of the regional location, natural resources, and site details for each parcel are provided in Section 2.0.

MCAS Cherry Point (Air Station)

MCAS Cherry Point is approximately 11,600 acres in size, and is located in Craven County, North Carolina. It is the home station for the 2d MAW, II Marine Expeditionary Force (II MEF), and the largest airfield for Marine Corps aviation on the east coast;

maintaining and/or operating facilities, services, and materials to support the 2d MAW. Per Code of Federal Regulations (CFR)334.430 portions of the Neuse River and Slocum and Hancock Creek tributaries located adjacent or on MCAS Cherry Point are designated as a restricted area and danger zone. Entry points into these designated areas are identified with signage indicating the restricted access.

Piney Island

Piney Island also known as Bombing Target – 11 (BT-11) is approximately 11,913 acres in size and is located on a low-lying peninsula in Pamlico Sound, Carteret County, North Carolina 21 miles east of MCAS Cherry Point. Piney Island is one of the most important military ranges on the east coast and is home to the Mid-Atlantic Electronic Warfare Range. The site contains a multi-purpose target complex designed to provide training in delivery of conventional and special weapons. The target includes three 0.5-mile radius restricted areas, and a 1.8-mile prohibited radius around a barge target located in the northern half of the island (33 CFR 334.420). All restricted and prohibited areas are closed to navigation and personnel at all times, with the exception of vessels engaged in operational and maintenance work as authorized by the Commanding Officer.

Marine Corps Outlying Landing Field (MCOLF) Atlantic

Marine Corps Outlying Airfield (MCOLF) Atlantic is approximately 1,493 acres in size, and is located in northeastern Carteret County, North Carolina 28 miles east of MCAS Cherry Point. MCOLF Atlantic serves primarily as a base for military personnel who support activities at Piney Island. Threat emitters and facilities associated with the Mid-Atlantic Electronic Warfare Range are located at MCOLF Atlantic, and with the exception of routine helicopter shuttle flights, aircraft use this facility only during special training exercises. New facilities and training structures will be constructed at MCOLF Atlantic, which will increase use of the site for military training. The MCOLF contains a Military Operations Urban Terrain (MOUT) simmunition Airfield Seizure Facility (AFSF) and a close quarters battle (CQB) Live Fire Shoot House (LFSH). In addition, there is a barracks facility that can accommodate 76 personnel in support of forward deployments/detachments operating from the MCOLF. No aircraft are permanently stationed at MCOLF Atlantic.

MCOLF Oak Grove

MCOLF Oak Grove is approximately 827 acres located on the Trent River in Jones County, NC. 28 miles west of MCAS Cherry Point. MCOLF Oak Grove is used for aircraft training and field training exercises. Flight operations at MCOLF Oak Grove typically range from aircraft familiarization, and air/ground tactical support missions, to search-and-rescue maneuvers, and night vision goggle/forward looking infrared (FLIR) training. No aircraft are permanently stationed at MCOLF Oak Grove.

Marine Corps Auxiliary Landing Field (MCALF) Bogue

Marine Corps Auxiliary Landing Field (MCALF) Bogue is approximately 853 acres in size and is located on Bogue Sound in southwestern Carteret County, North Carolina 15 miles south of MCAS Cherry Point. MCALF Bogue is used for aircraft training and field training exercises. The airfield contains replicas of amphibious assault ship decks that are used for

pilot qualifications training for ship deck landings. No aircraft are permanently stationed at MCALF Bogue.

Pamlico Point, Maw Point, Cat Island, and Raccoon Island

Pamlico Point is approximately 141 acres in size, and is located in northeastern Pamlico County, North Carolina, approximately 33 miles northeast of MCAS Cherry Point. Maw Point is approximately 55 acres in size and is located on the western edge of Pamlico Sound in eastern Pamlico County, North Carolina, approximately 23 miles northeast of MCAS Cherry Point. Cat Island is a small island, approximately 18 acres in size, and is located in Bogue Sound, western Carteret County, North Carolina, approximately 15 miles south of MCAS Cherry Point. Raccoon Island is a land mass (approximately 114 acres in size) associated with Piney Island, located approximately 0.4 miles northeast of Piney Island. All four of these parcels are currently being managed by MCAS Cherry Point; however, these sites are inactive bombing targets and are not subject to any active training activities.

Brant Island Shoal

Brant Island Shoal also known as Bombing Target – 9 (BT-9) is a water-based target, approximately 18,000 acres in size is within the Pamlico Sound, Pamlico County, North Carolina. BT- 9 is located approximately 30 miles northeast of MCAS Cherry Point. BT-9 and BT-11 are both integral bombing targets that support the military mission of MCAS Cherry Point. A 3.0-mile radius around the center of the target area denotes the danger zone for this target and is closed to navigation and personnel at all times, with the exception of vessels engaged in operational and maintenance work as authorized by the Commanding Officer (33 CFR 334.420).

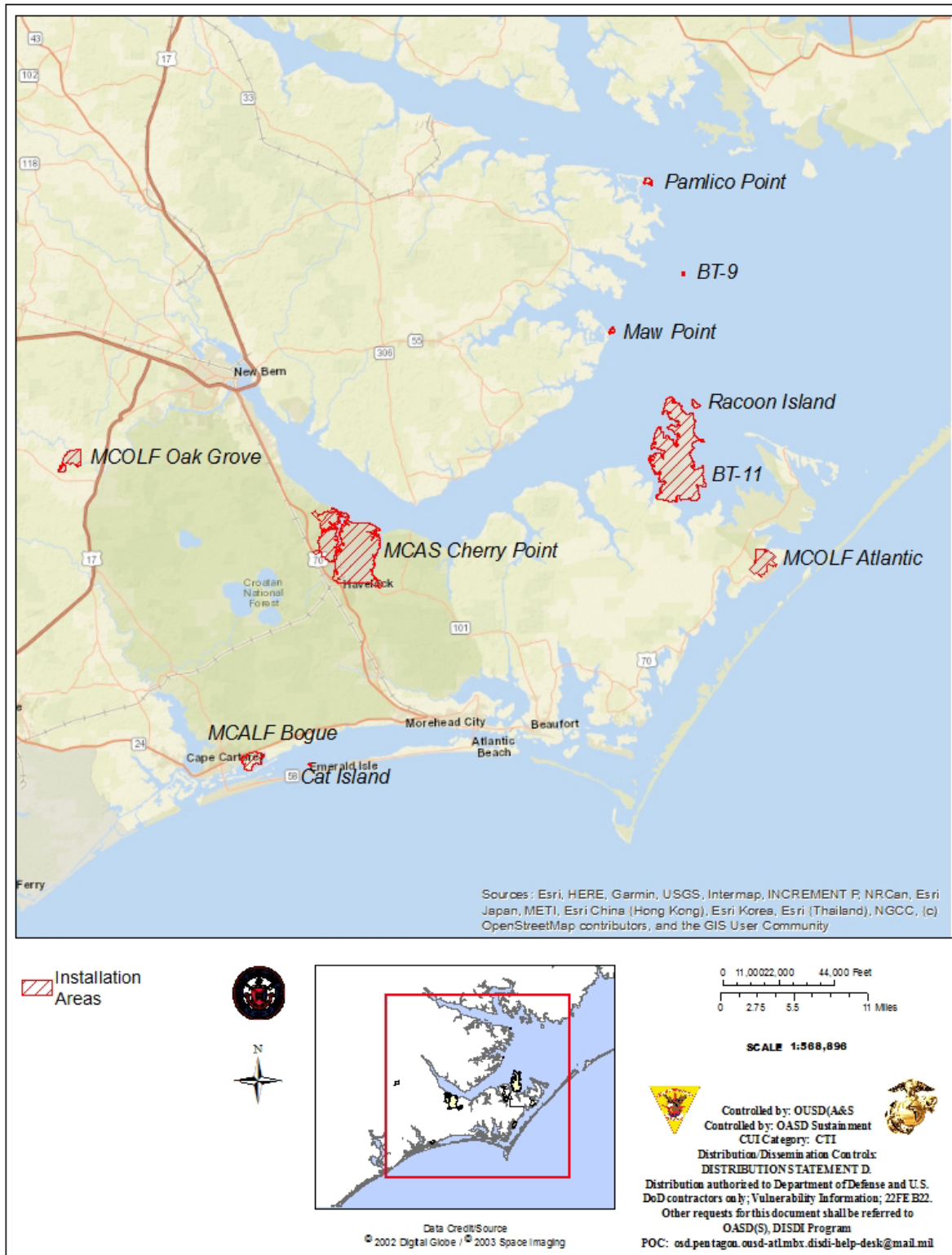


Figure 1.1 General Location of MCAS Cherry Point and Surrounding Areas.

1.2.3 Current Operations and Training

To accomplish the national security mission, Marines and Sailors must be trained in all requirements for responding to national security threats. Land based training activities are associated with MCAS Cherry Point, BT-11, and the three outlying airfields (MCOLF Atlantic, MCOLF Oak Grove, and MCALF Bogue). Land based training activities include, but are not limited to:

- Combat engineer field exercises,
- Base camp exercises,
- Ground convoy escort training,
- Vehicle convoy training,
- Airfield attack and seizure,
- Aircraft and helicopter refueling and rearming,
- Fuel transport,
- Field bivouac (temporary encampment in the open),
- Navigation exercises
- Communication exercises
- Field maneuvers,
- Air-to-ground training,
- Small arms training
- Explosives handling.

Water based training activities occur at MCALF Bogue, MCOLF Atlantic, BT-9, and BT-11. These facilities support various small boat and amphibious craft operations and training for military and federal security agencies. Training activities, include, but are not limited to:

- Insertions and extractions,
- Rescues,
- Interdictions,
- Platform integration testing and training.

Special use airspace training activities and exercises include:

- Air-to-surface training
- Surface-to-surface training
- Small arms training
- Explosives training

The offshore range areas for air-to-ground and air-to-water surface training are used by multiple units from MCAS Cherry Point, Marine Corps Base (MCB) Camp Lejeune, Fleet Forces Command, and other United States (U.S.) Army, Navy, Air Force, Coast Guard and Special Operations Command (SOCOM) units.

1.2.4 MCAS Cherry Point Unit Missions

MCAS Cherry Point is home to 2d MAW, Fleet Readiness Center East (FRC East), Naval Health Clinic Cherry Point, and Defense Logistics Agency (DLA) Distribution Cherry Point. Subordinate commands include Marine Air Control Group (MACG) 28, Marine Aircraft Group (MAG) 14, and Marine Wing Headquarters Squadron (MWHS) 2. Primary tenants and their mission are summarized below.

2nd Low Altitude Air Defense Battalion (2d LAAD): The 2d LAAD, a MACG- 28 unit, provides close-in, low-altitude surface-to-air weapons fires in defense of forward combat areas, vital areas, and installations. It also provides surface-to-air weapons support for units engaged in special and independent operations.

2d Marine Air Wing (2d MAW): Conducts air operations in support of the Marine Forces to include offensive air support, antiair warfare, assault support, aerial reconnaissance, electronic warfare, and control of aircraft and missiles.

Atlantic Marine Corps Communities (AMCC) is the privatized housing provider for MCAS Cherry Point operating under a 50-year lease, which is set to expire in 2058. Its mission is to provide outstanding communities where military families live, work, and thrive.

Center for Naval Aviation Training (CNATT): Trains approximately 1,400 Marine, Navy, Italian Foreign National, and civilian students per year in 76 courses of instruction supporting the AV-8B, KC-130J, FA-18E/F and maintenance specialties in I-level ordnance, avionics, and cryogenics communities.

Combat Logistics Company (CLC) 21: Operates the APOE/D, provides intermediate supply support and motor transport and engineer ground equipment maintenance to 2d MAW, and provides personnel to the Fleet Assistance Program.

Defense Logistics Agency (DLA) Distribution Cherry Point: Provides wholesale distribution support for the 2d MAW, numerous Marine Aviation Logistics Squadrons, MCAS Cherry Point, and the Naval Air Systems Command's FRC East, as well as military and government customers worldwide.

Fleet Readiness Center East (FRC East): Maintains and operates facilities for and performs a complete range of depot level rework operations on designated weapon systems, accessories, and equipment; manufactures parts and assemblies as required; provides engineering services in the development of changes of hardware design; furnishes technical services on aircraft maintenance and logistic problems; and performs, upon specific request or assignment, other levels of aircraft maintenance.

Marine Air Control Group (MACG) 28: Conducts task-organized aviation ground support for a MAG or other designated aviation forces by establishing and supporting contingency airfields through forward aviation combat engineering, flightline operations, forward arming and refueling points, airfield damage repair, and aircraft salvage and recovery to enable expeditionary aviation operations.

Marine Aerial Refueler Transport Squadron (VMGR-252): A MAG-14 unit, VMGR- 252 supports the MAGTF commander by providing air-to-air refueling, assault support, Close Air Support and Multi-sensor Imagery Reconnaissance, day or night under all weather conditions during expeditionary, joint, or combined operations.

Marine Air Control Squadron 2 (MACS-2): A MACG-28 unit, MACS- 2 detects, identifies and controls the intercept of hostile aircraft and missiles and provides continuous all-weather, radar, non-radar approach, departure, enroute, and tower air traffic control services to friendly aircraft.

Marine Attack Squadron 223 (VMA-223): Provides offensive air support, armed reconnaissance, and air-defense for Marine expeditionary forces. VMA-223 and VMA-231 are the two AV-8B Harrier squadrons assigned to MAG-14, 2d MAW.

Marine Attack Squadron 231 (VMA-231): Provides offensive air support, armed reconnaissance, and air-defense for Marine expeditionary forces. VMA-231 and VMA-223 are the two AV-8B Harrier squadrons assigned to MAG-14, 2d MAW.

Marine Aviation Logistics Squadron (MALS) 14: Provides aviation logistics support, guidance, and direction to MAG- 14 squadrons including intermediate level maintenance for aircraft and aeronautical components, first degree repair on J-52 and F-402 engines, aviation supply support for aircraft and navy-funded equipment, and Class V (A) ammunition logistics support.

Marine Air Support Squadron (MASS) 1: This MACG-28 unit provides Direct Air Support Center capabilities for control and coordination of aircraft operating in direct support of MAGTF operations.

Marine Corps Community Services (MCCS): Provides oversight and accountability for Quality-of-Life programs to optimize support to the operating forces, tenant commands, Marines, and family members.

Marine Fighter Attack Squadron 542 (VMFA-542): This MAG-14 unit locates, attacks, and destroys surface targets; intercepts and destroys enemy aircraft; and provides electronic warfare support.

Marine Unmanned Aerial Vehicle Squadron (VMU) 2: Supports the MAGTF commander by conducting multi-sensor reconnaissance and surveillance, and facilitating the destruction of targets, from unmanned aerial platforms during expeditionary, joint, and combined operations.

Marine Wing Communications Squadron (MWCS-28): Provides expeditionary communication and information technology support to the aviation combat element of a Marine expeditionary force, including the phased deployment element of tasked-organized elements. A MACG-28 unit, MWCS-28 is responsible for providing a variety of communication services, including voice and data communications, network operations, and cyber security. The squadron also provides technical support to aviation units, including the maintenance and repair of communication equipment and systems.

Marine Wing Headquarters Squadron 2 (MWHS-2): As the Headquarters (HQ) element of the 2d MAW, provides command, administrative and support for a Marine Wing HQ and for certain elements of the MACG.

Marine Wing Support Squadron (MWSS) 271: Conducts task organized aviation ground support for a MAG or other designated aviation forces by establishing and supporting contingency airfields through forward aviation combat engineering, flightline operations, forward arming and refueling points, airfield damage repair, and aircraft salvage and recovery to enable expeditionary aviation operations.

Naval Health Clinic: Provides medical support to Marines, Sailors, family members, and military retirees. Services include primary care, preventive care, mental health and substance abuse, dental, vision, and readiness. The mission of the Naval Health Clinic Cherry Point is to “Keep the Warfighter in the Fight.”

Naval Surface Warfare (NAVSURFWAR) Center Corona Division: Instruments and supports DoD test and training ranges worldwide. NAVSURFWAR personnel at MCAS Cherry Point operate and maintain electronic warfare threat systems at ALF Bogue, OLF Atlantic, and BT-11 that are associated with the Mid-Atlantic Electronic Warfare Range in support of rotary, tiltrotor, and fixed-wing aircraft training.

Navy Boat Docks, Weather Support Unit, Naval Boat Detachment: Repairs, maintains and modernizes Navy boats and moves personnel to and from the mainland to BT-9 and BT-11 for training exercises.

Marine Attack Squadron (VMA) 223: Provides offensive air support, armed reconnaissance, and air defense for Marine expeditionary forces. Additionally, VMA-223 provides aircraft for the AV-8B Fleet Replacement Detachment for the training of Naval Aviators to fly the AV-8B Harrier.

1.2.5 Future Operations and Training

Modernization of the Marine Corps is especially important. New technologies are leading to new weapons systems and platforms, which in turn may lead to the need for new or improved training ranges for these weapons and systems. The Marine Corps will continue to build on its foundation by doing those things that served it well in the past, while exploring new opportunities to enhance future capabilities and military readiness. Currently the focus of expansion and modernization is along the flight line of MCAS Cherry Point. The fielding of the F-35 Lightning II Joint Strike Fighter, has required an overhaul of the flightline corridor to include new hangars, utilities upgrades, and a new Air Traffic Control (ATC) tower and Air Operations building.

The focus on future training has been identified as the Force Design concept, which requires a “wider range of force options and capabilities,” to include Expeditionary Advance Base Operations (EABO), long range weapons and air defense systems.

1.2.6 Adjacent Land Use

Craven, Carteret, and Pamlico counties have developed Land Use Plans (LUPs) in compliance with Coastal Area Management Act (CAMA) regulations for coastal counties. These LUPs are briefly described in Section 2.5.

MCAS Cherry Point participates in regional land use planning and has a standing invitation to sit in at county and municipal planning board meetings. The MCAS Cherry Point Community

Plans & Liaison Office is responsible for coordinating participation at these meetings as necessary. Focus of participation primarily revolves around encroachment issues, but MCAS Cherry Point may participate in various planning board meetings that involve matters that have the potential to affect military training.

MCAS Cherry Point is a participating member of the North Carolina Onslow Bight Conservation Forum (OBCF), along with the North Carolina Chapter of TNC, NCWRC, NCDENR, USFWS, USFS, Endangered Species Coalition, North Carolina Coastal Federation, North Carolina Coastal Land Trust, North Carolina Department of Transportation, U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS), Ducks Unlimited, and the Conservation Fund. A Memorandum of Understanding (MOU) has been enacted between these organizations for the purpose of enhancing cooperation and communications regarding regional conservation issues within the Onslow Bight landscape and establishment of the OBCF. Additional information on the OBCF and MCAS Cherry Point involvement is provided in Section 12.1.

1.3 MCAS Cherry Point Natural Resources Management

Natural resources management in support of a military installation is a complex endeavor. The wide diversity of species, habitats, and military activities at MCAS Cherry Point necessitates a flexible, proactive approach. Professional natural resources management has been conducted at MCAS Cherry Point since the 1960s. Management and planning for multiple-use and sustainable-use of natural resources has been practiced in consideration of military mission requirements as well as compliance with all pertinent laws and regulations. Management and restoration of native species and habitats are central themes in all natural resource management practices. The natural resource management projects and principles that are provided in this INRMP represent a reasonable plan for addressing the needs of the military mission and MCAS Cherry Point's stewardship responsibilities for managing natural resources.

Military readiness requirements for MCAS Cherry Point are not significantly constrained by natural resources management activities. Natural resource management actions directly benefit the military mission through efforts such as reduction of deer/aircraft strikes through intensive deer herd management, providing enhanced access to forested areas with forestry roads, and providing improved training areas by thinning and burning forested areas. Effective natural resource management, with prime importance given to the military mission, requires coordination and cooperation between managers and users of MCAS Cherry Point.

SAIA defines the purposes of natural resources management on military lands as: *“the conservation and rehabilitation of natural resources on military installations; the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and non-consumptive uses; and subject to safety requirements and military security, public access to military installations to facilitate the use [of these resources].”* Further, SAIA states that conservation on military installations shall: *“be consistent with the use of military installations to ensure the preparedness of the armed forces...”*

The intent is for natural resources management on military installations to support the installation mission, provide an opportunity to the public to have access to installation natural resources, and participate, as appropriate, in regional ecosystem initiatives. In particular, Congress intended each

INRMP to support and be consistent with the mission of the installation. One of the objectives of the INRMP is to minimize future training restrictions (no net loss in the ability to train) by increasing the integration of natural resources management, training, and operations planning.

1.3.1 Air Station Environmental Policy

MCAS Cherry Point is committed to environmental protection, continual environmental improvement and pollution prevention. MCAS Cherry Point recognizes the importance of the natural environment as a key asset for training and support of the military mission. MCAS Cherry Point's environmental policy is to protect, preserve, and enhance the land, air, and water resources they are entrusted with. Major components of the environmental policy include:

- Comply with all environmental laws, regulations, and policies;
- Continue to minimize risk to the military mission by integrating sound environmental practices into all operation and business decisions;
- Conserve and enhance natural and cultural resources;
- Implement pollution prevention initiatives and waste minimization programs;
- Review all proposed activities for potential environmental impacts in accordance with the NEPA;
- Promote the cleanup of contaminated sites;
- Communicate environmental commitments to all levels of the MCAS Cherry Point organization and its tenants to increase awareness of this environmental policy;
- Sustain MCAS Cherry Point's partnership with the local community and regulatory agencies to continue a proactive environmental compliance and protection program; and
- Educate MCAS Cherry Point Marines, Sailors, and civilian employees of their responsibility to protect the environment and recognize individuals or groups for their outstanding participation.

It is the intent of MCAS Cherry Point to sustain and enhance military mission readiness through compliance with relevant environmental laws and regulations, prevention of pollution, and continual improvement of the natural resources management program. As technology improves and science expands, new information is continually becoming available to natural resources managers. The professionals at MCAS Cherry Point strive to respond to the availability of new information related to natural resources management practices that will ensure the incorporation of the latest scientific data, and to continue to provide a sustainable environment for Marine training.

1.3.2 Ecosystem Management Approach

Management of installation natural resources will support sustainable military use through application of an integrated approach to ecosystem management. An ecosystem, by definition, is a dynamic and natural complex of living organisms interacting with each other and with their associated environment. Ecosystem management is an interdisciplinary planning and management process that focuses on identifying, restoring and maintaining natural communities to support the

military mission and other sustainable activities. The 10 principles of ecosystem management, as provided in DoDI 4715.3 (3 May 1996), are as follows:

- **Maintain and improve the sustainability and native biological diversity of ecosystems.** MCAS Cherry Point maintains habitat for plant and wildlife species, and a diverse natural community that has been supported by over 60 years of sound natural resources management.
- **Administer with consideration of ecological units and timeframes.** Impacts of installation activities are considered in terms of their relevancy to natural processes. Natural resources at MCAS Cherry Point are significant on a base level (providing land and resources for military activities), on a regional level (MCAS Cherry Point is one of many large State and federal landowners in the region and as such plays a key role in regional initiatives), and on a national level, providing one of the most diverse ecosystems in the U.S. While it is appropriate to consider many actions solely at the MCAS Cherry Point level (e.g., construction of new buildings, etc.), some activities need to be considered on a larger scale (e.g., impacts of MCAS Cherry Point management on protected sea turtles and marine mammals).
- **Support sustainable human activities.** Ecosystem management recognizes that people are an integral component of ecological systems, and it supports multiple-use of natural resources and sustainable development. Natural resources are managed at MCAS Cherry Point to support the military mission, and to provide sustainable environments for training, education, and operations. Within the safety and operational constraints of military training and consistent with the needs of the region, MCAS Cherry Point works to (1) provide outdoor recreational opportunities consistent with demand from Air station personnel, residents, and military retirees in nearby communities; and (2) promote natural resources management, general welfare, and the local economy by appropriately producing and marketing forest products on an environmentally sustainable basis.
- **Develop a vision of ecosystem health.** Ecosystem management depends upon participation by diverse stakeholders (federal, state, local, and tribal governments; NGOs; private organizations; and the public) and their ability to develop a shared vision of what constitutes a desirable future condition for the region of concern. At MCAS Cherry Point, this means considering the mission as well as the relationship of MCAS Cherry Point with surrounding communities and regional environmental efforts.
- **Develop priorities and reconcile conflicts.** MCAS Cherry Point objectives are established, prioritized, and revisited on a regular basis. This includes consideration of natural resources management to meet both mission and regional objectives. If there are any conflicts, they can be resolved through periodic regional workshops and stakeholder discussion.
- **Develop coordinated approaches to work towards ecosystem health.** Because ecosystems do not follow political and social boundaries, a coordinated approach on military installations must (1) include early and regular participation by military operations personnel and regional stakeholders (to include other state and federal agencies); (2) incorporate ecosystem management goals into strategic, financial,

and program planning and design budgets; and (3) seek to prevent duplication of effort and minimize inefficiencies. These efforts are ongoing at MCAS Cherry Point.

- **Rely on the best science and data.** Understanding of ecosystems and natural communities is constantly evolving through science and discussion. MCAS Cherry Point is committed to the collection, maintenance, and use of scientific data required for making sound natural resources and land use management decisions, and uses geographic information system (GIS) mapping technologies to help guide management actions.
- **Use benchmarks to monitor and evaluate outcomes.** The ecosystem management approach depends on specific and measurable objectives and criteria with which to evaluate activities in the ecosystem. This INRMP includes specific, measurable goals and objectives, and task schedules for natural resources projects proposed for MCAS Cherry Point.
- **Use adaptive management.** Ecosystems are constantly changing, and management practices must accommodate changes in both the ecosystem, and our understanding of these systems. This INRMP will formally be reviewed in 2027, at the 5-year period of the plan. The MCAS Cherry Point NRM will adapt environmental management efforts when new information is available or significant changes to the ecosystem occur.
- **Implement through installation plans and programs.** Ecosystem management activities identified in an INRMP cannot stand alone, but instead they must be incorporated into other planning and budgeting documents that help direct land management planning at MCAS Cherry Point.

1.3.3 Integrating Environmental Stewardship with Military Use at MCAS Cherry Point

The training and natural resources management communities at MCAS Cherry Point share a common goal of maintaining a sustainable landscape that can accommodate continued training with minimal restrictions placed upon it. This shared value is attainable only through cooperation and collaboration between the two communities. Open communication and information sharing is crucial to their respective missions.

1.3.4 History of the MCAS Cherry Point Natural Resources Program

The natural resources of MCAS Cherry Point have been under professional management since the late 1960s. Natural resources management programs are designed to support the military mission and enhance training opportunities for the Marine Corps. Over the course of natural resources management at MCAS Cherry Point the following milestones have been achieved:

- A Draft Forest Management Plan was developed in 1975, and updated in 1980, 1990, 1998 and 2022;
- A Draft Multiple Land-Use Management Plan that integrated forestry and wildlife management was developed in 1980 (this plan was replaced by the 2001 INRMP);
- The property record and subsequent natural resources management responsibilities for outlying field Oak Grove were transferred to MCAS Cherry Point from MCAS New River

in 1985; Oak Grove was transferred from MCAS Cherry Point to MCB Camp Lejeune in 2005 and back to MCAS Cherry Point in 2015.

- A comprehensive Natural Heritage Inventory was completed by NCDEQ Natural Heritage Program (NHP) for all MCAS Cherry Point properties in 1993; and
- A natural resources specialist position was established for wetlands/NEPA compliance in 1994 (USMC 2001), and three full time Conservation Law Enforcement (CLE) Officers (USMC 2007, USMC 2008a) are currently staffed.

Management plans and survey reports recently completed for MCAS Cherry Point include the following documents:

- Essential Fish Habitat Assessment and Study (Navy 2007);
- Marine Mammal and Protected Species Monitoring Plan (USMC 2010c);
- Monitoring and Management of a Sensitive Resource – A Landscape-level Approach with Amphibians (Mitchell 2001, Mitchell 2002a);
- Guide to Inventory and Monitoring of Amphibians on Dare County Bombing Range, Cherry Point Marine Corps Air Station, and MCB Camp Lejeune, North Carolina (Mitchell 2002b);
- Amphibian Survey of the Mitigation Wetland Site on MCAS Cherry Point (Mitchell and Hall 2007);
- Wildland Fire Management Plan (WFMP) (USMC Draft 2022);
- Pest Management Plan Forest Inventory (USMC 2004);
- Invasive Species Plant Survey and Management Plan (Navy 2006);
- Annual Water Quality Report (USMC 2023);
- Assessment of the Commercial and Recreational Usage of Waters Surrounding Piney Island and Brant Island Shoal (USMC 2010d);
- Delineate Wetland and Stream Limits on MCAS Cherry Point (USMC 2013);
- Numerous Secretive Marshbird studies (2014, 2018, 2021, 2022);
- Northern long-eared bat survey (2018).

MCAS Cherry Point's forest management program currently is overseen by the MCAS Cherry Point forester, who ensures a varied, safe and sustainable forest environment is maintained that meets the overall needs of the military mission, maintains and creates wildlife habitat, and provides a sustainable flow of timber products. The hunting and fishing programs are overseen by MCAS Cherry Point Conservation Law Enforcement Officers (CLEOs). This program provides recreational game and non-game hunting opportunities on more than 10,000 acres of forestland, and recreational fishing opportunities on 20 acres of freshwater ponds, 12 miles of streams and creeks, and 67 miles of shoreline. More than \$10,000 is generated annually from user fees and permits. Other natural resources programs include Threatened and Endangered Species Management, Wetlands and Soil Management, BASH, Cultural Resources, and NEPA. Natural resources personnel who are involved with each of these management programs work

collaboratively to provide sustainable military training environments and meet legal and regulatory compliance requirements.

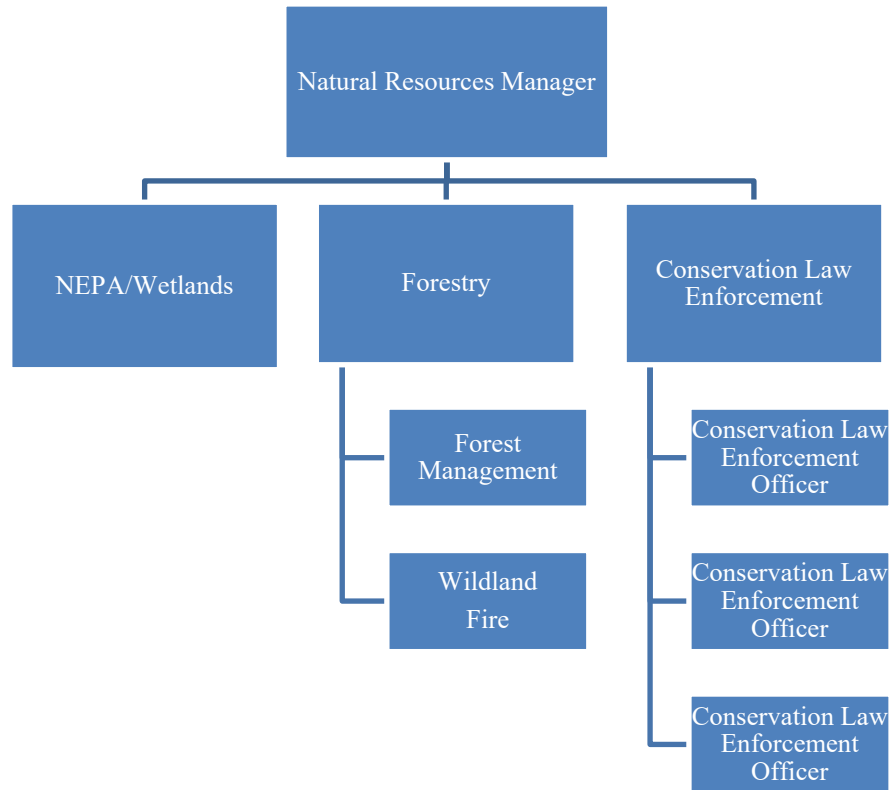


Figure 1.2 Natural Resources Division Organizational Chart.

This page intentionally left blank.

2.0 MCAS CHERRY POINT CURRENT CONDITIONS AND USE

This section describes the physical setting of MCAS Cherry Point, including descriptions of location, physical setting, topography and soils, geology, climate, vegetation, and water resources. The conservation significance of the area, including significant natural areas, regional areas of ecological significance, and the Onslow Bight are also discussed in this section. The socioeconomic setting of the area, county land use, history, and land use of MCAS Cherry Point, and a description of facilities also are included in this chapter.

2.1 LOCATION

MCAS Cherry Point is located approximately 270 miles south of Washington, D.C., and 130 miles southeast of the State capital City of Raleigh, North Carolina. The MCAS Cherry Point Complex encompasses nine separate parcels and includes approximately 26,432 acres of land located in three counties of eastern North Carolina (Figure 2.1). An additional 18,000 acres of water-based property of BT-9 is located in Pamlico Sound south of Pamlico Point. MCAS Cherry Point is located in Craven County; BT-11, MCOLF Atlantic, MCALF Bogue, and Cat Island are located in Carteret County; BT-9, Pamlico Point, and Maw Point are located in Pamlico County; and MCOLF Oak Grove in Jones County.

MCAS Cherry Point is located in the City of Havelock, North Carolina, approximately 45 miles northeast of the City of Jacksonville, North Carolina and MCB Camp Lejeune. Another regional military installation is MCAS New River also located in Jacksonville, North Carolina, approximately 55 miles southwest of MCAS Cherry Point.

2.2 PHYSICAL SETTING

MCAS Cherry Point is located in the Atlantic Coastal Flatlands (Section 232C) of the Outer Coastal Plains Mixed Forest Province (Section 232), as described in *Ecoregions and Subregions of the United States* (Bailey et al. 1994). Based on similar regional climate, geologic origin, topography, drainage networks and potential natural vegetation, this section has the following characteristics, as compiled by the USFS Southern Regional and Southeastern Forest Experiment Station (USFS 2010a, USFS 2010b):

- **Geomorphology** – Generally flat (elevation 0–80 feet [ft], with local relief of 0–25 ft), with weakly dissected alluvial plains formed from continental sediment deposits on submerged, shallow continental shelf that was later exposed by sea level subsidence. Active fluvial deposition and shore zone processes along the coast continue to develop and maintain beaches, swamps, and mud flats.
- **Lithology and Stratigraphy** – Rocks formed during the Cenozoic Era (66 million years ago to present) to create a strata of tertiary marine deposits, thin shale formations, and sand. Quaternary marine deposits consist of sand, silt, and clay alluvial deposits originating from upland sources.

- **Soils** – Major soil series include Aquults, with Paleaquults and Umbraquults defining lower, wet areas. Higher area soils with better drainage are comprised of Hapludults and Paleudults. Locally important soil series include Haplaquods, Quartzipsamments, and Paleudults. Soils have a thermic temperature regime, an aquic moisture regime, are deep, medium textured, and have adequate to excessive water available for vegetation.

- **Potential Natural Vegetation** – Southern mixed forest and oak–hickory–pine forest, with smaller areas of southern floodplain forest and pocosin. Forest cover in northern areas of this section, where MCAS Cherry is located, is primarily longleaf pine (*Pinus palustris*) and loblolly pine (*Pinus taeda*). Coastal area forests with poorly drained organic soils are primarily pond pine (*Pinus serotina*), especially in those areas prone to wildfire. Oak–gum–cypress forests are common along floodplains and major rivers. Areas that are comprised of mostly hardwoods also are present, and include laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), sweetbay (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), live oak (*Quercus virginiana*), red maple (*Acer rubrum*), and spruce pine (*Pinus glabra*).

- **Fauna** – Common mammal species include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), swamp rabbit (*Sylvilagus aquaticus*), eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), and many small rodents and shrews.

Bird species that are widespread include Eastern wild turkey (*Meleagris gallopavo*), northern bobwhite (*Colinus virginianus*), and the mourning dove (*Zenaidura macroura*). Resident and migratory waterfowl are also common. Ibis (subfamily Threskiornithinae), cormorants (family Phalacrocoracidae), herons and egrets (family Ardeidae), and belted kingfisher (*Ceryle alcyon*) are common throughout flooded areas. Common songbirds include red-eyed vireo (*Vireo olivaceus*), cardinal (family Cardinalidae), tufted titmouse (*Baeolophus bicolor*), ruby-throated hummingbird (*Archilochus colubris*), eastern towhee (*Pipilo erythrophthalmus*), wood thrush (*Hylocichla mustelina*), summer tanager (*Piranga rubra*), blue-gray gnatcatcher (*Poliophtila caerulea*), hooded warbler (*Wilsonia citrina*), and Carolina wren (*Thryothorus ludovicianus*).

Common herpetofauna include box turtle (*Terrapene* spp.), common garter snake (*Thamnophis sirtalis*), green tree frog (*Hyla cinerea*), squirrel treefrog (*Hyla squirella*), eastern spadefoot (*Scaphiopus holbrookii*), southern toad (*Anaxyrus terrestris*), and American alligator (*Alligator mississippiensis*).

- **Climate** – Average annual precipitation is approximately 53 inches, with average temperatures of 63 degrees Fahrenheit (°F). The growing season is approximately 185–220 days.

- **Surface Water** – A moderate number of small–medium sized perennial streams are found within this section, with a low number of rivers present (the Neuse River) having a moderate volume of water with low velocity. The water table is high in many areas,

resulting in poor drainage and an abundance of wetlands, including numerous isolated wetlands. The relatively young, weakly dissected plain has resulted in the poor drainage pattern, and numerous palustrine wetland systems with seasonally high water levels that are found throughout this section.

- **Disturbance Regimes** – The primary physical disturbance in this section is wildfire, with pocosin areas of eastern North Carolina subject to high intensity fires. Climatic disturbances include frequent hurricanes, and insect disturbances are caused by southern pine beetle (*Dendroctonus frontalis*).
- **Land Use** – Agriculture has cleared natural vegetation in approximately 40% of land area in this section.

2.2.1 Topography and Soils

Topography of the Coastal Plain region is primarily flat, with elevations less than 50 ft above mean sea level (MSL) (State Climate Office of North Carolina 2010). Coastal Plain soils are composed of soft sediments, with little to no underlying bedrock. Elevations range from 2 ft below MSL to 51 ft above MSL. MCAS Cherry Point has the highest elevation of 51 ft above MSL, associated with a small area located north of the airfield. Elevations at all other parcels are 24 ft above MSL or less.

A total of 38 different soil series are associated with MCAS Cherry Point parcels. Soils are characterized by a combination of poorly drained broad, level flatlands and gently rolling better-drained terrain. Hydric soils are defined as soils that are sufficiently wet in the upper horizon to develop anaerobic conditions during the growing season. Hydric soils are one of the most important management and habitat considerations, with approximately 85% of MCAS Cherry Point soils classified as hydric, with the most common being Longshoal muck, very frequently flooded; Norfolk loamy fine sand, 2–6% slopes; Rains fine sandy loam; and Goldsboro loamy fine sand, 0–2% slopes. Common non-hydric soils include Urban land; Suffolk loamy sand, 10–30% slopes; Bragg soil, 0–8% slopes; and Norfolk–Urban land complex, 0–6% slopes.

Soils associated with each of the land-based properties are provided in the following tables and include acreage and percent cover information for each major soil series present and identifies soils series that are classified as hydric soils.

Air Station

The topography of MCAS Cherry Point is almost uniformly flat and poorly drained. Elevation ranges from near sea level along the shores of the Neuse River, Slocum Creek, and Hancock Creek, to 51 ft above MSL north of the airfield. Elevations of terraces located between stream systems are approximately 25–33 ft above MSL (USMC 2001). Land surface of MCAS Cherry Point is part of the Talbot Terrace Plain formed of unconsolidated marine sediment deposits. These sediments were deposited and reshaped during several cycles of coastal emergence and submergence from the Cretaceous Period to present. Broad, flat terraces between major stream valleys characterize the land surface. Terraces slope rather abruptly to stream and tributary valleys, tending to be steeply sloped near outlets and more shallowly sloped inland.

There are 27 different soil series mapped on MCAS Cherry Point, a majority which are hydric (69%) and associated with broad interstream divides and ridges of marine terraces (Table 2.1) (USDA NRCS 2009). The following seven soil series comprise 67% of Air Station soils:

- Norfolk loamy fine sand, 2–6% slopes,
- Rains fine sandy loam,
- Goldsboro loamy fine sand, 0–2% slopes,
- Urban land,
- Suffolk loamy sand, 10–30% slopes,
- Bragg soils, 0–8% slopes, and
- Autryville loamy sand, 0–6% slopes.

Soils of MCAS Cherry Point range from well drained soils to very poorly drained soils. Areas of low relief contain soils that have high water retention capacity, with well drained soils generally associated with slopes of streams and rivers. Major well drained soils series of MCAS Cherry Point include Norfolk loamy fine sand (2–6% slopes), Suffolk loamy sand (10–30% slopes), Bragg soils (0–8% slopes), Autryville loamy sand (0–6% slopes), and Norfolk–Urban land complex (0–6% slopes). Soils associated with broad interstream terraces are loamy sands or sandy loams, including Rains fine sandy loam, Lynchburg fine sandy loam, Norfolk–Urban land complex (0–6% slopes), Goldsboro–Urban land complex (0–2% slopes), Norfolk loamy fine sand (0–2% slopes), and Onslow loamy sand. Masontown mucky fine sandy loam and Muckalee sandy loam, frequently flooded, is associated with floodplain areas of MCAS Cherry Point. Approximately 75% of soils classified as Urban land are covered by asphalt and buildings (USMC 2001).

Table 2.1. Major Soils of MCAS Cherry Point.

Soil Series	Acres	Hydric?	Description ¹
Arapahoe fine sandy loam (Ap)	26.6	Yes	Very poorly drained, fine sandy loam and loamy sand; occurs on depressions and flats.
Augusta fine sandy loam (Ag)	13.5	Yes	Somewhat poorly drained, fine sandy loam, sandy clay loam, and sandy loam; occurs on stream terraces.
Autryville loamy sand, 0–6% slopes (AuB)	702.4	No	Well drained, loamy fine sand, loamy sand, sand, and sandy loam; occurs on marine terrace flats, and ridges of marine terraces.
Bragg soils, 0–8% slopes (BrB)	786.4	No	Well drained, sandy loam and fine sandy loam; occurs on flats of marine terraces, and ridges of marine terraces.
Conetoe loamy sand, 0–5% slopes (CnB)	46.4	No	Well drained, loamy sand, sandy loam, loamy sand, and sand; occurs on ridges of stream terraces.
Craven silt loam, 1–4% slopes (CrB)	<0.1	Yes	Moderately well drained, fine sandy loam, clay and sandy loam; occurs on flats of marine terraces, and ridges of marine terraces.
Goldsboro loamy fine sand, 0–2% slopes (GoA)	1,050.30	No	Moderately well drained, loamy fine sand, fine sandy loam, sandy clay loam, and clay loam.
Goldsboro–Urban land complex, 0–2% slopes (GuA)	422.2	No	Moderately well drained, loamy fine sand, fine sandy loam, sandy clay loam, and clay loam; occurs on flats of marine terraces, and broad interstream divides of marine terraces.
Lenoir silt loam (Le)	40	No	Somewhat poorly drained, loam, clay, and sandy clay; occurs on flats of broad interstream divides and terraces.
Longshoal muck, very frequently flooded (LF)	55.4	Yes	Very poorly drained, muck; occurs on tidal marshes.
Lynchburg fine sandy loam (Ly)	522.7	No	Somewhat poorly drained, fine sandy loam, sandy loam, sandy clam loam, and clay; occurs on flats of marine terraces, and broad interstream divides of marine terraces.
Lynchburg–Urban land complex (Lc)	133.9	No	Somewhat poorly drained, fine sandy loam, sandy loam, sandy clay loam, and clay; occurs on flats of marine terraces, and broad interstream divides of marine terraces.
Masontown mucky fine sandy loam and Muckalee sandy loam, frequently flooded (MM)	461.8	Yes	Very poorly drained, mucky fine sandy loam, fine sandy loam, and sand; occurs on floodplains.
Norfolk loamy fine sand, 0–2% slopes (NoA)	411.6	No	Well drained, loamy fine sand, sandy clam loam, and sandy loam; occurs on ridges of marine terraces, and broad interstream divides of marine terraces.

Soil Series	Acres	Hydric?	Description ¹
Norfolk loamy fine sand, 2–6% slopes (NoB)	1,873.50	No	Well drained, loamy fine sand and sandy clay loam; occurs on broad interstream divides on marine terraces, and on ridges of marine terraces.
Norfolk–Urban land complex, 0–6% slopes (NuB)	483.3	No	Well drained, loamy fine sand, and sandy clay loam; occurs on broad interstream divides of marine terraces, and ridges of marine terraces.
Onslow loamy sand (On)	406.9	No	Moderately well drained, loamy fine sand and sandy clam loam; occurs on broad interstream divides of marine terraces, and flats of marine terraces.
Pantego fine sandy loam (Pa)	18.8	Yes	Very poorly drained, loam and sandy clay loam; occurs on flats of marine terraces, and broad interstream divides of marine terraces.
Rains fine sandy loam (Ra)	1,433.70	Yes	Poorly drained, fine sandy loam, sandy loam, and sandy clam loam; occurs on flats of marine terraces, in Carolina bays on marine terraces, and the broad interstream that divides marine terraces.
Rains–Urban land complex (Rc)	138.3	Yes	Poorly drained, fine sandy loam, sandy loam, and sandy clay loam; occurs on flats of marine terraces, Carolina bays of marine terraces, and broad interstream divides of marine terraces.
Seabrook loamy sand (Se)	143	No	Moderately well drained, loamy sand and sand; occurs on depressions of marine terraces and depressions of stream terraces.
Suffolk loamy sand, 10–30% slopes (SuD)	898.1	No	Well drained, loamy sand, sandy clam loam, and loamy sand; occurs on escarpments of marine terraces.
Tarboro sand, 0–6% slopes (TaB)	16.8	No	Somewhat excessively drained, sand and gravelly sand; occurs on ridges of stream terraces.
Torhunta fine sandy loam (To)	59.8	Yes	Very poorly drained, mucky fine sandy loam, fine sandy loam, and loamy sand; occurs on flats of marine terraces, Carolina bays of marine terraces, and depressions of stream terraces.
Udorthents, loamy (Ud)	351.8	No	Well drained, sandy clay loam; occurs on ridges.
Urban land (Ur)	1,040.10	No	Developed areas, typically poorly drained due to pavement, structures, or other impermeable surfaces.
Soils Total	11,537.6		

¹ Soil descriptions are of a typical profile from surface to depth layers.
Source: USDA NRCS 2009

Piney Island (BT-11)

The land surface of Piney Island consists of marine sediment deposits and organic mucks. Surface is low and flat, with elevations ranging from sea level to 13 ft above MSL. Dunes located along

the shoreline range up to approximately 5 ft above MSL (USMC 2001). The shoreline is irregularly contoured with bays and points, and a low primary dune is frequently located above the beach. There are several small tidal creeks and ponded areas, primarily located along the north end of the island. Raccoon Island is also part of BT-11, and is located within ½ mile of the northeast end of Piney Island. Geographically Piney Island is a peninsula, having been severed from the mainland by Indian Ditch. The majority of the island is coastal marsh, with few built-up areas supporting infrastructure.

Two soil series are associated with Piney Island: Longshoal muck, very frequently flooded; and Dare muck (Table 2.2) (USDA NRCS 2008). Both of these soil series are hydric and are very poorly drained. Longshoal muck, very frequently flooded soils comprise 97% of Piney Island soils. Two circular patches of Dare muck are located near the central area of the target (USMC 2001). The water table on the island is at or near the surface with continuous water ponding.

Table 2.2. Major Soils of Piney Island (BT-11).

Soil Series	Acres	Hydric?	Description ¹
Longshoal muck, very frequently flooded (LF)	11,522.6	Yes	Very poorly drained, muck; occurs on tidal marshes.
Dare muck (DA)	319.5	Yes	Very poorly drained, muck, woody muck, fine sand, and loamy fine sand; occurs on pocosins.
Soils Total	11,842.1		

¹ Soil descriptions are of a typical profile from surface to depth layers.

Source: USDA NRCS 2008

MCOLF Atlantic

The land surface of MCOLF Atlantic is part of the Pamlico Terrace Plain formed of unconsolidated marine sediment deposits (USMC 2001). It is characterized by low, nearly flat relief, with an elevation gradient from sea level in the northern marshes to 22 ft above MSL on ridges in the south. South of the marshlands, the terrain consists of a series of neatly parallel, low ridges and intervening swales of a relict dune ridge-and-swale system that is oriented along a northwest-southeast axis. A Carolina Bay system, characterized by elliptical ridges (bay rims) surrounded by a central depression, protrudes slightly onto the site along the west side, south of Old Cedar Island Road.

Six soil series occur on MCOLF Atlantic (Table 2.3) (USDA NRCS 2008), with a majority of these being hydric (98%) and poorly drained. Murville mucky sand and Leon sand are the dominant soil series, comprising approximately 73% of MCOLF Atlantic soils. Leon–Urban land complex soils are associated with developed areas (USMC 2001). Mandarin soils are nearly level and somewhat poorly drained soils that form upland ridges of the site. Murville mucky sand is associated with low-lying areas, where the water table is at or near the surface nearly all the time, and water ponds on the surface frequently.

Table 2.3. Major Soils of MCOLF Atlantic.

Soil Series	Acres	Hydric?	Description ¹
Murville mucky sand (Mu)	609.6	Yes	Very poorly drained, mucky sand and sand; occurs on depressions of marine terraces, and flats of marine terraces.
Leon sand (Ln)	451.1	Yes	Poorly drained, sand and fine sand; occurs on flats of marine terraces.
Leon–Urban land complex (Lu)	187.3	Yes	Poorly drained, sand and fine sand; occurs on flats of marine terraces.
Longshoal muck, very frequently flooded (LF)	172.3	Yes	Very poorly drained, muck; occurs on tidal marshes.
Mandarin sand (Mn)	36.2	No	Somewhat poorly drained sand; occurs on flats of marine terraces.
Baymeade fine sand, 1–6% slopes (ByB)	0.1	Yes	Well drained, fine sand, fine sandy loam; and loamy fine sand; occurs on ridges of marine terraces.
Soils Total	1,456.6		

¹ Soil descriptions are of a typical profile from surface to depth layers.

Source: USDA NRCS 2008

MCALF Bogue

The land surface of MCALF Bogue is part of the Pamlico Terrace Plain formed of unconsolidated marine sediment deposits. It is characterized by low, nearly flat relief, with an elevation gradient from sea level at the coastal edge, to 24 ft above MSL on the inland terrace. There are seven different soil series on MCALF Bogue, all of which are hydric (Table 2.4) (USDA NRCS 2008). The major soil series (57%) are well drained, and include Wando–Urban land complex (0–6% slopes), and Wando fine sand (0–6% slopes). All MCALF Bogue soil series are associated with marine terraces, floodplains or tidal marsh areas. Seabrook fine sand is a rarely flooded soil that occurs in low-lying areas, and is susceptible to wind erosion (USMC 2001). Carteret sand, frequently flooded, is found in narrow strips around Bogue Sound. Arapahoe fine sandy loam located along the western border of the site is nearly level and very poorly drained.

Table 2.4. Major Soils of MCALF Bogue.

Soil Series	Acres	Hydric?	Description ¹
Arapahoe fine sandy loam (Ap)	7.6	Yes	Very poorly drained, fine sandy loam and loamy sand; occurs on depressions and flats.
Carteret sand, frequently flooded (CH)	48.9	Yes	Very poorly drained, sand, and fine sand; occurs on tidal marshes.

Soil Series	Acres	Hydric?	Description ¹
Leon sand (Ln)	166	Yes	Poorly drained, sand and fine sand; occurs on flats of marine terraces.
Masontown mucky loam, frequently flooded (MA)	0.3	Yes	Very poorly drained, mucky loam, fine sandy loam, and sand; occurs on floodplains.
Seabrook fine sand (Se)	143	No	Moderately well drained, loamy sand and sand; occurs on depressions of marine terraces and depressions of stream terraces.
Wando fine sand, 0–6% slopes (WaB)	236.9	No	Well drained, fine sand; occurs on ridges of marine terraces.
Wando–Urban land complex, 0–6% slopes (WuB)	242.3	No	Well drained, fine sand; occurs on ridges of marine terraces.
Soils Total	845.0		

¹ Soil descriptions are of a typical profile from surface to depth layers.
Source: USDA NRCS 2008

Pamlico Point, Maw Point, and Cat Island

Marine sediment deposits and organic mucks define land surfaces of the three historic bombing targets. Pamlico Point and Maw Point have surfaces that are low and flat, with elevations ranging from sea level to 3 ft above MSL (USMC 2001). Elevations at Cat Island range from sea level to 9 ft above MSL. Low dunes near the shoreline of Cat Island range up to 5 ft above MSL, and the northern ¹/₃ of the island (approximately 4 acres) is characterized by forested dunes with an elevation of approximately 9 ft above MSL; with the southern ²/₃ of the island having an elevation of less than 3 ft above MSL. Pamlico Point and Maw Point soils are mucky, very poorly drained, hydric soils that occur on tidal marshes (Table 2.5, USDA NRCS 2007 and USDA NRCS 2008). Cat Island soils are excessively drained, hydric soils that are associated with dunes. Each of the historic bombing targets contains a single soil type.

Table 2.5. Major Soils of Pamlico Point, Maw Point, and Cat Island.

Soil Series	Acres	Hydric?	Description ¹
Pamlico Point			
Longshoal muck, very frequently flooded (LF)	132.1	Yes	Very poorly drained, muck; occurs on tidal marshes.
Maw Point			
Hobucken muck, frequently flooded (HN)	55.1	Yes	Very poorly drained, muck, mucky fine sandy loam, and fine sandy loam; occurs on tidal marshes.

Soil Series	Acres	Hydric?	Description ¹
Cat Island			
Newhan–Corolla complex, 0–30% slopes (Nc)	9.4	Yes	Excessively drained, fine sand and sand; occurs on dunes.
Soils Total	196.6		

¹ Soil descriptions are of a typical profile from surface to depth layers.
Sources: USDA NRCS 2007, USDA NRCS 2008

Brant Island Shoal

BT-9 is a water based target area with no associated land mass.

MCOLF Oak Grove

There are eight different soil series occurring at MCOLF Oak Grove, seven of which are non-hydric leaving one hydric soil type. Elevation ranges from 12 feet above sea level at the Trent River to 32 Feet at the northern edge of the property.

The most common soil type present is Alpin fine sand (AnB) which comprises 36% of the total area found along river terraces and is excessively well drained. This soil is poorly suited for crops and prone to wind erosion which is evident at LZ Emu. Autryville fine sandy loam (AuB) and Norfolk loamy sand (NoB) are well drained and make up 28% and 13% respectively. Other soil types occurring at MCOLF Oak Grove are Goldsboro loamy sand (GoA) which is moderately well drained; Marvyn loamy sand (MaC), well drained; Pactolous loamy fine sand (Pa), moderately well drained to somewhat poorly drained; and Stallings loamy fine sand (St), somewhat poorly drained. Muckalee loam (Mk) is the only hydric soil present which comprises of roughly 7% of the total area. It is poorly drained and found in the swamp along the Trent River and in other drainage features. This area is subject to frequent flooding and seasonally high water tables.

Table 2.6 Major Soils of MCOLF Oak Grove.

Soil Series	Acres	Hydric?	Description ¹
Alpin fine sand (AnB), 0 to 6% slopes	338	No	Excessively drained; occurs on ridges on marine terraces
Autryville loamy fine sand (AuB), 0 to 4% slopes	268	No	Well drained; occurs on flats on marine terraces, ridges on marine terraces
Goldsboro loamy sand (GoA), 0 to 2% slopes	64	No	Moderately well drained; occurs on Flats on marine terraces, broad interstream divides on marine terraces
Marvyn loamy sand (MaC), 6 to 15% slopes	4	No	Well drained; occurs on ridges of marine terraces
Muckalee loam (Mk)	69	Yes	Poorly drained; occurs in floodplains
Norfolk loamy sand (NoB), 1 to 4% slopes	125	No	Well drained; occurs on broad interstream divides on marine terraces, ridges on marine terraces
Pactolus loamy fine sand (Pa)	59	No	Moderately well drained; occurs on ridges of stream terraces
Stallings loamy fine sand (St)	18	No	Somewhat poorly drained; Occurs on flats in marine terraces, broad interstream divides on marine terraces
Soils Total	945.0		

¹ Soil descriptions are of a typical profile from surface to depth layers.
Sources: USDA NRCS 2007, USDA NRCS 2008

2.2.2 Geology

Geological features of the region include the low-lying coastal plain which extends inland to the Suffolk scarp, which is defined by alluvial and estuarine valleys and adjacent terraces (USMC 2012). The Suffolk scarp forms the boundary between the Outer and Inner Coastal Plain, and identifies an ancient shoreline that formed during the late Pleistocene Epoch, more than 10,000 years ago. Quaternary sedimentary rocks define the soils, which are primarily comprised of undivided surficial deposits of sand, clay and gravel (North Carolina Geological Survey 1991). The North Atlantic Coastal Plain section of the Outer Coastal Plain Mixed Forest Province is further defined as having a flat terrain, with a weakly dissected alluvial plain. Soils in this section formed in a thick layer of recent marine shale and sand deposits (USDA 2005).

2.2.3 Climate

Climate associated with the Coastal Plain area of North Carolina is temperate. The Gulf Stream is located approximately 50 miles offshore, and somewhat directly affects temperatures of the immediate coast, as warmer waters are brought up from the south as the current flows northward

(State Climate Office of North Carolina 2010). Warm eddies spiral off the Gulf Stream and move towards the coast, which has the effect of moderating temperatures of coastal areas, especially along the Outer Banks of North Carolina. Warmer than expected temperatures can occur during winter months when coastal fronts move inland. The area where the two opposing currents overlap can provide the right conditions for stormy weather to develop, resulting in strong low pressure systems that develop into major storms (State Climate Office of North Carolina 2010). These storms can bring heavy rainfall to the North Carolina coast and states located to the north.

Temperatures in the Coastal Plain are not frequently affected by colder air masses that move southeast towards North Carolina from central Canada and the northern U.S., as the Appalachian Mountains acts a buffer range where it traverses the western part of the State. Winter temperatures along the coast are further moderated by the Atlantic Ocean, which raises average winter temperatures and lowers the average day-to-night temperature range (State Climate Office of North Carolina 2010). Temperatures begin to rise during the spring, with the greatest rise in average temperatures occurring during May. Temperatures increase throughout the summer, with typical summer temperatures of 90°F; however, when cloudless and dry conditions persist over several days, temperatures can reach 100°F. During the fall, temperatures begin to drop, with the greatest decrease in average temperature occurring in October. By November, temperatures are usually within 5°F of the lowest temperatures expected for the year.

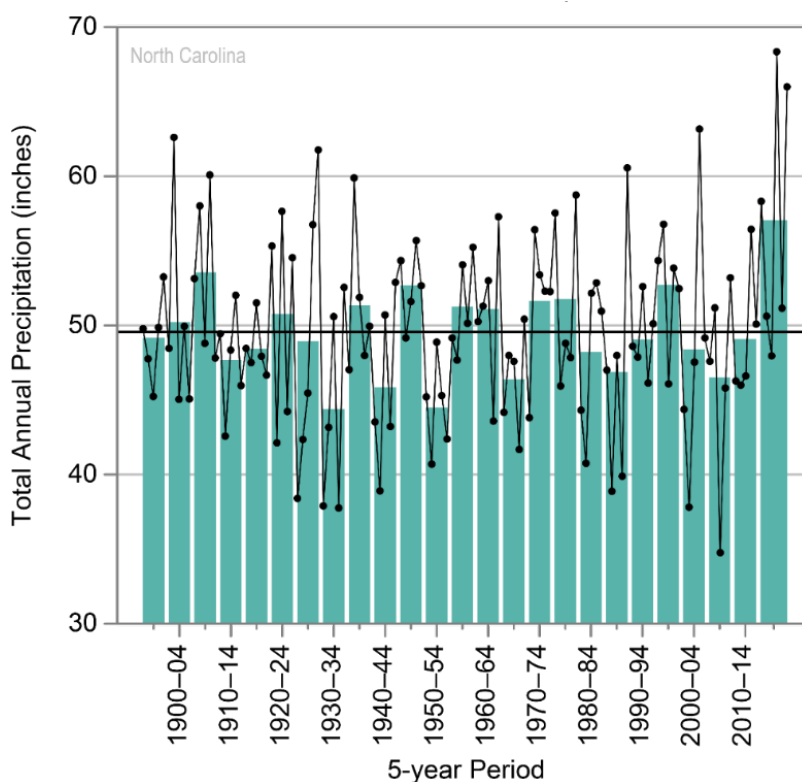


Figure 2.1 Observed Annual Precipitation from 1900 to 2020.

*Source [North Carolina - State Climate Summaries 2022 \(ncics.org\)](https://www.ncics.org/)

The Coastal Plain region does not have distinct wet or dry season, with rainfall occurring throughout the year. Precipitation is normally greatest during the summer months, with July being the wettest month, and rainfall associated with rain showers and thunderstorms (State Climate Office of North Carolina 2010). However, rainfall during the summer is variable with the potential for rainfall to occur daily, or for dry conditions to persist for 1–2 weeks. Fall tends to be the driest period, with November being the driest month on average; however, there is also a greater chance of flooding during the fall, due to heavy rains associated with thunderstorms, and the occasional tropical storm or hurricane. Rainfall during winter and spring months is primarily associated with migratory low pressure storm systems, which can occur regularly. On the coast sleet and/or snow occur on average about 1–2 times per year, with total accumulation of 1 inch or less (State Climate Office of North Carolina 2010). An average of 290 frost-free days each year can be expected along the coast.

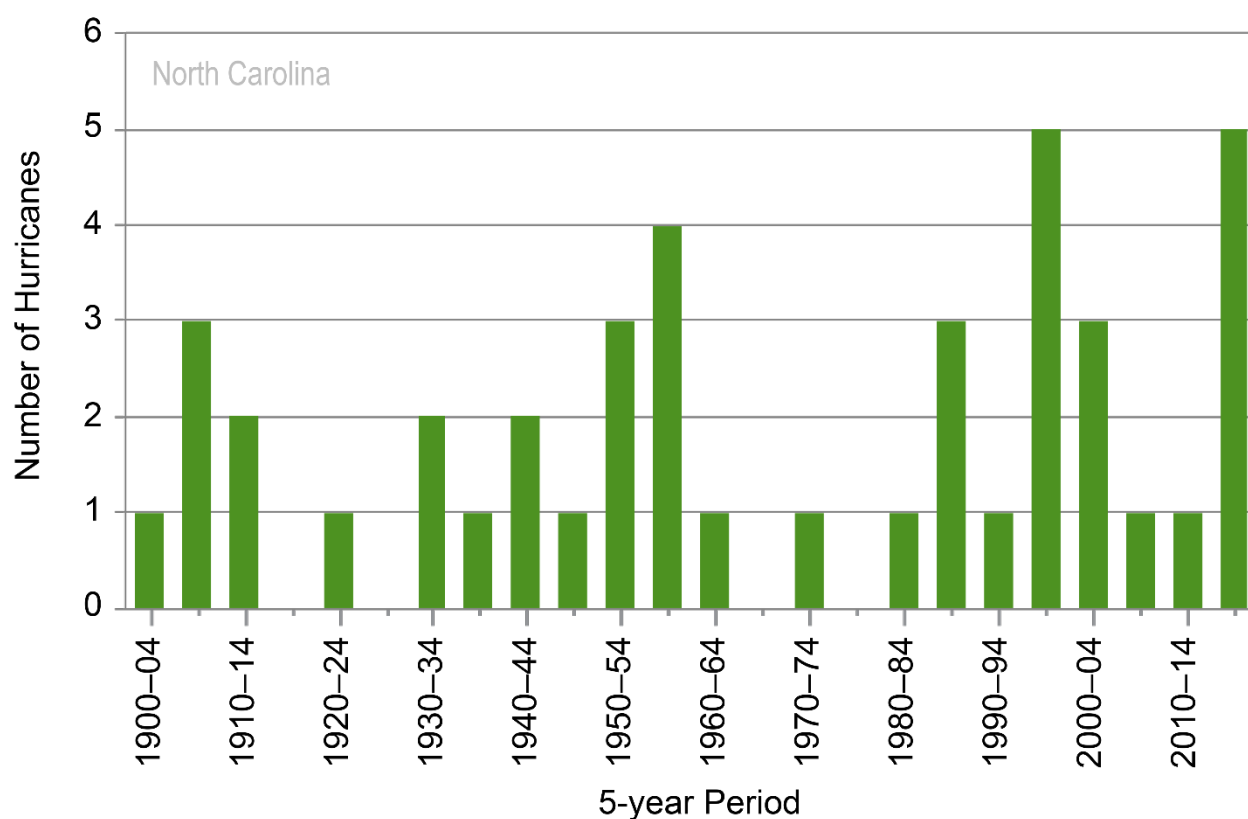


Figure 2.2 Total Hurricane Events in North Carolina from 1900 to 2020.

*Source [North Carolina - State Climate Summaries 2022 \(ncics.org\)](https://ncics.org/)

Average relative humidity of the Coastal Plain region is 75% as recorded from weather station data (State Climate Office of North Carolina 2010). On average 126 days per year are clear, 117 days are partly cloudy, and 122 days are cloudy. Measurable rainfall occurs on 120 days on average. For 10 months of the year prevailing winds are from the southwest, with prevailing winds originating from the northeast during September and October. Average wind speed throughout the year is 10 miles per hour, although winds exceeding 100 miles per hour can occur in association

with hurricanes that periodically directly affect the North Carolina coast. Hurricanes influence the weather of coastal North Carolina about twice per year on average, and directly make landfall in the State about once every 10 years (State Climate Office of North Carolina 2010). Although hurricanes and tropical storms have the potential to cause economic and environmental damage, especially storm surges associated with high tide, hail and winds associated with summer thunderstorms tend to routinely cause the most damage. Any given North Carolina location may be subject to 40–50 thunderstorms during the summer months.

2.2.4 Vegetation

This section describes the natural plant communities of MCAS Cherry Point and associated parcels. Figures included in this section depict significant natural heritage areas (SNHAs), if present, and SNHAs are described in Section 2.3.1. Aerial cover described for each natural community type was derived from MCAS Cherry Point’s GIS dataset, whereas National Wetlands Inventory wetland data were obtained from USFWS; acreages for these two datasets may not be equivalent for similar communities (i.e., wetlands).

Air Station

MCAS Cherry Point is comprised of five natural community types: pine, grassland, pine–hardwood, hardwood, and hardwood–pine (Table 2.6). The most abundant community type is forests, with pine and hardwood totaling 6,913 acres, or approximately 81% of the natural community types at MCAS Cherry Point (Table 2.6 and Figure 2.3). Pine forest is the dominant natural community, totaling 4,222 acres of habitat distributed throughout MCAS Cherry Point. Within the pine community type, loblolly pine dominates the canopy in broad interstream areas. Loblolly forests located at MCAS Cherry Point are burned by prescription on a 3–5 year cycle to facilitate military training, reduce wildfire danger, improve wildlife habitat, and promote native plant communities. This management practice produces an open mid-canopy and promotes dominance of switchcane (*Arundinaria gigantea*) at the ground layer.

Table 2.6. Natural Community Types of MCAS Cherry Point.

Natural Community Type	Acres
Woodland	5,518
Grassland	2,115
Residential	843
Marsh	55
Industrial	1,647
Runway	697
Total	10, 899

Source: USMC 2010e

Approximately 1,631 acres of pine–hardwood community are located along Slocum and Tucker creeks, the Neuse River and in smaller areas around the airfield. Lower slope forests of MCAS Cherry Point contain a mesic mixed hardwood–pine community, including loblolly pine, live oak, yaupon (*Ilex vomitoria*), and Spanish moss (*Tillandsia usneoides*). Coastal fringe forest habitat is part of the mixed hardwood–pine community and occurs on the low upland terraces along the larger tidal creeks. Important canopy components of the hardwood forest community includes sweetgum, white oak (*Quercus alba*), pignut hickory (*Carya glabra*), and American beech (*Fagus grandifolia*). Primary subcanopy species include American holly (*Ilex opaca*) and flowering dogwood (*Cornus florida*). Bottomland forests are a primarily hardwood habitat which occurs on broad flat lowlands where streams and rivers cause occasional flooding. Canopy components can include gum (*Nyssa sp.*), oak (*Quercus sp.*), green ash (*Fraxinus pennsylvanica*) and bald cypress (*Taxodium distichum*). Grassland habitat occupies 1,631 acres around the airfield and a few areas located north of the airfield.

A review of pre-settlement vegetation associated with MCAS Cherry Point determined that historical habitat was mostly mesic longleaf pine/wiregrass savanna (Mickler 2006). These communities are characterized by a dominance of longleaf pine in the canopy layer and a diverse array of graminoids in the herbaceous layer. Land use, logging, and fire suppression have reduced longleaf pine regeneration throughout the entire southeast, and MCAS Cherry Point currently is participating in a longleaf pine restoration effort, which is directly benefited by the prescribed burn cycle. Forest management and protection measures employed at MCAS Cherry Point are described further in Section 6.0.

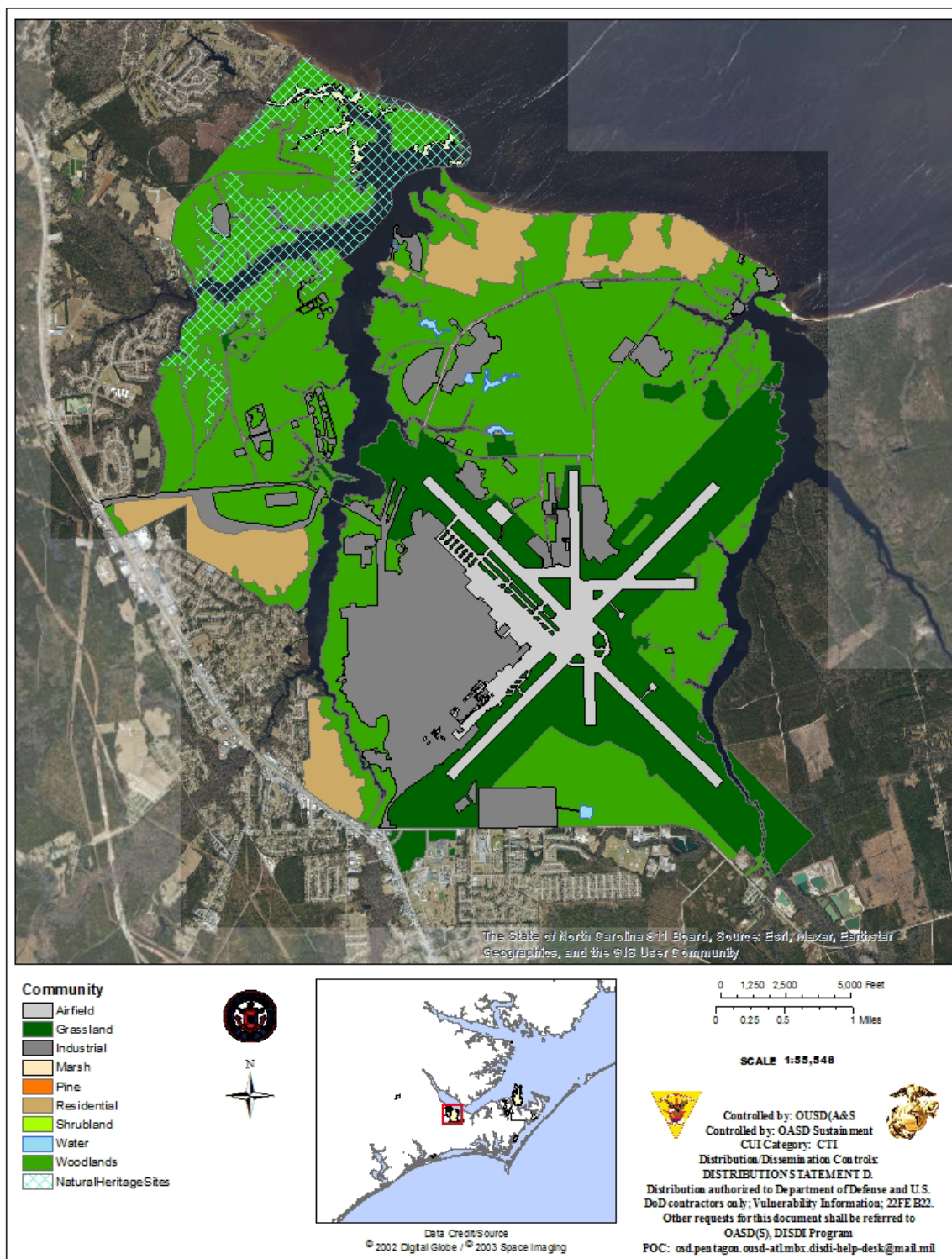


Figure 2.3 MCAS Cherry Point Significant Natural Heritage Areas and Landcover

Piney Island (BT-11)

Similar to pre-settlement conditions, Piney Island vegetation is dominated by brackish marshland covering approximately 11,912 acres (Figure 2.4 and Table 2.7) (LeBlond et al. 1994, Mickler 2006). The brackish marsh system that occurs on Piney Island and nearby Cedar Island is one of the most extensive in the country (Legrand et al. 1992). The marshes of Piney Island burn frequently due to sparks from flares used during military activities. These burns mimic natural fires triggered by lightning strikes and contribute to the relatively high species diversity of Piney Island.



Brackish marshland of Piney Island.

Source: Mickler 2006

Table 2.7. Natural Community Types of Piney Island (BT-11).

Natural Community Type	Acres
Brackish Marshland	11,912
Total	11,912

Source: USMC 2010e



Remnant pocosin dominated by pond pine on Piney Island.

Source: Mickler 2006

Black needlerush (*Juncus roemerianus*) and saltmeadow cordgrass (*Spartina patens*) are dominant species within the marsh community. Swamp sawgrass and big cordgrass (*Panicum virgatum*) are common as well. A small inclusion of Dare muck soil in the south-central part of the island supports a small woodland community approximately 48 acres in size. This community was historically a sparse canopied pond pine pocosin. Currently it is characterized by a dense growth of wax myrtle (*Morella cerifera*), and swamp bay (*Persea palustris*) in the understory (USMC 2001).

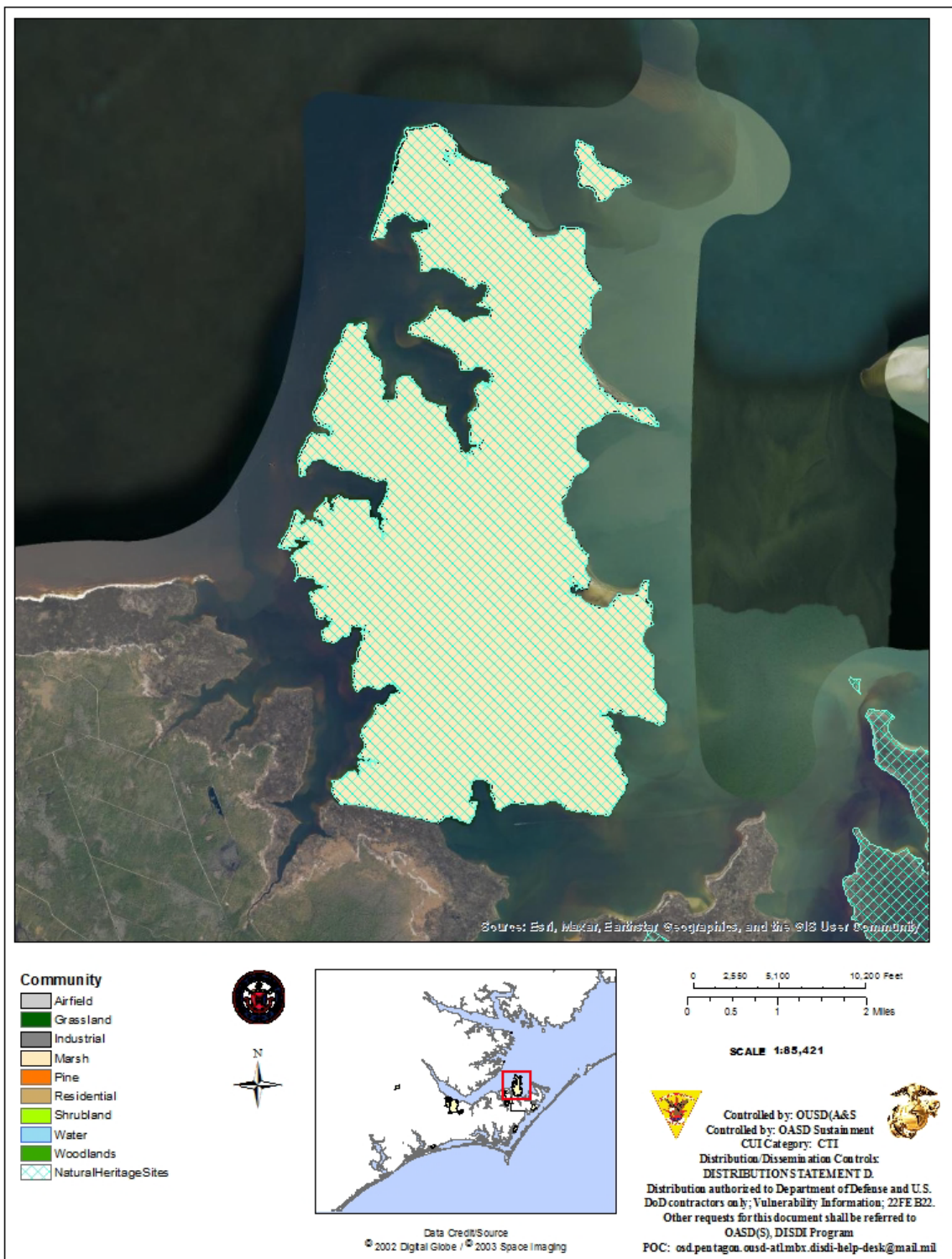


Figure 2.4. Piney Island (BT-11) and MCOLF Atlantic Significant Natural Heritage Areas (SNHAs) and Land Cover.

MCOLF Atlantic

Plant communities associated with MCOLF Atlantic include pine, marshland, Carolina Bay, and grassland (Figure 2.5 and Table 2.8). Approximately 617 acres of pine habitat is located throughout the central and south-central portion of the outlying field. Marshland habitat encompasses approximately 428 acres at the north end of MCOLF Atlantic, along the southwest shore of Barry Bay. Much of this area is comprised of brackish marsh that is dominated by black needlerush with saltmeadow cordgrass and swamp sawgrass becoming more common in fresher inland areas of the community.

Table 2.8. Natural Community Types of MCOLF Atlantic.

Natural Community Type	Acres
Woodland	863
Marsh	195
Grassland	51
Scrubland	257
Industrial	43
Runway	55
Total	1,464

Source: USMC 2010e

The historical habitat of MCOLF Atlantic and surrounding area was primarily pond pine/pyrophytic low pocosin and various other vegetation communities (Mickler 2006). In the wake of disturbance and twentieth century fire suppression, hardwoods became more abundant, but pine is still the dominant community aboard MCOLF Atlantic, with various types being present.

The most prolific type of pine community is high pocosin which occurs throughout the southern half of MCOLF Atlantic. A total of 262 acres of this pond pine-dominated high pocosin community occupies wet swales and depressions. Except when recovering from fire, high pocosin communities contain a dense shrub layer dominated by fetterbush lyonia (*Lyonia lucida*), swamp titi (*Cyrilla racemiflora*), and inkberry (*Ilex glabra*) (Schafale and Weakley 1990). Other areas aboard MCOLF Atlantic share the same understory vegetation as high pocosin but are on more well drained sites. These areas have dominant canopies of loblolly or longleaf pine.

The southern portion of site also includes 75 acres of Carolina Bay habitat. Longleaf pine is the dominant canopy species within this community. Pond pine is often present and is occasionally co-dominant. Shrubs found on the bay ridges and rims include dangleberry (*Gaylussacia frondosa*), creeping blueberry (*Vaccinium crassifolium*), and sandmyrtle (*Leiophyllum buxifolium*). The highest and driest portions of the bay ridges support a community with longleaf pine as the overstory. Bluejack oak (*Quercus incana*) is an important component of the subcanopy, and wiregrass (*Aristida stricta*) is a locally abundant component of the ground layer (Legrand et al. 1992).

Grasslands occupy approximately 55 acres of MCOLF Atlantic (Table 2.8). Most of the grassland habitat occurs interspersed among the high pocosin habitat at the south end of the site (Figure 2.5).



Butterwort (Pinguicula caerulea), a fire-dependent species associated with OLF Atlantic.

Source: Mickler 2006

MCALF Bogue

Vegetation communities at MCALF Bogue include pine, grassland, hardwood, marshland, and mixed pine–hardwood/hardwood–pine habitat (Figure 2.6 and Table 2.9). The majority of unimproved land at MCALF Bogue is pine forest, which covers approximately 360 acres and is distributed in areas around the airfield. Hurricanes Fran and Bertha, both of which impacted North Carolina in 1996, resulted in blowdown and damage to many of loblolly pines, a common species within the softwood forests at MCALF Bogue. An infestation of loblolly pines at MCALF Bogue by southern pine beetle followed, which resulted in timber harvesting and sanitation cuts of infested trees in an effort to prevent spread of the beetle infestation, and to clear out trees damaged by the hurricanes. Currently approximately 80% of loblolly pines at MCALF Bogue are in regeneration.

Table 2.9. Natural Community Types of MCALF Bogue.

Natural Community Type	Acres
Woodland	333
Grassland	26
Marsh	87
Airfield	339
Runway	67
Total	852

Source: USMC 2010e

The next most abundant community types are grassland and maritime forest communities. A majority of the 176 acres of grassland habitat is located throughout the central airfield area of MCALF Bogue (Figure 2.6). Maritime forest habitat occupies approximately 133 acres and borders the upland side of marshland community throughout much of the site. This band of forest is dominated by live oak (*Quercus virginiana*) and loblolly pine. Although much of the live oak

maritime forest was impacted by storm surges associated with Hurricanes Fran and Bertha in the summer of 1996; it has continued to show slow recovery since that time.

Marshlands encompass approximately 69 acres of MCALF Bogue, forming a fringe that borders much of the coastal waters, especially in the northeast and southwest (Figure 2.6). The band of marshland located along the Bogue Sound shoreline is primarily salt marsh and dominated by saltmeadow cordgrass. The marshlands in the south-west are brackish marshes dominated by smooth cordgrass (2001 INRMP). Approximately 36 acres of forest comprised of both pine and hardwood species occur in two patches at MCALF Bogue, one to the northwest of the airstrip and the other to the northeast (Figure 2.6).

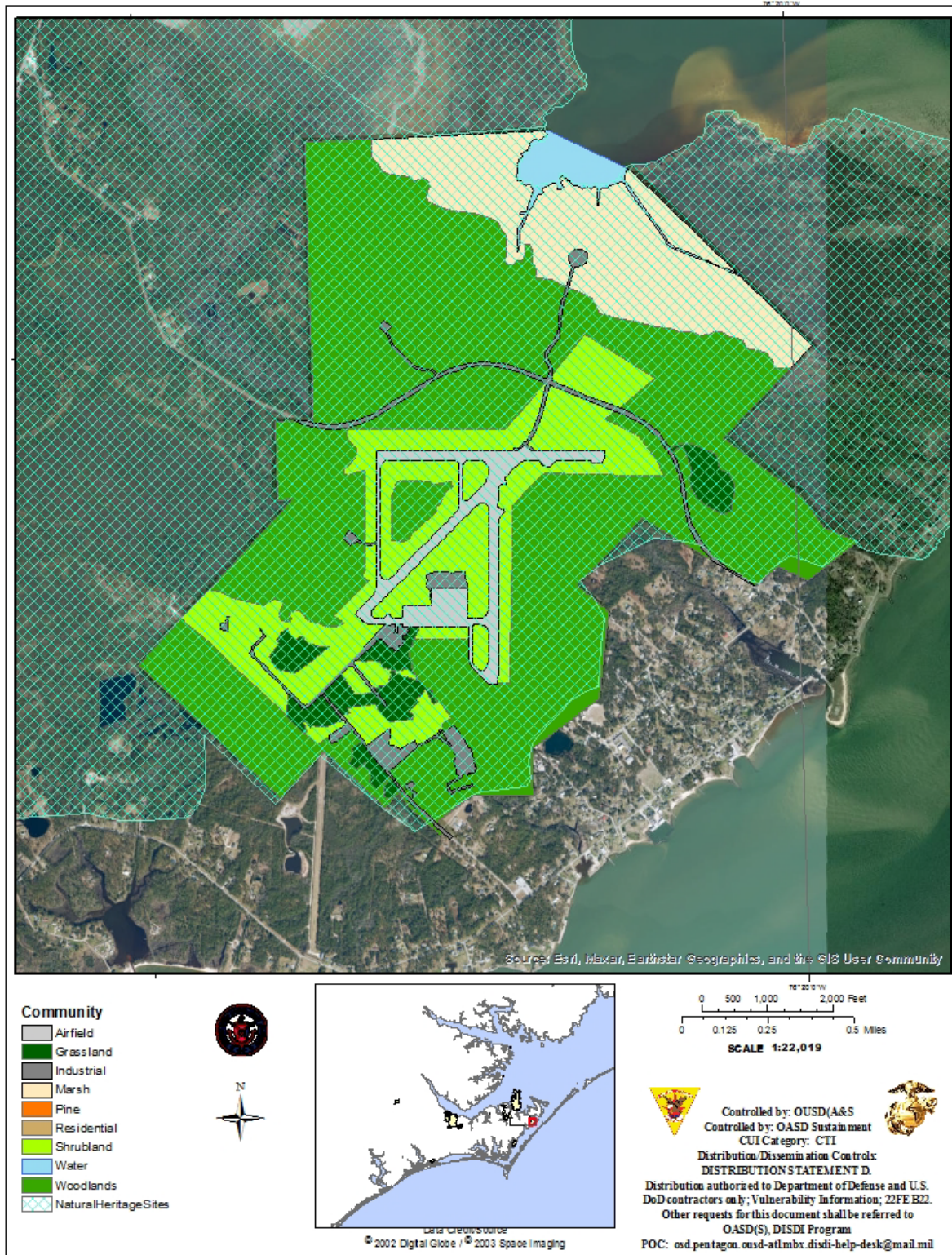


Figure 2.5. MCOLF Atlantic Significant Natural Heritage Areas (SNHAs) and Land Cover.

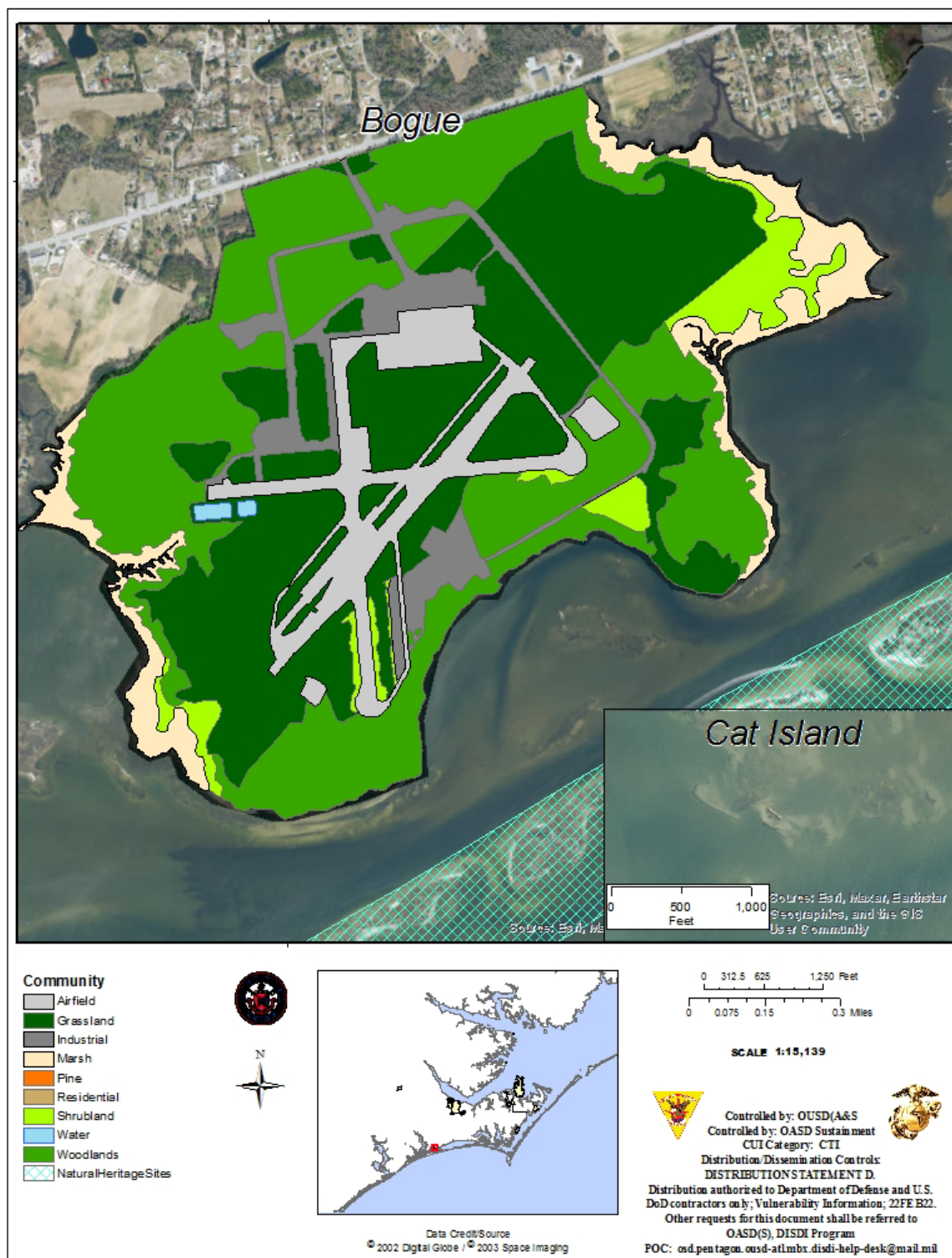


Figure 2.6 MCALF Bogue and Cat Island Significant Natural Heritage Areas (SNHAs) and Land Cover.

Pamlico Point, Maw Point, and Cat Island

The entire vegetated area of Pamlico Point and Maw Point is dominated by brackish marsh (approximately 141 acres and 55 acres, respectively) containing black needlerush, saltmeadow cordgrass, and smooth cordgrass (Figure 2.7 and Table 2.10). Cat Island is also dominated by approximately 18 acres of marshland habitat but includes some vegetation that is characteristic of maritime evergreen forest dominated by live oak, yaupon, greenbrier (*Smilax* spp.), and eastern poison ivy (*Toxicodendron radicans*) (Figure 2.6 and Table 2.10). Marshland habitat of Cat Island is dominated by smooth cordgrass. There is no land area at Brant Island Shoal (BT-9) (Figure 2.5).

Table 2.10. Natural Community Types of Pamlico Point, Maw Point, and Cat Island.

Natural Community Type	Acres
Pamlico Point	
Marshland	141
Maw Point	
Marshland	55
Cat Island	
Marshland	18

Source: USMC 2010e

Brant Island Shoal

BT-9 is a water-based target area with no associated land mass.

MCOLF Oak Grove

Vegetation at MCOLF Oak Grove includes pine, hardwood, and grassland communities. Pine is the dominant overstory type with 443 acres of loblolly pine (Figure 2.8). Grasslands surround an airfield on the northeast side of MCOLF Oak Grove and comprise 292 acres. The southern and western boundaries of MCOLF Oak Grove border on the Trent River. These borders are made up of bottomland hardwood swamps and flood plains conapied with baldcypress, oak, and gum trees.

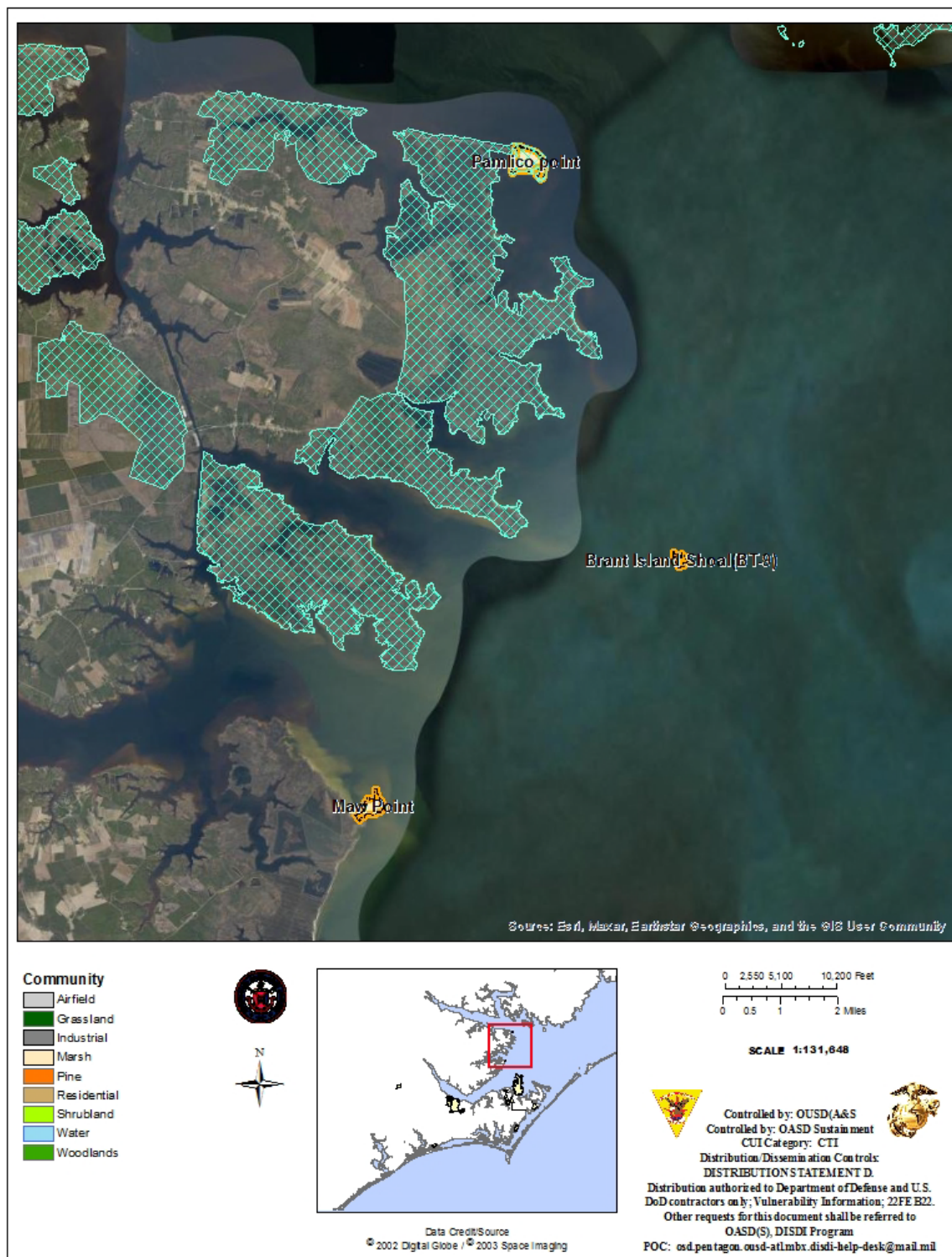


Figure 2.7. Pamlico Point and MAW Point Significant Natural Heritage Areas (SNHAs) and Land Cover.

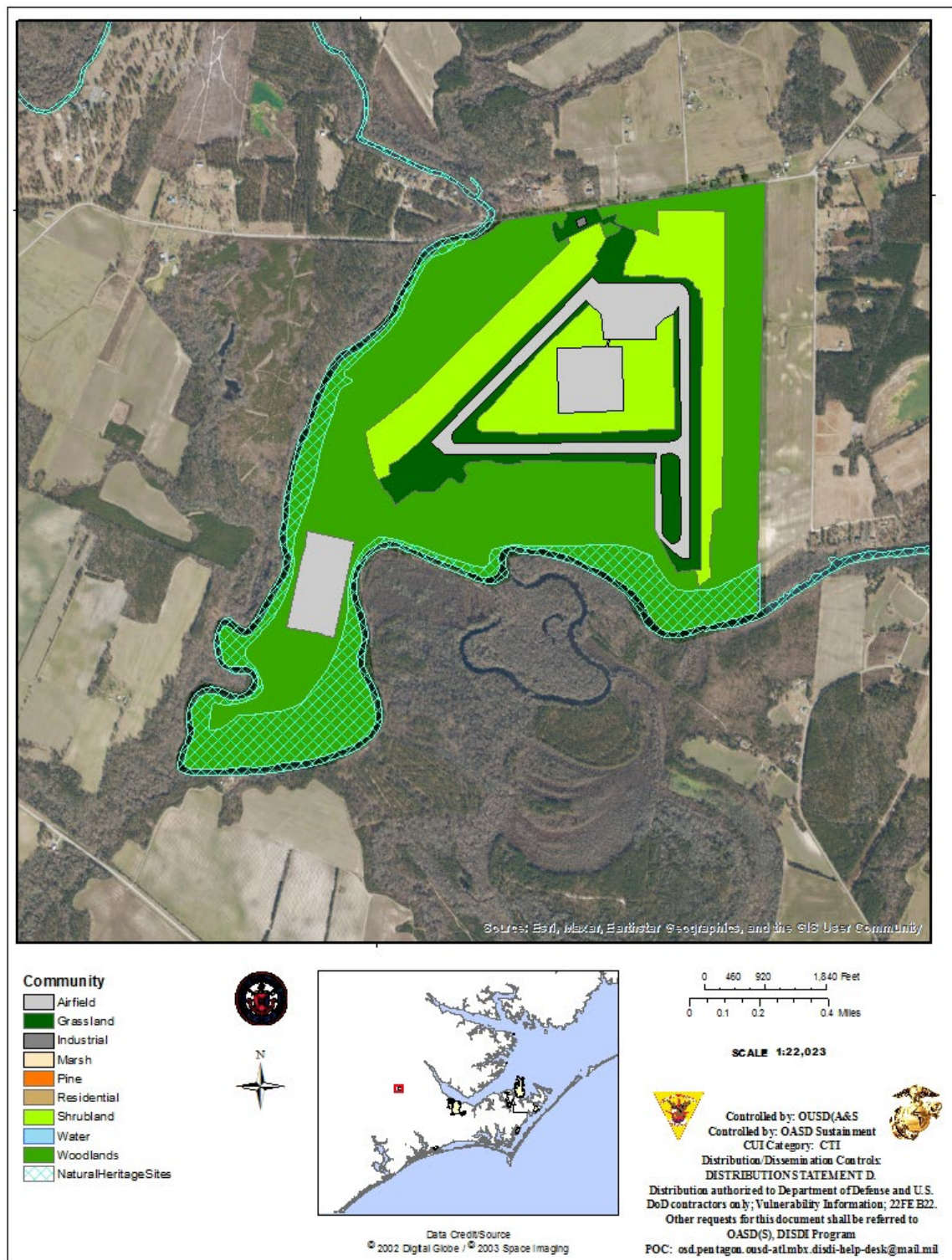


Figure 2.8. MCOLF Oak Grove Significant Natural Heritage Areas (SNHAs) and Land Cover.

Mixed pine-hardwood stands exist on the slopes connecting these lowland areas with the pine flats and grasslands on the interstream uplands.

Table 2.11. Natural Community Types of MCOLF Oak Grove.

Natural Community Type	Acres
Woodland	542
Grassland	101
Shrublands	191
Industrial	1
Runway	115
Total	950

Source: USMC 2010e

2.2.5 Water Resources

MCAS Cherry Point of MCAS Cherry Point and outlying fields are located within three main watersheds: the Neuse River Basin, the Tar–Pamlico River Basin, and the White Oak Basin.

Neuse River Watershed

MCAS Cherry Point, BT-11, and Maw Point are located in the lower basin of the Neuse River Watershed. The Neuse River is the longest river in North Carolina and discharging into Pamlico Sound (North Carolina Office of Environmental Education 2010). The watershed includes 3,880 miles of streams and rivers, 16,414 acres of lakes, 369,977 acres of estuary, 21 miles of coastline, and covers 6,235 square miles located in 18 North Carolina counties. In the area of New Bern, North Carolina, freshwater of the Neuse River becomes brackish, and the river widens as it flows along the last 40 mile stretch before reaching Pamlico Sound. The river is 6 miles wide at the discharge point to the sound, ranking it as the widest river in the U.S. The watershed is the sixth largest watershed in the State and contains approximately $\frac{1}{6}$ of the State's population. The watershed is part of the larger Albemarle–Pamlico estuary system, which provides approximately 90% of the State's nursery habitat for commercial seafood species.

Tar–Pamlico River Watershed

MCOLF Atlantic and Pamlico Point are located in the Tar–Pamlico River Watershed. BT-9 is not directly located within this watershed; however, it is located in waters of Pamlico Sound, which is part of the larger Albemarle–Pamlico estuarine system. The Tar and Pamlico Rivers are the main river systems that define the watershed. These two rivers are considered separate ecological components of the same river, with upper reaches of the Tar River being defined entirely as a freshwater system, which is received by the lower reaches of the brackish Pamlico River system. The Tar River begins near Roxboro, North Carolina and drains into Pamlico River in Washington, North Carolina, which eventually drains into Pamlico Sound (NCOEE 2010).

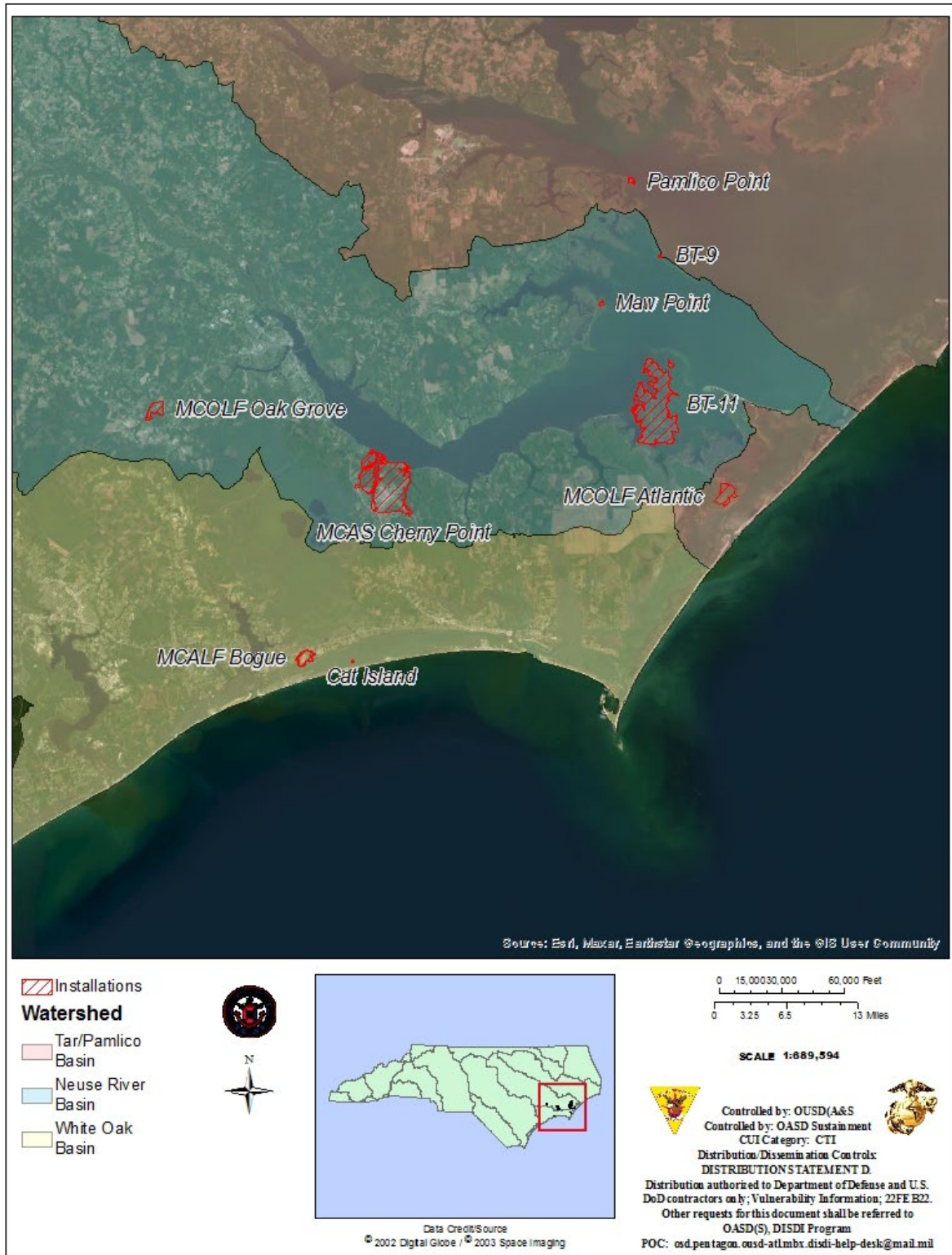


Figure 2.9. Installation locations within major watersheds.

The watershed is the fourth largest in the State, and includes 2,566 miles of river and streams, 3,977 acres of lakes, 663,592 acres of estuary, 17 miles of coastline, covers 5,571 square miles located in 16 North Carolina counties.

White Oak Watershed

MCALF Bogue and Cat Island are located in the White Oak Watershed. In addition to the White Oak River subbasin, the watershed includes four subbasins, the New River subbasin, Newport River subbasin, and the North River subbasin. Waters from this watershed discharge into estuaries of Back, Core, and Bogue Sounds. The White Oak River is a scenic river, extending 48 miles through remote habitat, and ultimately discharging into Bogue Sound near Swansboro, North Carolina (North Carolina Office of Environmental Education 2010). The watershed includes 446 miles of river and streams, 130,009 acres of estuary, 91 miles of coastline, covers 1,264 square miles located in four North Carolina counties. More than 80,000 acres of Croatan National Forest is located within the White Oak Watershed.

Air Station

MCAS Cherry Point is located within the Neuse River Basin (Figure 2.9). Groundwater is near or at the surface in broad, level terraces, with small tributaries associated with larger creeks fed by groundwater. Stream flow is generally intermittent, especially in inland areas, with groundwater and small stream levels tending to be higher during winter when the evapotranspiration process is lower.

Two perennial streams are located within the boundaries of MCAS Cherry Point: Slocum and Hancock creeks. Slocum Creek is located on the west side of MCAS Cherry Point and flows north into the Neuse River (Figure 2.6). Hancock Creek bounds MCAS Cherry Point to the east and also flows north into the Neuse River. Tucker Creek, a tributary to Slocum Creek, flows onto MCAS Cherry Point in the northwest, and flows into Slocum Creek just south of the confluence with the Neuse River. The Neuse River, Slocum Creek, Hancock Creek, and their larger tributaries are drowned valleys subject to tidal fluctuations, which is mostly associated with wind action (USMC 2001). West and southwest winds cause lower water levels, and northeast and east winds raise water levels throughout the area. The Neuse River borders the northern boundary of MCAS Cherry Point for approximately 4 miles. Hancock Creek borders the eastern boundary for approximately 5 miles and Slocum and Tucker Creeks border the western boundary for approximately 7 miles.

There are 1,234 acres of wetlands at MCAS Cherry Point, covering approximately 11% of the land area (Table 2.12). Several types of wetlands are present; however, the majority associated with forested palustrine systems. Approximately 734 acres of forested wetland are located primarily in the riparian zones of the major streams and their tributaries (Figure 2.6). Blackwater swamps dominate inland floodplains of the tributary streams. The main canopy species this forested wetland community include swamp tupelo (*Nyssa biflora*), bald cypress (*Taxodium distichum*), red maple, sweetgum, and a variety of oaks (*Quercus* spp.); the mid-canopy is dominated by American hornbeam (*Carpinus caroliniana*).

Table 2.12. Wetlands at MCAS Cherry Point.

Wetland Community Type	Acres
Forested Wetland	734
Undetermined Wetland Type	335
Emergent Wetland	168
Unconsolidated Bottom	18
Scrub–Shrub Wetland	5
Open Water	4
Total Wetland Acreage	1,234

Source: USFWS 2010f

A total of 168 acres of MCAS Cherry Point are classified as emergent wetland. This herbaceous community is most common along the edges of the Neuse River, Slocum Creek, Hancock Creek, and their larger tributaries. Important components of this community include big cordgrass (*Spartina cynosuroides*), black needlerush (*Juncus roemerianus*), Jamaica swamp sawgrass (*Cladium mariscus* ssp. *jamaicense*), and broadleaf cattail (*Typha latifolia*).

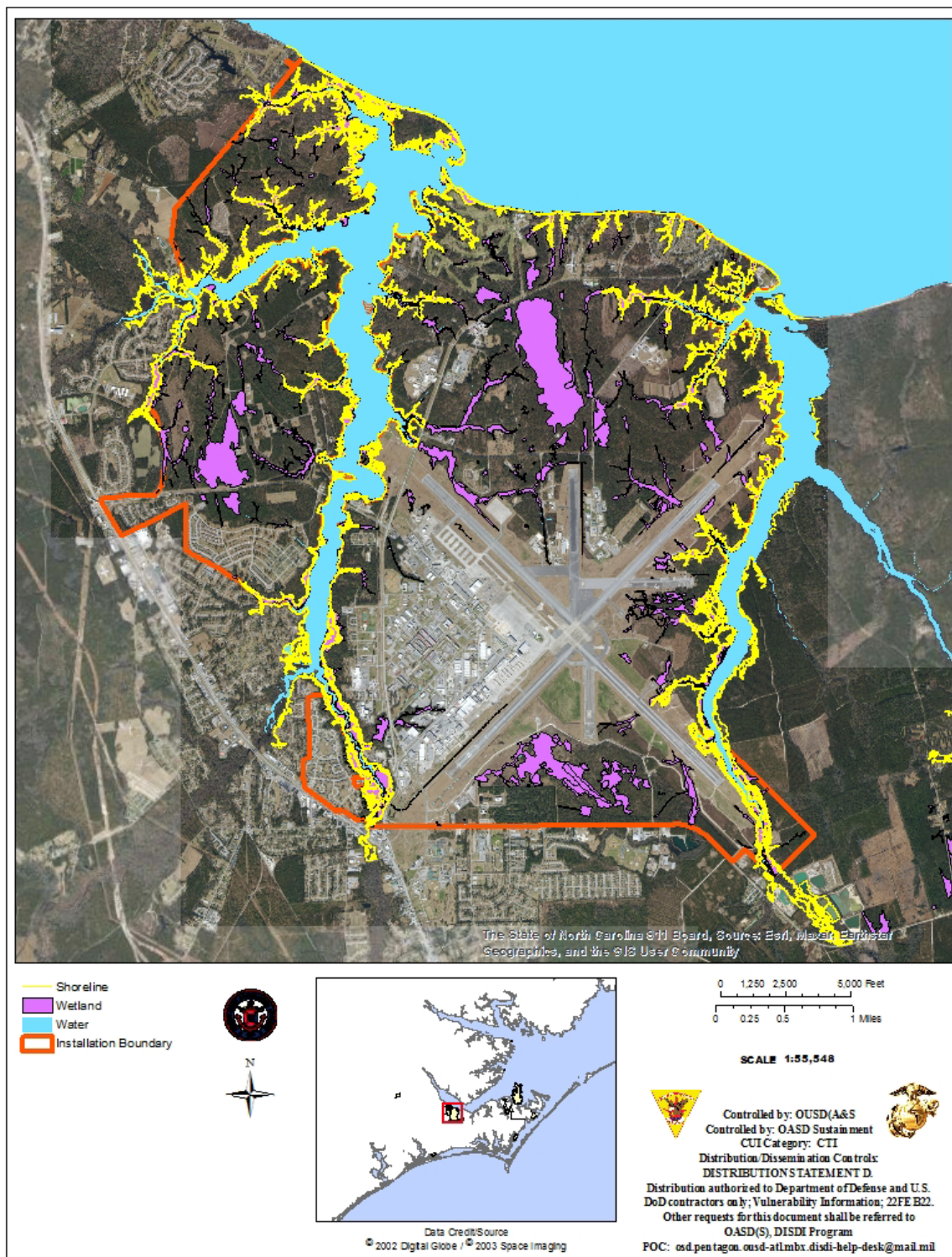


Figure 2.10. Air Station Water Resources.

Piney Island (BT-11)

Piney Island is located in the Neuse River Basin. The entire natural land surface of Piney Island is subject to occasional flooding, especially during storm surges associated with tropical storms or hurricanes. Inland areas are infrequently flooded; however daily flooding occurs along the shoreline, and areas adjacent to tidal creeks. Lunar tidal influence is very minimal. Groundwater is always near or at the surface, and even infrequently flooded areas have continuously wet to saturated soils. Canals paralleling the roadbed network and runway serve to lower surface water levels, at least in areas adjacent to the canals. Piney Island includes approximately 40 miles of marsh shoreline.

There are approximately 12,000 acres of wetlands at Piney Island, which account for approximately 98% of the property (Figure 2.11 and Table 2.13). The majority of wetlands of Piney Island are brackish marshland. Lesser amounts of scrub–shrub wetland and forested wetland are located in the south-central portion of the island, south of developed area. Small pockets of unconsolidated bottom habitat are dispersed throughout the site. Raccoon Island has approximately 1.9 miles of shoreline but a habitat assessment has not been conducted therefore wetland information is not available.

Table 2.13. Wetlands at Piney Island (BT-11).

Wetland Community Type	Acres
Emergent Wetland	11,148
Scrub–Shrub Wetland	365
Unconsolidated Bottom	82
Forested Wetland	46
Total Wetland Acreage	11,641

Source: USFWS 2010f

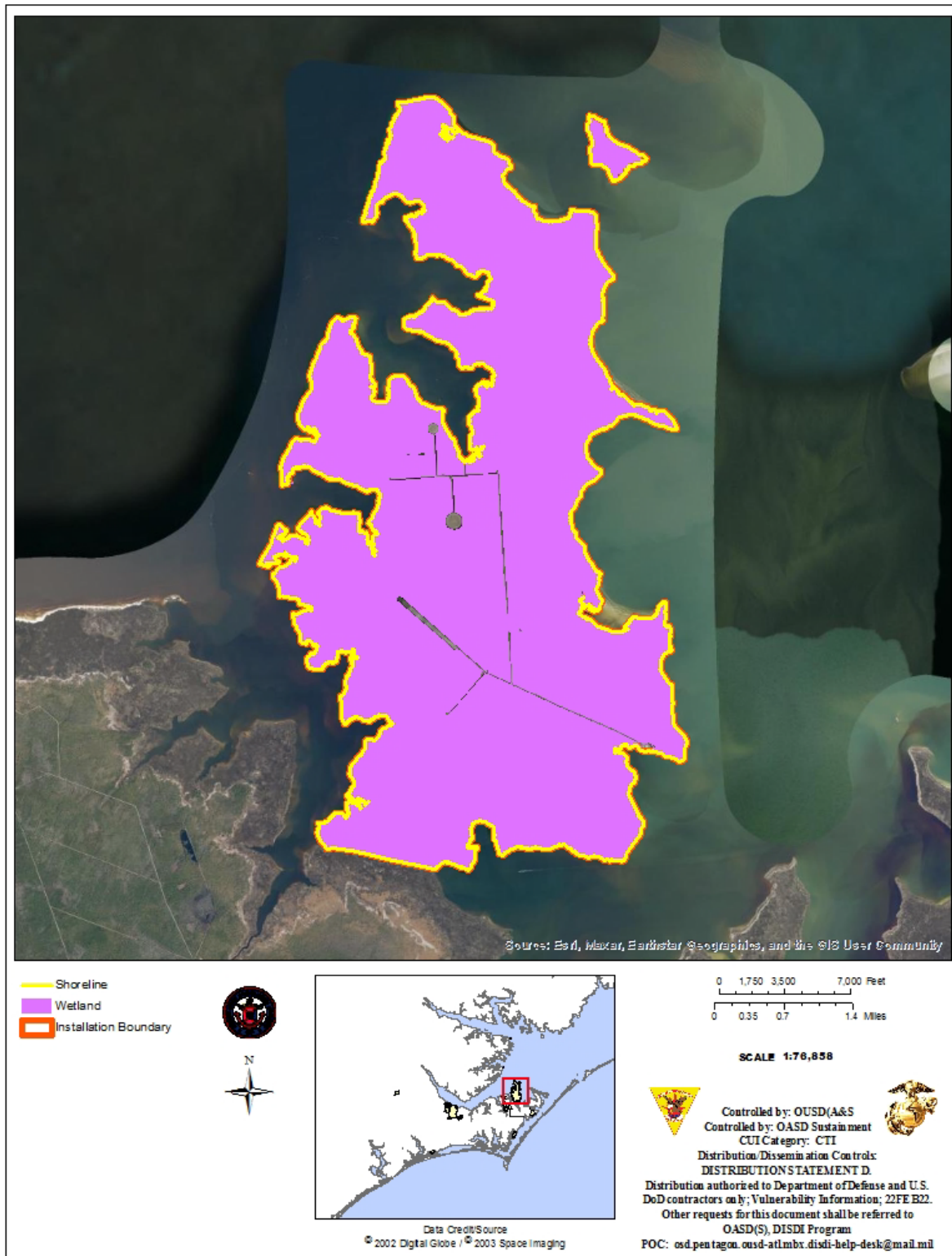


Figure 2.11. Piney Island (BT-11) Water Resources.

MCOLF Atlantic

MCOLF Atlantic is located adjacent to Barry Bay and Core Sound. Much of this site is composed of sandy ridges that are poorly drained that support palustrine wetland communities. Only the highest portions of the bay rim and relic dune ridges support terrestrial dry-soil communities. Lower portions of the site are regularly flooded, with irregular flooding occurring on higher portions of the site; however, soils in higher portions of the site are usually permanently saturated. MCOLF Atlantic includes approximately 0.5 miles of marsh shoreline along Barry Bay.

The majority of the 999 acres of wetland habitat that occur at MCOLF Atlantic is either forested or scrub–shrub community (Table 2.14 and Figure 2.12). In addition, approximately 239 acres of MCOLF Atlantic are covered by emergent wetland community.

Table 2.14. Wetlands at MCOLF Atlantic.

Wetland Community Type	Acres
Forested Wetland	375
Scrub–Shrub Wetland	354
Emergent Wetland	239
Unconsolidated Shore	28
Unconsolidated Bottom	2
Aquatic Bed	1
Total Wetland Acreage	999

Source: USFWS 2010f

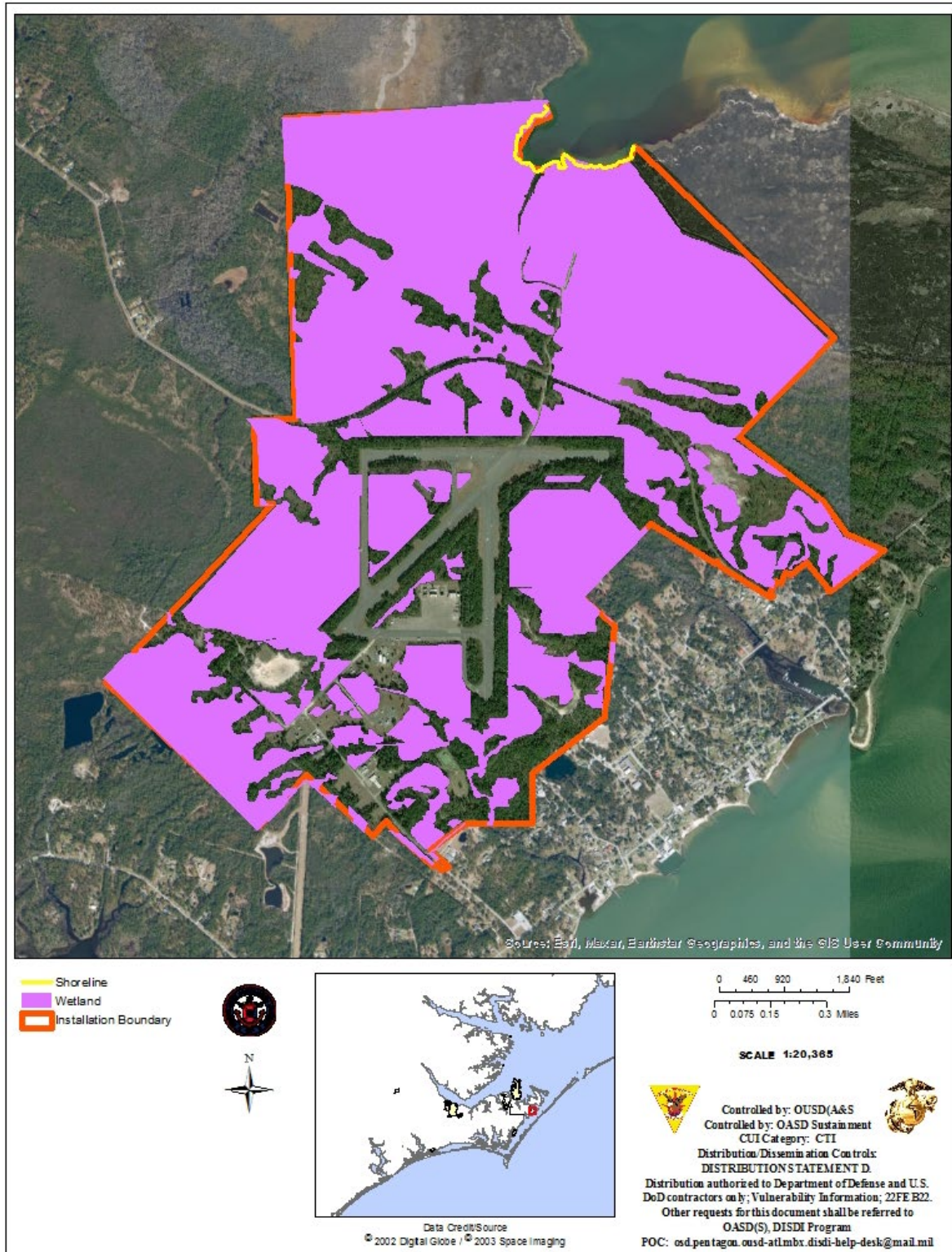


Figure 2.12. MCOLF Atlantic Water Resources.

MCALF Bogue

MCALF Bogue is located in the White Oak River Basin, on the north shore of Bogue Sound (Figure 2.13). Bogue Sound is subject to lunar tides and contains commercial fish and shellfish resources. In some areas, such as in the northern area of MCALF Bogue, groundwater that is near the surface serves as the headwaters for many streams associated with the site. MCALF Bogue includes approximately 4 miles of shoreline.

Approximately 132 acres of wetlands occur on this site, comprising approximately 15% of the land area (Table 2.15). The vegetated wetlands communities occur primarily on the edge of MCALF Bogue. The most common types of wetlands are forested (63 acres) and emergent (41 acres) wetlands, the latter of which is mostly brackish marsh. A total of 25 acres of scrub–shrub wetland also occur at MCALF Bogue.

Table 2.15. Wetlands of MCALF Bogue.

Wetland Community Type	Acres
Forested Wetland	63
Emergent Wetland	41
Scrub–Shrub Wetland	25
Unconsolidated Bottom	2
Unconsolidated Shore	1
Total Wetland Acreage	132

Source: USFWS 2010f

NCDEQ, Division of Water Quality has classified Western Bogue Sound as an Outstanding Resource Water (ORW). NCDEQ, Division of Water Quality provides a classification for all surface waters that are used for recreation, or for drinking water, that provides for protection from degradation, and the appropriate usage of these waters (NCDEQ, Division of Water Quality 2010), and waters with excellent water quality are classified as High Quality Waters, or ORW. The ORW classification is assigned to waters that are unique or special, having excellent water quality, and exceptional State or national ecological or recreational significance. Resource value includes outstanding fish habitat or fisheries; unusually high level of water-based recreation; special designation (i.e., North Carolina Wild, Scenic, or Recreational River, or NWR); waters having an important component of a State or national park, or forest; or waters of special ecological significance. In association with this designation, restrictions have been established for Western Bogue Sound for construction of marinas, or discharges associated with new or expanded National Pollution Discharge Elimination System (NPDES) permits (15A North Carolina Administrative Code [NCAC] 02B.0225, Outstanding Resource Waters).



Figure 2.13. MCALF Bogue Water Resources.

Pamlico Point, Maw Point, Cat Island, and Brant Island Shoal (BT-9)

All land surface at Pamlico Point, Maw Point and Cat Island, other than dune habitat, is subject to tidal flooding, and marshland communities at these sites have semi-permanently saturated and flooded soils (Figure 2.14 and Table 2.16) (USMC 2001). The Pamlico Point wetlands cover 100% of the site, including 125 acres of emergent wetland and 16 acres of unconsolidated bottom habitat. Maw Point is comprised of 54 acres of emergent wetland and approximately 1 acre of unconsolidated shore. NWI wetland data are not available for Cat Island; however, based on available natural community data, this site is also expected to be completely covered by wetland habitat.

Table 2.16. Wetlands at Pamlico Point, Maw Point, Cat Island, and Brant Island Shoal (BT-9).

Wetland Community Type	Acres
Pamlico Point	
Emergent Wetland	125
Unconsolidated Bottom	16
Total Wetland Acreage	141
Maw Point	
Emergent Wetland	54
Unconsolidated Shore	1
Total Wetland Acreage	55
Cat Island	
Total Wetland Acreage	NWI Data Not Available
Brant Island Shoal	
Unconsolidated Bottom	21
Total Wetland Acreage	21

Source: USFWS 2010f

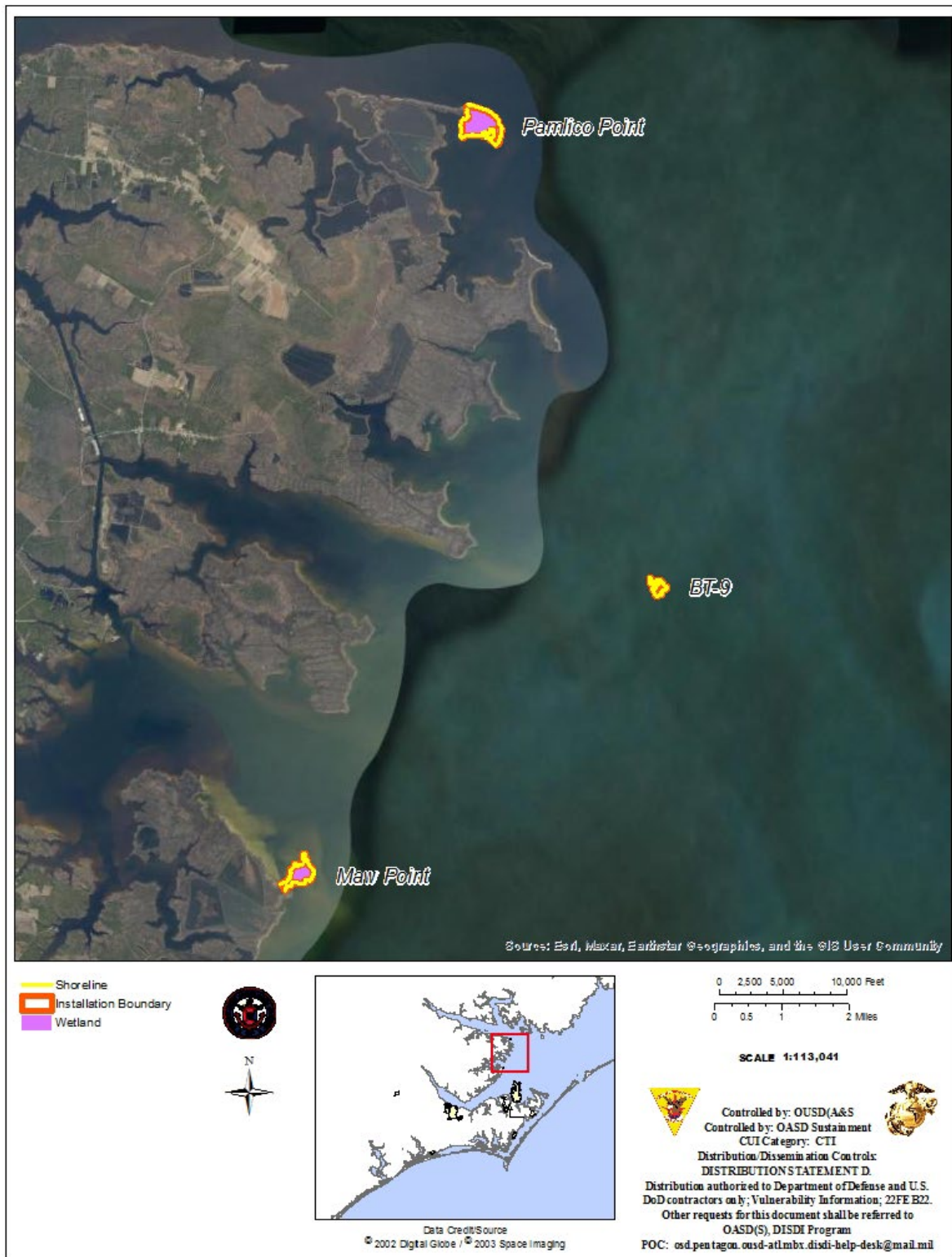


Figure 2.14. Brant Island Shoal (BT-9), Maw Point, and Pamlico Point Water Resources.

BT-9 consists of two ship hulks grounded on Brant Island Shoals in Pamlico Sound, Pamlico County, North Carolina. There is no land within the boundary of this range. The range consists entirely of State-owned waters of Pamlico Sound. Water depths within the 18,000 acres prohibited zone vary from 1–20 ft (USMC 2001).

MCOLF Oak Grove

MCOLF Oak Grove is located in the Neuse River Basin. The Trent River, for 4.7 miles, forms the western and southern boundaries of the property. Much of the site contains sandy non-hydric soils that are well-drained or moderately well-drained. The 83 acres of wetland habitats that occur at MCOLF Oak Grove are located along the Trent River (Table 2.17 and Figure 2.15).

Table 2.17. Wetlands at MCOLF Oak Grove.

Wetland Community Type	Acres
Forested Wetland	83
Open Water	5.5
Total Wetland Acreage	88.5

Source: Versar, 2017

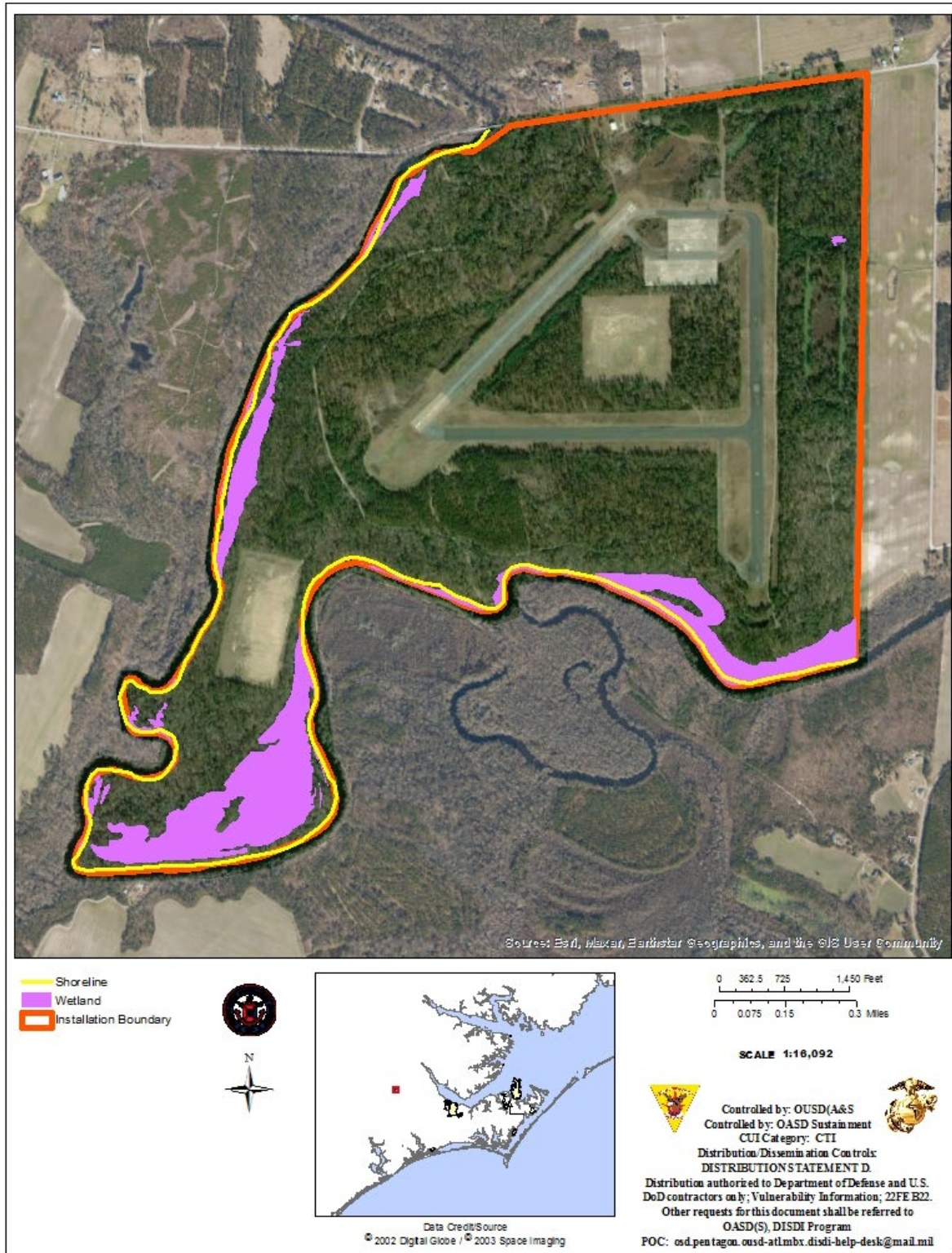


Figure 2.15. MCOLF Oak Grove Water Resources.

2.3 CONSERVATION SIGNIFICANCE OF THE AREA

There are areas in proximity to MCAS Cherry Point that are considered ecologically important. The largest regional ecological areas include the Coastal Plain, Croatan National Forest, and Cedar Island NWR. The Coastal Plain region of North Carolina supports a rich biodiversity, including a broad range of plant species, and rare species (TNC 2010a).

Croatan National Forest is maintained by USFS, and contains 160,000 acres of pine forests, saltwater estuaries, and pocosin habitat (USFS undated). Croatan National Forest is the only coastal forest that is part of the National Forest system. This forest covers an area approximately 160,000 acres in size and contains the largest population of carnivorous plants of any National Forest (North Carolina Office of Environmental Education 2010). Vegetation communities that occur within Croatan National Forest include pine forest, saltwater estuaries, and bogs. In addition to interesting plant species and diverse habitats, Croatan National Forest provides habitat for many species of wildlife including deer, bear, alligators, and many types of birds including song birds, wading birds, and birds of prey. Canoeing, fish, hiking, and camping are among the many outdoor recreational activities available at Croatan National Forest.

Cedar Island NWR was established in 1964 and is maintained by USFWS. The refuge contains approximately 11,000 acres of irregularly flooded, brackish marsh habitat, and 3,480 acres of pocosin and woodland habitat (USFWS 2010a). MCOLF Atlantic is located directly adjacent to the western portion of Cedar Island NWR.

In addition to federally managed lands, the NCWRC and manages a network of game lands within coastal North Carolina that also contribute to the regional conservation significance of the area. The NCWRC properties Goose Creek (Beaufort and Pamlico counties), Neuse Game Lands (Craven County), Carteret County Game Lands, Croatan (Petiford Creek Tract–Carteret), Light Ground Pocosin (Pamlico County) and White Oak River Game Lands (Onslow County) comprise approximately 21,326 acres.

2.3.1 Significant Natural Heritage Areas (SNHAs)

NHP is part of the Office of Natural Resources Planning and Conservation within NCDEQ. NHP has catalogued the most rare and significant elements of natural diversity in North Carolina (NCDEQ NHP 2022), including plants, animals and natural communities. Over the past 25 years NHP has conducted inventories of SNHAs for most counties located throughout the State, utilizing approved methodologies developed by TNC and shared by the Natural Heritage Network and NatureServe. The NHP Biennial Protection Plan, List of Significant Natural Heritage Areas (NCDEQ Natural Resources Planning and Conservation 2009) was reviewed to identify SNHAs associated with MCAS Cherry Point and nearby areas. Significance criteria associated with each SNHA are described below.

- Significance A – Nationally significant natural areas that contain examples of natural communities, rare plant or animal populations, or geologic features that are among the

highest quality, most viable, or best of their kind in the nation, or clusters of such elements that are among the best in the nation.

- Significance B – Statewide significant natural areas contain similar ecological resources that are among the best occurrences in North Carolina. There are a few better quality representatives or larger populations on nationally significant sites elsewhere in the nation or possibly within the State.
- Significance C – Regionally significant natural areas contain natural elements that may be represented elsewhere in the State by better quality examples, but which are among the outstanding examples in their geographic region of the State. A few better examples may occur in nationally or State significant natural areas. Regions consist of an area the size of about five counties.

Six SNHAs encompassing 14,417 acres were identified in the NHP report for MCAS Cherry Point (NCDEQ Natural Resources Planning and Conservation 2009). These include five SNHAs of Statewide importance (Significance B) and one SNHA of regional significance (Significance C). No nationally significant SNHAs (Significance A) were identified for MCAS Cherry Point. Statewide and regional SNHAs located on MCAS Cherry Point and outlying properties are described below.

Air Station

Cherry Point Tucker Creek Natural Area, a Significance C SNHA, is located in the northwest portion of MCAS Cherry Point adjacent to Anderson Creek, Tucker Creek, and the Neuse River (Figure 2.2). This Natural Area is part of the Croatan National Forest Megasite, a group that contains 17 other SNHAs (NCDEQ Natural Resources Planning and Conservation 2009). Total area of Tucker Creek Natural Area within the boundaries of MCAS Cherry Point is approximately 909 acres. Natural communities in Tucker Creek Natural Area include tidal freshwater marsh, coastal fringe evergreen forest, blackwater swamp, and lower slope mesic–mixed hardwood forest. Although site specific species data are not available for this natural area, there is a potential for rare plants and wildlife species to occur in this area. The coastal fringe evergreen forest, mixed mesic hardwood forest, and tidal freshwater marsh (oligohaline variant) natural communities of the Tucker Creek Natural Area are considered exemplary (LeBlond et al. 1994). In 2022, the NHP resurveyed natural areas across the state, including the Tucker Creek Natural Area. It was classified as having “High” representational value and “Moderate” collective value (NHP 2023).

Piney Island (BT-11)

All of Piney Island and adjacent Raccoon Island compose Piney Island Natural Area (Figure 2.3), a Significance B Natural Heritage Area (NCDEQ Natural Resources Planning and Conservation 2009). Total area of Piney Island Natural Area is 11,895 acres, and along with the Atlantic Natural Area located at MCOLF Atlantic approximately 6 miles to the southeast, are included in the Cedar Island/Atlantic Macrosite. Natural communities associated with Piney Island Natural Area include brackish marsh and pond pine woodland, both of which are considered exemplary (LeBlond et al. 1994). Surveys of Raccoon Island have identified 1,000s of nesting laughing gulls (*Larus atricilla*), and numerous pairs of nesting herons and egrets (family Ardeidae), and ibis (subfamily

Threskiornithinae) (NCWRC unpublished data). Raccoon Island may also provide habitat for nesting rails and bitterns, a gull-tern-skimmer colony is also associated with the Piney Island Natural Area.

MCOLF Atlantic

Marshlands and forests north of SR 1387 and forests along the west and southwest sides of MCOLF Atlantic compose the Atlantic Natural Area (Figure 2.3), a Significance B Natural Area totaling approximately 1,457 acres. This natural area and the Piney Island Natural Area are part of the Cedar Island/Atlantic Macrosite. Atlantic Natural Area supports vegetation communities ranging from wet pine flatwoods (*Leiophyllum* variant and wet spodosol variant), coastal fringe sandhill, estuarine fringe loblolly pine forest, pond pine woodland, and brackish marsh; all of which are considered exemplary (LeBlond et al. 1994).

MCOLF Oak Grove

Marshlands and forests in the southern fringe of MCOLF Oak Grove along the Trent River comprise the Cherry Point Oak Grove Swamps Natural Area (Figure 2.8), a Regionally Significant Natural Area totaling approximately 143 acres. The Trent River is a part of the Trent River Aquatic Habitat Natural Area, which is of Regional Significance.

Pamlico Point

Pamlico Point marsh habitat and impoundments are listed as a Significance B Natural Heritage Area (NCDEQ Natural Resources Planning and Conservation 2009) and total approximately 138 acres. Pamlico Point Marshes and other sites compose the Southern Pamlico Marshes and Swamps Macrosite. In addition to the extensive marsh habitat of Pamlico Point, existing impoundments in the northern portion of the Natural Area provide high quality habitat for breeding, migrating, and wintering waterbirds (Legrand et al. 1992). Several bird species known or suspected of breeding here include black duck (*Anas rubripes*), gadwall (*A. strepera*), blue-winged teal (*A. discors*), and ruddy duck (*Oxyura jamaicensis*) (NCDEQ NHP 1990). Nesting bird surveys conducted by NCWRC in 2011 recorded 9,501 nests from nine different species. The number of laughing gull nests exceeded 9,000 (NCWRC unpublished data).

Cat Island

Cat Island is included in the Bogue Inlet/Bogue Sound Bird Nesting Islands, a Significance B Natural Heritage Area (Figure 2.4). All 18 acres of the Cat Island site are included in this natural area. The area of Bogue Inlet and Bogue Sound provide valuable habitat for migratory shorebirds, colonial waterbirds, marine mammals and reptiles, anadromous fish, and estuarine and marine fisheries (USFWS undated). Wetland communities define the site, including maritime forest and salt marsh community dominated by smooth cordgrass. This site also supports a heron rookery (LeBlond et al. 1994). Nesting bird surveys conducted by NCWRC in 2011 identified 679 nests from eight different species (NCWRC unpublished data), with the highest number of nests

belonging to cattle egrets (*Bubulcus ibis*), great egrets (*Ardea alba*), and tricolored herons (*Egretta tricolor*).

Maw Point, Brant Island Shoals, and MCALF Bogue

No SNHAs have been designated at Maw Point, BT-9, or MCALF Bogue.

2.4 SOCIOECONOMIC SETTING

The 2022 Federal Census provides demographic information for Craven, Carteret, Jones and Pamlico counties (U.S. Census Bureau 2022). More detailed information regarding demographics of these counties and the State of North Carolina can be found online at www.census.gov and at www.quickfacts.census.gov.

Craven County

The 2021 Craven County population was 100,874 (U.S. Census Bureau 2022), which includes approximately 38,154 military and civilian employees, and their family members (MCASCP 2021). For the year 2022 the population of Craven County was predominately white (65%), with a median age of 49.2 years. Percentage of minorities making up the county population were estimated as 21% Black or African American, 8% Hispanic or Latino, 3% Asian, and 3% other race. For the same time period approximately 90% of Craven County's residents had at least a high school diploma, and approximately 26% had a Bachelors degree or higher. Approximately 16% of residents of Craven County were civilian veterans in 2018. Since 2010 the population of Craven County has decreased by approximately 3%(103,505)(U.S. Census Bureau 2010).

Carteret County

The 2021 Carteret County population was 69,380 (U.S. Census Bureau 2022). The population of Carteret County was predominately white (87%), with a median age of 44 years. Percentage of minorities making up the county population were estimated as 5% Black or African American, 5% Hispanic or Latino, 1% Asian, and 2% other race. For the same period approximately 92% of Carteret County's residents had at least a high school diploma, and approximately 30% had a Bachelors degree or higher. Approximately 9% of residents were civilian veterans in 2018. Since 2010 population of Carteret County has increased by approximately 4%, (66469) (U.S. Census Bureau 2010).

Pamlico County

The 2021 Pamlico County population was 12,381 (U.S. Census Bureau 2022). The 2022 population of Pamlico County was predominately white (74%), with a median age of 54 years (U.S. Census Bureau 2020). Percentage of minorities making up the county population were estimated as 19% Black or African American, 5% Hispanic or Latino, less than 1% Asian, and 1% other race. Approximately 90% of Pamlico County's residents had at least a high school diploma, and approximately 24% had a Bachelors degree or higher. Approximately 1,330 residents were

civilian veterans in 2022. Since 2010, the population of Pamlico County has decreased by approximately 6% (13144) (U.S. Census Bureau 2010).

Jones County

The 2021 Jones County population was 9,233 (U.S. Census Bureau 2022). The 2021 population of Jones County was predominately white (62%) with a median age of 48 years (U.S. Census Bureau 2020). Percentage of minorities making up the county population were estimated as 29% Black or African American, 6% Hispanic or Latino, less than 1% Asian, and 2% other race. Approximately 83% of Jones County's residents had at least a high school diploma, and approximately 15% had a Bachelors degree or higher. Approximately 829 residents were civilian veterans in 2021. Since 2020, the population of Jones County has decreased by less than 1%, with an overall 9% decrease in the county population since 2010 (10139) (U.S. Census Bureau 2010).

2.4.1 Economic Character

Craven County

For the 2021 census 52% of persons over 16yrs of age living in Craven County were within the labor force. Approximately 50% of persons aged 16 years or older making up the labor force were employed within the civilian sector, and approximately 10% were employed in the armed forces sector, with 37% not within the labor force (U.S. Census Bureau 2021). The largest occupation sectors of Craven County are sales and related occupations (10.3%); office and administration support (8.68%); and management, professional, and related occupations (8.35%) (DataUSA 2021). The largest industries in Craven County are health care and social assistance (14.5%); retail (11.8%), and manufacturing (11.8%).

Median household income for Craven County families in 2021 was \$56,325. MCAS Cherry Point is one of the largest employers in eastern North Carolina, contributing significantly to the economy of North Carolina). Economic impact for FY2021 was \$2.2 billion, with civilian and military personnel salaries totaling \$1.2 billion (MCASCP 2021).

The work force of MCAS Cherry Point for FY2021 was estimated as 15,888 people (MCAS CP 2021). This estimate includes the following:

- 6,832 active duty enlisted Marines and Sailors,
- 5,356 civilian employees,
- 3,700 permanent contractors

Carteret County

For the 2020 census a total of 30,800 persons living within Carteret County were within the labor force. Approximately 55% of persons aged 16 years or older making up the labor force were employed within the civilian sector, and approximately 1% were employed in the armed forces sector, with approximately 44% not within the labor force (U.S. Census Bureau 2022). The largest

occupation sectors of Carteret County are sales and office (12.1%); office and administrative support (9.59%); and management occupations (9.43%). The largest industries in Carteret County are healthcare and social assistance (12.6%); retail (12.9%); and accommodation and food services (9.57%). Median household income for Carteret County families in 2022 was \$61,805.

Pamlico County

For the 2020 census a total of 4,534 persons living within Pamlico County were within the labor force (or 44% of population 16 years and over). Approximately 44% of persons aged 16 years or older making up the labor force were employed within the civilian sector, with less than 1% employed in the armed forces sector, and approximately 55% not within the labor force (U.S. Census Bureau 2022). The largest occupation sectors of Pamlico County are management, office and administration support occupations (11.2%); installation, maintenance and repair occupations (7.76%). The largest industries in Pamlico County are healthcare and social assistance (11.6%); retail trade (10.8%), and educational services (8.8%). Median household income for Pamlico County families in 2021 was \$52,124.

Jones County

For the 2022 census a total of 52% of persons living within Jones County were within the labor force. Approximately 52% of persons aged 16 years or older making up the labor force were employed within the civilian sector, with less than 1% employed in the armed forces sector, and approximately 47% not within the labor force (U.S. Census Bureau 2022). The largest occupation sectors in Jones County are office and administrative support (11.5%); construction and extraction occupations (10.3%); and production occupations (8.56%). The largest industries in Jones County are manufacturing (13%); retail trade (12.3%); and healthcare and social assistance (12%). Median household income for Jones County families in 2021 was \$42,401.

2.4.2 LAND USE

Craven County

The Craven County LUP was developed in 2009 in compliance with CAMA requirements for coastal counties. This LUP contains detailed information on the county's current population, resources, and land use, as well as vision and policy statements for future management. Existing land use within Craven County is primarily agricultural and low density residential (70%), followed by government and institutional land use (19%) (Craven County 2009). Land classified as agricultural and low density residential includes large tracts used for farming and related activities, and includes areas of low density residential development. Approximately 68% of the county is used for agricultural purposes, with a majority located in the northern section of the county where land is best suited for this purpose.

An annual growth rate for Craven County through 2030 is estimated at less than 1%, which would result in a population increase of 26% (Craven County 2009). Future land use acreage estimates for agriculture and low density residential are expected to increase by 45% during this period, with

an estimated 42% increase in acreage needed for conservation for this period. Acreage increases for military use is expected to increase by less than 1% by 2030.

The Craven County LUP does not include the City of Havelock Planning and Zoning Area, which encompasses the boundary of MCAS Cherry Point. The City of Havelock CAMA LUP was certified by the NC Coastal Resources Commission in June 2023. The LUP provides detailed information on current conditions in Havelock, a land suitability analysis, and provides a “general direction for future growth and redevelopment across the city for the next 20 years.” The focus is on sustainable development while considering future infrastructure needs, compatible land use, and economic development strategies (City of Havelock 2023)

Carteret County

The Carteret County LUP was updated in 2022 and was developed in compliance with CAMA requirements for coastal counties. Existing land use within Carteret County is primarily undeveloped (66%), followed by institutional land use (29%) (Carteret County 2005). Land that is classified as institutional includes military bases, federal lands such as Croatan National Forest, State-owned land, county parks and beach access points.

For the 5-county region of Carteret, Beaufort, Craven, Hyde, and Pamlico counties, Carteret County was the fastest growing county in terms of population for the period of 1980–2000, and this was associated in part due to expansion of military complexes in the region (Pamlico County 2004). The combined permanent and seasonal population of Carteret County is expected to increase by approximately 11,500 people between 2005 and 2025. Total projected land needed to accommodate this population expansion is 2,610 acres (Carteret County 2005).

Pamlico County

The Pamlico County LUP was approved in 2012 and was developed in compliance with CAMA requirements for coastal counties. This LUP contains detailed information on the county’s current population, resources, and land use, as well as vision and policy statements for future management. Existing land use within Pamlico County is predominantly undeveloped with 45% of land classified as forestry and wooded land, and 18% classified as agricultural or open land (Pamlico County 2012). Land classified as forestry and wooded includes large tracts of forests (approximately 98,000 acres), but does not include shrubland, marshland, and other types of vegetated communities. Pamlico County encompasses approximately 38,600 acres of cropland with most farming activities concentrated in the northern, southeastern, and southern areas of the county (Pamlico County 2004). The undefined land use category “other” covers 34% of Pamlico County.

Current projection analysis of the permanent population shows an increase in population from approximately 13,200 to 15,400 from 2003 to 2023. This represents an annual growth rate of less than 1%. The seasonal population is expected to increase from 5,940 to 6,930 for the same period. According to these estimates, approximately 1,600 acres of land will be required to accommodate the projected increase in permanent and seasonal population (Pamlico County 2012).

Jones County

Jones County contains the largest forest laboratory in the nation, the Hoffman Forest, which is utilized by students of North Carolina State University. Additionally, Jones County is home to the Croatan National Forest. These forested areas are 65% of the Jones County land area (jonescountync.gov 2023).

2.5 MCAS Cherry Point Military History

Congress authorized construction of MCAS Cherry Point on 9 July 1941, on a 7,582-acre tract of land covered by swamps, farms, and forests. MCAS Cherry Point was commissioned on 20 May 1942 with the original name Cunningham Field, named in honor of USMC's first aviator, Lt. Alfred A. Cunningham. It was later renamed Cherry Point, a name adopted from a local post office established in the area for Blades Lumber Company which was situated amongst a grove of cherry trees. Since being commissioned in 1942 MCAS Cherry Point has expanded to more than 11,000 acres, with an additional 16,000 acres of outlying fields, and 18,000 acres used as a water-based bombing target (BT-9). Historically, the large runway available at MCAS Cherry Point served as an alternate emergency landing site for space shuttles launched from Cape Canaveral in Florida.



MCAS Cherry Point historic photograph.

Source: USMC 2010f

MCAS Cherry Point has served as headquarters for the Commander, Marine Corps Air Bases, Eastern Area, and has been home to the 2d MAW since 1946. It is also home to the Marine Transport Squadron, which provides military transportation and search and rescue efforts for Marine aviators. Additional search and rescue support is provided to the local community.



MCAS Cherry Point historic photograph.

Source: USMC 2010f

Land (573 acres) for MCALF Bogue was purchased in 1942 for the purpose of developing an auxiliary landing field. Three 4000 ft runways were built to provide a Field Carrier Landing Practice (FCLP) area for pilots stationed at MCAS Cherry Point. Pilots use this site to conduct simulated night-time landings on an aircraft carrier. The Navy also acquired 1,470 acres of land in 1942 for construction of MCOLF Atlantic for use as a



satellite airfield. Three runways were constructed with the first dive-bombing aircraft arriving in 1943. By 1945 aviation activity at the airfield had declined significantly, and the airfield was completely abandoned sometime between 1956 and 1965. The airfield remains officially closed today; however, it is occasionally used as a satellite airfield by aircraft and helicopters stationed at MCAS New River and MCAS Cherry Point.

MCAS Cherry Point has provided a pivotal role during conflicts involving U.S. forces. During World War II (WWII) the primary mission of MCAS Cherry Point was to train Marines for service in the Pacific theater, but MCAS Cherry Point also served as a base for anti-submarine operations that included the Army Air Corps 22nd Antisubmarine Squadron. MCALF Bogue was used during WWII for dive-bomber training, with circular dive-bomber targets constructed on nearby islands and vertical targets constructed for low-level bombing practice. MCALF Bogue was decommissioned after WWII, and use of the outlying airfield transitioned to use as USMC's first Short Airfield for Tactical Support beginning in 1958. During the Korean War MCAS Cherry Point contributed to training pilots, air crewman, and maintenance and support personnel. During the Vietnam War MCAS Cherry Point was responsible for supplying A-6 Intruder squadrons deploying to the Far East, and MCALF Bogue was reopened for use as a satellite airfield for aircraft and helicopters stationed at MCAS New River and MCAS Cherry Point. MCAS Cherry Point has also provided aircraft support roles in Operation Desert Storm, performed strike missions during the Afghanistan conflict and Operation Enduring Freedom. Currently MCALF Bogue is the primary location for AV-8B Harrier practice operations, supporting approximately 3,500 FCLPs per training year, but is also used by KC-130 Hercules transports, F/A-18 Hornet fighters and helicopters for practice approaches.

2.5.1 MCAS Cherry Point Facilities

Air Station

Land at MCAS Cherry Point is categorized into three broad land use types: cantonment, operations and training, and forested/undeveloped areas (USMC 2009a). Cantonment areas are used for administrative, housing, and industrial activities. Operations and training includes land used for outdoor mounted heavy and light vehicle maneuvering, dismounted maneuvering, small and large arms ranges, indoor academic training, and indoor practice areas. Undeveloped/forested areas include forested or undeveloped areas not currently used for training activities.

Current and planned land use at MCAS Cherry Point is largely dictated by the extent of aviation facilities and associated buffers, as well as environmental constraints such as the presence of water resources (USMC 2009a). Aviation facilities at MCAS Cherry Point include four runways, runway clear zones, and accident potential zones. Other land uses include support and training facilities, administrative, maintenance and supply, housing and community facilities, utilities, forestry, and open space/conservation (USMC 2001).

The most developed area of MCAS Cherry Point is in the vicinity of the airfield, and east of Roosevelt Boulevard (Figure 2.10). Industrial uses, such as aircraft hangars, maintenance, supply, and storage are associated with the airfield. The FRC-East is located in the airfield area, and this

facility is one of only three aircraft maintenance, engineering, and logistics facilities operated by the Navy/USMC, and the only such facility located on a USMC installation. Other less developed regions near the airfield include combined bachelor quarters, training facilities, recreation or entertainment uses, and administrative facilities.

West of Roosevelt Boulevard, land uses include family housing, personnel support facilities, recreational facilities, and the ordnance area. The remainder of MCAS Cherry Point is largely undeveloped forestland and primarily classified as open/conservation areas. Within this undeveloped area, however, are a number of isolated land use activities such as training, operations, and recreation.

Piney Island (BT-11)

BT-11 is a multi-purpose complex that contains both land and water based targets; including bulls eye targets, boat targets, simulated truck convoy, simulated train, simulated airstrip, strafing banner, and surface-to-air missile targets (Figure 2.11). Water based targets are located on the west side of Piney Island within Rattan Bay, and include a barge, PT boat, and remotely controlled boats. The Rattan Bay target area includes approximately 2,300 acres of water. The complex is designed to accommodate for multiple aircraft and small watercraft strikes. Only inert ordnance (practice bombs with no explosives) is authorized for use at BT-11, and the site contains both full-time and intermittent basis restricted danger zones.

MCOLF Atlantic

MCOLF Atlantic contains an airfield and historic facilities that support training activities conducted at BT-11 (Figure 2.11). Threat emitters and facilities associated with the Mid-Atlantic Electronic Warfare Range are located at MCOLF Atlantic (USMC 2001). Except for routine helicopter shuttle flights, aircraft use the facility only during special training exercises. No aircraft are permanently stationed at MCOLF Atlantic.

MCALF Bogue

MCALF Bogue includes an airfield that is used to support aircraft training and field training exercises (Figure 2.12). The airfield is marked to simulate an aircraft carrier and amphibious assault ship deck and is used for carrier landing qualifications training. No aircraft are permanently stationed at MCALF Bogue (USMC 2001).

MCOLF Oak Grove

MCOLF Oak Grove is approximately 827 acres located on the Trent River in Jones County, NC. 28 miles west of MCAS Cherry Point. MCOLF Oak Grove is used for aircraft training and field training exercises. Flight operations at MCOLF Oak Grove typically range from aircraft familiarization, and air/ground tactical support missions, to search-and-rescue maneuvers, and night vision goggle/forward looking infrared (FLIR) training. No aircraft are permanently stationed at MCOLF Oak Grove.

Pamlico Point, Maw Point, and Cat Island

No structures or targets are currently associated with Pamlico Point, Maw Point or Cat Island (Figure 2.12 and Figure 2.13). These three sites were historically used as bombing targets and are no longer actively being used.

Brant Island Shoal (BT-9)

Brant Island Shoal (BT-9) is located completely offshore within State-owned waters of Pamlico Sound (Figure 2.13). The target consists of two ship hulks grounded on Brant Island Shoals in Pamlico Sound, which are used for various aircraft and small watercraft training in bombing techniques and target training. Ship hulks are replaced periodically when they become too damaged from ordnance strikes to serve effectively as targets. Replacement hulks are placed either directly on top of the previous hull, or directly to the side. Several previous ship hulk targets remain submerged, in proximity to the ship hulk currently in use. The target is defined by a 6 statute-mile diameter, circular surface water danger zone designated by the U.S. Army Corps of Engineers (USACE), Wilmington District (33 CFR §334.42). Surface vessels are not permitted within this area, which is delineated by large signs on pilings placed around the perimeter. Water depths within the 18,000-acre prohibited zone vary from 1–20 ft (Navy Public Works Center 2001). Both inert ordnance up to 2,000 pounds, and strafing and explosive ordnance (not to exceed 100 pounds of trinitrotoluene, or TNT, equivalent) are authorized for use at BT-9.

3.0 NATURAL RESOURCES PRIORITIES AND THEIR RELATIONSHIP TO GOALS AND MANAGEMENT ACTIONS

3.1 MISSION FOCUSED NATURAL RESOURCES PRIORITIES

The military mission of MCAS Cherry Point is to provide the highest quality aviation facilities, support and services to promote the readiness, sustainment and quality of life for Marines, Sailors, Civilian Marines, Family Members and others associated with MCAS Cherry Point (USMC 2010b). Six Natural Resource Priorities have been identified for MCAS Cherry Point that must be satisfied for continued support of the military mission without disruption:

- (1) **Range Management and Training Land Condition** – Maintain ranges, airfields, and military training areas (ground training and airfield clear zones).
- (2) **Bird/Wildlife Aircraft Strike Hazard (BASH)** – Maintain a safe operating environment for aircraft.
- (3) **Wildland Fire** – Ensure fires associated with military activities do not affect facilities, timber, and adjacent private properties.
- (4) **Quality of Life** – Ensure the quality of life for military personnel is maintained and, where possible, improved.
- (5) **Water Quality** – Maintain/improve surface water quality and protect/preserve wetlands in compliance with the CWA.
- (6) **Regional Ecosystem Management** – Preserve/enhance natural resources of regional importance.

These natural resources priorities provide the basis for natural resources management objectives in this INRMP. The goals determine the management regimes that are to be implemented, define management actions, set priorities, and govern the course of action to be taken. These goals reflect the core values of the MCAS Cherry Point military mission and the philosophy of natural resources stewardship and conservation and provide a clear concept of natural resources management policies, values, and beliefs. The following sections describe the natural resources management goals that are necessary to satisfy each natural resources priority.

3.1.1 Range Management and Training Land Condition

To satisfy the goals established for Range Management and Training Land Condition. MCAS Cherry Point will continue to implement the Clear Zone Management Plan, and control invasive species as recommended in the MCAS Cherry Point Complex Invasive Species Survey and Management Plan (NAVFAC Atlantic 2006). These management measures will assist in meeting the following natural resources management goals developed to satisfy priorities established for Range Management and Training Land Condition.

Goal 1: Maintain healthy forest lands in open condition for military training activities, to include foot and vehicle access.

Goal 2: Maintain and manage runway clear zones and reduce BASH.

Goal 3: Maintain suitability of wetland and marshland used for training activities, including all of Piney Island (BT-11).

Goal 4: Implement NEPA program management.

Goal 5: Conduct periodic wildlife and plant surveys to update species inventories on Range and Training lands.

3.1.2 BASH

Implementation of an integrated Bird/Wildlife Aircraft Strike Hazard/Animal Damage Control (BASH/ADC) Program and monitoring of avian and wildlife species will assist in meeting the following natural resources goals developed for the BASH program.

Goal 1: Minimize BASH hazard to aircraft through land and vegetation management, research/data collection, and animal control.

Goal 2: Maintain and manage runway clear zones to reduce the potential for BASH.

3.1.3 Wildland Fire

MCAS Cherry Point participation in regional wildland fire protection activities; continued implementation of the MCAS Cherry Point WFMP, and development of a prescribed burn program for undeveloped (non-commercial forest) land will assist in meeting the following natural resources goals developed to satisfy priorities established for Wildland Fire.

Goal 1: Minimize risks of wildland fire danger to military facilities and land, while accommodating for ongoing training activities.

Goal 2: Minimize risk to adjacent private lands from fires caused by military training activities.

Goal 3: Utilize wildland fire as a tool for habitat management and improvement.

3.1.4 Quality of Life

Developing coordinated natural resources education and outreach efforts will assist in meeting the following goals developed to satisfy priorities established for Quality of Life.

Goal 1: Provide quality natural resources-based recreation opportunities, including hiking, biking, wildlife watching, hunting, fishing, and environmental education opportunities.

Goal 2: Provide personnel and equipment to enforce natural resources laws.

3.1.5 Water Quality

Ensuring that MCAS Cherry Point complies with regulations through active management; implementing a wetlands mitigation plan; repairing and preventing erosion within and around the airfield clear zone; and restoring degraded streams and riparian areas will assist in meeting the following natural resources management goals developed to satisfy priorities established to protect water quality.

Goal 1: Comply with wetland laws and regulations to promote training activities and development.

Goal 2: Control sedimentation and erosion to reduce damage to land utilized for training, and maintain water quality (also a Quality of Life issue).

Goal 3: Implement water resources restoration projects, focusing on areas impacted by urbanization.

3.1.6 Regional Ecosystem Management

Management of at-risk species and natural communities, with a focus on longleaf pine restoration efforts, and actively participating in regional natural resources planning efforts will assist in meeting the following natural resources management goals developed to satisfy the priorities established for Regional Ecosystem Management.

Goal 1: Participate in regional initiatives to promote ecosystem management and ensure that military land uses are considered in regional land and ecosystem planning efforts.

Goal 2: Comply with laws and regulations that apply to at-risk species.

Goal 3: Continue to implement management measures designed to protect federally protected sea turtle and marine mammal species at BT-9 and BT-11.

3.1.7 Internal Stakeholders

Internal stakeholders that participated in the review of this INRMP included the MCAS Cherry Point Commander, USDA staff associated with the BASH program, Operations Directorate (Range Operations), and members of the CWG. These participants will continue to be involved with implementation of the INRMP by participating in the INRMP annual review process, and on a case-by-case basis as needed.

3.1.8 External Stakeholders

External stakeholders that participated in the review of this INRMP include NMFS, USFWS, NCWRC, and NCDEQ. These agencies will continue to be involved with implementation of the

INRMP by participating in the INRMP annual review process, and on a case-by-case basis as needed to comply with State and federal regulations and as part of natural resources permitting requirements.

3.2 RELATIONSHIP OF NATURAL RESOURCE PRIORITIES, GOALS, AND MANAGEMENT ACTIONS

Meeting the goals of the identified natural resource priorities will allow for uninterrupted and continued support of all aspects of the military mission, and ensure compliance with relevant environmental laws, regulations and other restrictions. The priorities provide the focus for the natural resources management components described in Section 4.0 through Section 13.0 of this document. Management components included in this INRMP are:

Section 4.0 Protected Species Management

Section 5.0 Migratory Birds

Section 6.0 Forest Management and Protection

Section 7.0 Aquatic Resources and Water Quality Management

Section 8.0 Land Management

Section 9.0 Wildlife and Fisheries Management

Section 10.0 Public Access and Outdoor Recreation Enforcement

Section 11.0 Conservation Law Enforcement

Section 12.0 Regional Conservation

Section 13.0 Conservation Outreach and Education

Section 14.0 Resiliency and Climate Change

This INRMP provides specific priorities, action items and management goals identified for the 2024-2028 planning period. Some actions may be applicable to more than one natural resources management component, and whenever practical, actions identify units of measure and success (see Appendix B) to allow the NRM to quantitatively or qualitatively track progress toward achieving the INRMP objectives.

The three objectives established for MCAS Cherry Point are:

- (1) Support of mission requirements
- (2) Compliance with natural resources protection laws

(3) Participation in regional ecosystem initiatives

Long-term projects may require a 5- to 10-year implementation period to meet the desired objective. While year-to-year improvements associated with long-term projects may be small, it is important to note that these long-term projects are moving MCAS Cherry Point toward reaching a desired future condition, which represents an improvement of the current conditions.

3.3 FUNDING CLASSES

Actions or projects are categorized as either “must fund,” or “as funding becomes available”. Must fund projects must be implemented, including projects needed to fulfill compliance requirements. Projects that are to be implemented as funding becomes available will only be implemented if circumstances are favorable (i.e., when mission requirements allow access to land to conduct the action) and/or funding is available to complete the project.

Class 0 and Class 1 projects are considered must fund projects, and are given the highest priority. Class 0 projects are required to meet recurring natural and cultural resources conservation management requirements, and Class 1 projects must be funded to meet current compliance requirements. Although must fund projects are required to be implemented, the ability to implement these projects is subject to availability of funds. Funding to implement Class 0 and Class 1 projects is usually aggressively sought, as failure to implement these projects could or would result in non-compliance action, which may affect or disrupt mission activities. Examples of Class 0 and Class 1 projects include:

- Obtaining the terms and conditions for a BO or wetland fill permit;
- Obtaining Memorandum of Agreement (MOA)/MOU commitments;
- Implementing vegetation or siculture management activities necessary to support mission requirements (such as in within a training drop zone or within designated airfield clear zones); or
- Implementing erosion control measures that are necessary to remain in compliance with natural resources protection regulations.

Each of the projects identified in Appendix B include a description of the:

- Specific action to be taken including a narrative description, objective identifier, and lead person of contact;
- Relevant legal drivers or initiatives associated with the need and objective that the project will satisfy;
- Funding class priority relative to other INRMP projects;
- Monitoring unit of measure, if applicable; and
- Measure of success.

Class 2 and Class 3 projects are other than those classified as “must fund,” and represent other valid natural resources-related projects that will be implemented given favorable circumstances. All actions in this INRMP are subject to the availability of funds.

Nothing in this INRMP shall be construed to be a violation of the Anti-Deficiency Act, 31 USC §1341. All Class 0 and Class 1 actions are usually funded, with funding of Class 2 and 3 actions usually dependent upon availability of funding. Resources do become available from non-traditional sources from time to time, and these are considered when seeking funding opportunities for priority natural resources management objectives.

All INRMP projects, regardless of class, are important from a planning and NEPA compliance perspective, as they collectively describe and define natural resources management activities and serve as the proposed action for the plan period. It is important that all potential natural resources projects be included in an INRMP, for them to be eligible for funding and consideration during the INRMP implementation planning process. Most projects require some type of NEPA compliance, and by including them in the INRMP, which is implemented in compliance with the NEPA process, projects can be considered for funding as it becomes available, eliminating the need (in most cases) for a separate NEPA evaluation.

3.4 ROLE OF MONITORING

Monitoring is a key component of ecosystem management, and federal laws such as the ESA and CWA include a monitoring requirement. Monitoring can be used to evaluate the progress of achieving the natural resources objectives over time, evaluate the effectiveness of management actions, and identify future management needs. The use of cyclical monitoring for improving management of natural resources is referred to as adaptive management, since actions can be modified throughout the monitor process to improve effectiveness and focus on achievement of the objectives and goals.

Monitoring activities may focus on measuring success of specific management actions, or may focus on a specific species or natural community of interest. It is essential for tracking and analyzing changes in population parameters (e.g., size, density, and distribution), and habitat type and quality over time. Monitoring data, such as distribution, occurrence, breeding success, predation rates, and incidental take data, can also contribute to databases and inventories maintained for federally listed threatened and endangered species. Results of monitoring activities can be used to forecast undesirable ecological or environmental effects stemming from management or training activities; or determine if an ecosystem, community or, particular species, is moving closer towards achievement of the established INRMP objectives. Monitoring activities are usually repeated over time and according to an established schedule, which may extend 5, 10, or 20 or more years, before adequate data are available to determine whether a particular action has been successful, or a particular INRMP objective has been met.

Monitoring activities at MCAS Cherry Point are conducted for sea turtles and marine mammals, birds, and deer. Monitoring of federally listed threatened and endangered species is considered a high priority to ensure compliance with regulatory requirements and to assist in recovery efforts

for those species. Selected candidate, rare, sensitive (e.g., State listed species, migratory birds), and other (e.g., game and exotic) species may also be included in monitoring surveys, which can assist MCAS Cherry Point in preparing for future listing of species. Monitoring also assists with management of consumptive recreational programs, evaluates the effectiveness of management actions, and provides additional information on overall ecosystem health.

The following sections discuss MCAS Cherry Point’s management components. All monitoring and management actions are listed as “actions” under each associated objective. All INRMP actions are also identified in Appendix B: INRMP Actions and Monitoring Table and Funding Classes.

This page intentionally left blank.

4.0 PROTECTED SPECIES MANAGEMENT

Unique natural areas, river and estuarine shorelines, primary nursery areas for fish and shellfish, wetlands, and extensive forestlands support a tremendous biodiversity of flora and fauna at MCAS Cherry Point. Often these areas support sensitive species that are afforded legal protection or special designation by federal and state agencies, or natural heritage programs. To facilitate the management of these species and their habitats MCAS Cherry Point's protected species management is broken down into two separate groups: federally listed threatened and endangered species and MCAS Cherry Point designated species at-risk.

4.1 THREATENED AND ENDANGERED SPECIES

As a federal agency, the Marine Corps is required under the ESA to conserve (i.e., recover) federally listed species on its properties. Federally threatened and endangered species are those species listed by USFWS or NMFS as endangered, threatened, proposed, and candidate according to the following classification system:

- **Endangered (E)** – Any species that is in danger of extinction throughout all or a portion of its range;
- **Threatened (T)** – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range;
- **Proposed (P)** – Any species that has been proposed for listing as a threatened or endangered species; and
- **Candidate (CS)** – Species for which there is sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened.

The USMC is also required to adhere to requirements of the Marine Mammal Protection Act (MMPA), which affords protection to all marine mammal species regardless of their ESA status as follows:

- **Marine Mammal Protection Act (MMPA)** – Marine mammal species designated by NMFS for protection under the MMPA.

In addition to ESA classification listings and MMPA designations, listed species are afforded additional protection from the ESA through the designation of critical habitat. However, provisions in the NDAA excludes military installations from critical habitat designation as long as the INRMP meets criteria discussed in Section 1.2.9 of this document, such that:

- INRMP provides a conservation benefit to threatened and endangered species;
- Installation provides certainty that the INRMP will be implemented; and,
- INRMP is effective and developed in cooperation with agencies responsible for oversight of threatened and endangered species under their jurisdiction, such as the USFWS and state fish and wildlife agencies.

It is important to identify sensitive species that may occur at MCAS Cherry Point to provide the baseline for management. Information on threatened and endangered species that occur on or in the vicinity of MCAS Cherry Point parcels is compiled from studies conducted by the North Carolina NHP in 1992, 1993, and 1994, and from additional studies and inventories conducted since then by contractors and MCAS Cherry Point NRD staff (USMC 2001). Based on a review of this information a list of federally listed species as having occurred or having the potential to occur at MCAS Cherry Point based on recorded data and the presence of suitable habitat has been completed (NMFS 2002, USMC 2009d). Thirty-one federally threatened or endangered species occur or have the potential to occur at MCAS Cherry Point or within adjacent waters (Table 4.1). With the exception of marine mammals, all species listed in Table 4.1 are also State-listed as threatened or endangered and are granted protection by the NCWRC, under the North Carolina ESA (General Statute [G.S.] 113–331 to 113–337).

Table 4.1. Federal Threatened and Endangered Species and Marine Mammal Protection Act Species and their North Carolina Status that are Known or that have the Potential to Occur at MCAS Cherry Point Complex.

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal Status	North Carolina Status
Plants				
Roughleaf loosestrife	<i>Lysimachia asperulifolia</i>	CHPT and MCOLF Atlantic (P)	E	E
Seabeach amaranth	<i>Amaranthus pumilus</i>	BT-11 (P)	T	T
Sensitive (Virginia) joint-vetch	<i>Aeschynomene virginica</i>	CHPT (P)	T	T
Fish				
Atlantic sturgeon	<i>Acipenser oxyrinchus oxyrinchus</i>	CHPT, BT-11, MCOLF Atlantic, Pamlico Point, Maw Point, Cat Island, and BT-9 (P)	E	E
Carolina madtom	<i>Noturus furiosus</i>	CHPT, MCOLF Oak Grove	E	T
Giant manta ray	<i>Manta biostriis</i>	BT-9, BT-11 (P)	T	–
Oceanic Whitetip Shark	<i>Carcharchinus longinmanus</i>	BT-9, BT-11 (P)	T	–
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	CHPT, BT-11, MCOLF Atlantic, Pamlico Point, Maw Point, Cat Island, and BT-9 (P)	E	E
Herpetofauna				

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal Status	North Carolina Status
American alligator	<i>Alligator mississippiensis</i>	CHPT (O) MCOLF Atlantic, MCALF Bogue, and BT-11 (P)	T (SAT)	T
Neuse River waterdog	<i>Necturus lewisi</i>	CHPT, MCOLF Oak Grove	T	T
Atlantic hawksbill sea turtle	<i>Eretmochelys imbricata imbricata</i>	BT-9, BT-11 (P)	E	E
Green sea turtle	<i>Chelonia mydas</i>	BT-9, BT-11 (O ¹)	T	T
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	BT-9, BT-11 (O ¹)	E	E
Leatherback sea turtle	<i>Dermochelys coriacea</i>	BT-9, BT-11 (O ¹)	E	E
Loggerhead sea turtle	<i>Caretta caretta</i>	BT-9, BT-11 (O ¹)	T	T
Mammals				
Northern long-eared bat	<i>Myotis septentrionalis</i>	CHPT, MCOLF Oak Grove, MCOLF Atlantic, MCALF Bogue	E	T/PE
Tricolored bat	<i>Perimyotis subflavus</i>	CHPT, MCOLF Oak Grove, MCOLF Atlantic, MCALF Bogue	PE	E
Insects				
Monarch butterfly	<i>Danaus plexippus</i>	CHPT, MCOLF Oak Grove, MCOLF Atlantic, MCALF Bogue	C	—
Birds				
Eastern black rail	<i>Laterallus jamaicensis</i>	MCOLF Atlantic, BT-11, MCALF Bogue	T	T
Piping plover	<i>Charadrius melodus</i>	BT-11, MCALF Bogue (P)	T	T
Red-cockaded woodpecker	<i>Picoides borealis</i>	CHPT, MCOLF Atlantic, and MCALF Bogue (P)	E	E
Rufa red knot	<i>Calidris canutus rufa</i>	CHPT, MCOLF Atlantic, MCALF Bogue, BT-9, BT-11	T	T
Roseate tern	<i>Sterna dougallii</i>	CHPT, MCOLF Atlantic, BT-9, BT-11, MCALF Bogue (P)	E	E
Marine Mammals³				
Blue whale	<i>Balaenoptera musculu</i>	BT-9, BT-11 (P)	E	—

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal Status	North Carolina Status
Fin whale	<i>Balaenoptera physalus</i>	BT-9, BT-11 (P)	E	–
Humpback whale	<i>Megaptera novaeangliae</i>	BT-9, BT-11 (P)	MMPA	–
North Atlantic right whale	<i>Eubalaena glacialis</i>	BT-9, BT-11 (P)	E	–
Sei whale	<i>Balaenoptera borealis</i>	BT-9, BT-11 (P)	E	–
Sperm whale	<i>Physeter macrocephalus</i>	BT-9, BT-11 (P)	E	–
West Indian manatee	<i>Trichechus manatus</i>	BT-9 (O) CHPT, BT-11, and MCALF Bogue (P)	T	T

¹ Occurrence based on NMFS 2002 Biological Opinion for ongoing ordnance delivery at BT-9 and BT-11 (NMFS 2002).

² Green sea turtles in U.S. Atlantic waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between these populations away from nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters (NMFS 2002).

³ All marine mammals are addressed in this INRMP only to acknowledge the rare occurrence of these species within in-shore waters of Pamlico Sound.

Status codes: O – occurs; E – endangered; T – threatened; and SAT – Similarity of Appearance.

Sources: LeBlond et al. 1994, USMC 2001, NMFS 2002, NCWRC 2008, USMC 2009d, NCDEQ NHP 2022

4.1.1 Plants

Roughleaf Loosestrife

Roughleaf loosestrife (*Lysimachia asperulifolia*) is a federal and North Carolina endangered species that could potentially occur at MCAS Cherry Point and MCOLF Atlantic. Roughleaf loosestrife is endemic to North and South Carolina coastal plain and sandhill habitats (USMC 2012co). It occurs within ecotones located between longleaf pine and uplands, and pond pine pocosins on moist to seasonally saturated sands, and on shallow organic soils overlaying sand (USMC 2009a). A total of 64 populations have been identified in North and South Carolina (USMC 2012).

Seabeach Amaranth

Seabeach amaranth (*Amaranthus pumilus*), a federal and North Carolina threatened species, that could potentially occur on Piney Island. Seabeach amaranth is endemic to Atlantic Coast barrier beaches, where its primary habitat consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of non-eroding beaches (USFWS 2010c). It occasionally establishes small temporary populations in other habitats, and some of the sandy shoreline areas at Piney Island may provide habitat for this species; however, surveys of BT-11 have not documented it.

Sensitive (Virginia) Joint-vetch

Sensitive (Virginia) joint-vetch (*Aeschynomene virginica*) is a federal and North Carolina threatened species that occurs in intertidal zone areas that are flooded twice daily. This species could potentially occur at MCAS Cherry Point due to the presence of suitable habitat; however, surveys for this species have not identified it. This species is currently only known from 24 extant sites in Maryland (1), New Jersey (1), Virginia (20), and North Carolina (2). The two North Carolina sites are located in the nearby counties of Hyde and Beaufort (USFWS 2003). This species was documented at a site in Craven County over 20 years ago.

4.1.2 Fish

Atlantic Sturgeon

(*Acipenser oxyrinchus oxyrinchus*) is a federal and North Carolina endangered species that has the potential to occur in waters surrounding MCAS Cherry Point, Piney Island, MCOLF Atlantic, Pamlico Point, Maw Point, and Cat Island. However, presence of this species in these waters has not been documented since 2005. Former and current distribution of Atlantic sturgeon is uncertain (Hightower 2001) and in North Carolina, current populations are thought to be primarily restricted to the Cape Fear River and Albermarle Sound (NMFS 2002). Few reports of this species are associated with the Neuse River, which flows adjacent to MCAS Cherry Point, the Pamlico River, which flows adjacent to Pamlico Point, or the Pungo River, which flows into the Pamlico River northeast of Pamlico Point. Shortnose sturgeon could also potentially occur within the area of BT-9 (Table 4.1); however it is likely that the waters of BT-9 are too saline to support this species (Hightower 2001).

Carolina Madtom

The Carolina madtom (*Noturus furiosus*) is a moderate sized catfish with a short, chunky body and stinging spines in their pectoral fins. They are found in flowing streams in the Piedmont and Coastal Plain of North Carolina within the Neuse and Tar River basins. The Carolina madtom is a bottom-dwelling insectivore with a nesting season that extends from mid-May to late July (USFWS 2021).

In 2021, the Carolina madtom was listed as Endangered, as the species has been “extirpated from the southern portion of its range, including a large portion of the Neuse River basin and the entire Trent River basin (USFWS 2021).”

Giant Manta Ray

(*Manta biostriis*) is the world’s largest ray and is federally endangered throughout its range. Within the Southeast, giant manta rays have been observed along the U.S. east coast as far north as New Jersey, within the Gulf of Mexico and off the coasts of the U.S. Virgin Islands and Puerto Rico (Farmer et al., 2022). The species has also been observed in estuarine waters, oceanic inlets, and within bays and intercoastal waterways (NOAA.gov 2022). Giant manta rays could potentially occur within the areas of BT-9, BT-11, MCOLF Atlantic, and MCALF Bogue. There

have been no sightings around Carteret County. The closest sightings according to Farmer et. al, are south of Cape Hatteras, NC where there is photo confirmed sightings from observers and aerial surveys done by Southeast Fisheries Science Center (Farmer et al., 2022).

Oceanic Whitetip Shark

Carcharchinus longinmanus is a large, pelagic shark which is federally endangered throughout its range. In the western Atlantic Ocean, oceanic whitetip sharks occur from Maine to Argentina, including in the Caribbean Sea and Gulf of Mexico (NOAA Fisheries 2023). This species of shark live offshore in deep water. These sharks have not been observed in estuarine waters, inlets, or the sounds, so it is unlikely that oceanic whitetip sharks could occur within the waters surrounding BT-9, BT-11, MCOLF Atlantic, and MCALF Bogue.

Shortnose Sturgeon

Acipenser brevirostrum is a federal and North Carolina endangered species that has the potential to occur in waters surrounding MCAS Cherry Point, Piney Island, MCOLF Atlantic, Pamlico Point, Maw Point, and Cat Island. However, presence of this species in these waters has not been documented. Former and current distribution of shortnose sturgeon is uncertain (Hightower 2001) and in North Carolina, current populations are thought to be restricted to the Cape Fear River and Albemarle Sound (NMFS 2002). No reports of this species are associated with the Neuse River, which flows adjacent to MCAS Cherry Point; the Pamlico River, which flows adjacent to Pamlico Point; or the Pungo River, which flows into the Pamlico River northeast of Pamlico Point. Shortnose sturgeon could also potentially occur within the area of BT-9 (Table 4.1); however, it is likely that the waters of BT-9 are too saline to support this species (Hightower 2001).

4.1.3 Herpetofauna

American Alligator

The federally and state threatened American alligator occurs at MCAS Cherry Point (Table 4.1) (LeBlond et al. 1994). Although this species is considered fully recovered, it is listed as threatened due to similarity in appearance with the federally endangered American crocodile. No critical habitat rules have been published by USFWS for American alligator (USFWS 2010d).

MCAS Cherry Point supports a breeding population of American alligator, with a range of alligator sizes (post-hatchling to adult) commonly observed in the Hancock and Slocum creek areas, with nests observed in Jack's Branch (LeBlond et al. 1994, USMC 2001). MCOLF Atlantic, MCALF Bogue, and BT-11 also have the potential to support populations of American alligator; however, habitat at these locations is marginal, and likely only to support transient or juvenile representatives (LeBlond et al. 1994).

Neuse River Waterdog

Neuse River waterdog (*Necturus lewisi*) is a federally threatened species that occurs in portions of the Trent River located adjacent to MCOLF Oak Grove (Table 4.2) (USMC 2001). Although this species of aquatic salamander is limited in range to the Neuse and Tar–Pamlico River basins, it is widely distributed in these drainages (Petranka 1998). Similar to other species of stream salamanders, Neuse River waterdogs require relatively high oxygen levels and water quality. Among large accumulations of submerged leaves in eddies, or backwaters of streams (Petranka 1998). Eggs are attached to underside of objects in water. Adults and larvae are known to eat crayfish, snails, and insects, and adults will eat small fish.

In 2021, the Trent River, which runs to the south of MCOLF Oak Grove was designated as critical habitat for the Neuse River waterdog, however, portions immediately adjacent to MCOLF Oak Grove were exempted from that critical habitat due to protections already in place due to this INRMP (USFWS 2021).

Sea Turtles

Federally endangered Atlantic hawksbill sea turtle, Kemp’s ridley sea turtle, and leatherback sea turtle and federally threatened loggerhead sea turtle and green sea turtle are known or have the potential to occur within offshore waters of BT-9 and BT-11 (Table 4.1) (NMFS 2002).

Green sea turtles are found along the Atlantic coast from Massachusetts to Mexico, Puerto Rico, and the Virgin Islands. Green sea turtles in U.S. Atlantic waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between these populations away from nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters (NMFS 2002). Green turtle sightings have been reported from Carteret, Dare, Hyde, New Hanover, Onslow, and Pender counties. However, reports of nesting occur only from Onslow, Brunswick, and Hyde counties. Adult green sea turtles may migrate across open seas but are frequently observed in shallow waters that support an abundance of submerged aquatic vegetation (SAV) (Ernst and Lovich 2009). Similarly, juvenile development occurs in shallow, protected areas, and juveniles are known to forage along coral reefs, rocky outcroppings, old sunken ships, and sargassum mats. Juvenile green sea turtles eat mainly animal prey while adults are mainly herbivorous (Ernst and Lovich 2009). Primary foods include grasses and other species of aquatic plants, blue-green algae and other algae. Green sea turtles also feed on small molluscs, sponges, crustaceans, and jellyfish.

Kemp’s ridley sea turtles are the smallest sea turtles and have one of the most restricted ranges. Adults of this species are infrequently observed beyond the limits of the Gulf of Mexico; however, juveniles regularly migrate to the east coast of the U.S. from Florida north to coastal New England. Kemp’s ridley sea turtles prefer shallow waters with a mud or sand substrate (Ernst and Lovich 2009). Similar to other small sea turtle species, small Kemp’s ridley sea turtles use sargassum mats or sea grass mats for cover and forage (Ernst and Lovich 2009). Larger sized juveniles are usually observed in shallow waters along the coast or in bays and estuaries. This species is predominately

carnivorous and eats a variety of invertebrates. Adult Kemp's ridley sea turtles are capable of dives over 400 meters deep and can remain under water for up to 4 hours (Ernst and Lovich 2009).

Leatherback sea turtles are the largest extant species of turtle and are primarily pelagic. These turtles will enter nearshore waters, bays and estuaries to forage on plankton invertebrates; ocean jellyfish are a particular favorite (Ernst and Lovich 2009). Leatherback sea turtles are the most widely ranging of the sea turtle species. Their primary nesting beaches are located in tropical regions of the Atlantic, Pacific, and Indian oceans. Leatherbacks are known to range as far north as Nova Scotia and Labrador along the east coast of North America (Ernst and Lovich 2009).

Loggerhead sea turtles are the most frequently observed turtle in coastal waters near MCAS Cherry Point and are the largest living hard-shelled turtle (Ernst and Lovich 2009). Loggerheads wander widely offshore but utilize bays, salt marshes, creeks, and estuarine habitat to forage on benthic invertebrates, and frequently use reefs and shipwrecks as foraging areas. Loggerhead sea turtles are found year-round south of Cape Hatteras, but in spring and fall they are concentrated off Raleigh and Onslow Bays.

The probability of occurrence of the Atlantic hawksbill sea turtle in the area of BT-9 and BT-11 is low since it is primarily an oceanic species that is rarely observed within inland waters (USMC 2001). Atlantic hawksbill sea turtle is not known to nest or feed in the area of BT-9 and BT-11, and population and stranding data indicate that they are expected to occur in this area very rarely (NMFS 2002).

4.1.4 Mammals

Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis*) (NLEB), is listed as federally endangered due to declines caused by white-nose syndrome (WNS). USFWS determined that WNS was, and continues to be, the primary threat to the species. The final 4(d) rule prohibits all "purposeful take" within the range of NLEB, with exceptions for human health and safety. NLEB occurs through forested portions of the northeastern U.S. and had patchy distribution throughout the southern and western portions of its range (Barbour and Davis 1969). Distribution in North Carolina is bimodal, with populations in the mountains and the coastal plain (NAVFAC 2018). NLEB are known to be present in Craven County, in the adjacent Croatan National Forest. An adult NLEB was captured in May 2017 less than 14 km (9 mi) from MCAS Cherry Point (NCDPR 2017a), however, there are no known roost trees within Craven County (USFWS 2017c).

In 2017, surveys on MCAS Cherry Point were conducted to determine the presence or absence of the NLEB. As per USFWS guidelines, mist-net surveys were conducted with the 15 May – 15 August survey window over eight nights, for a total of 86 net-nights. No NLEB were captured during this survey. Additionally, acoustic surveys were performed, with no detections of NLEB. While NLEB were not found, it is assumed that they may occasionally utilize the installation or are present and were not detected.

Tricolored Bat

The tricolored bat (*Perimyotis subflavus*) was proposed for listing as endangered by the USFWS under the ESA in 2022, due to declines caused by white-nose syndrome (WNS) and listed as endangered by the state in February 2023. The tricolored bat is a small bat that once existed across the eastern and central United States. In locations where there are few caves, in particular eastern NC, they are often found roosting in road-side culverts. During spring, summer, and fall, the bats are often found in forested habitats where they roost in trees (USFWS 2022).

In 2017, surveys on MCAS Cherry Point were conducted to determine the presence or absence of the NLEB, as described above. During that survey, it was determined that the tricolored bat is utilizing Cherry Point habitats that are adjacent to open water (TetraTech 2018).

4.1.5 Insects

Monarch Butterfly

(*Danaus plexippus*) is a federal candidate species that has potential to occur at MCAS Cherry Point and all outlying fields. Species abundance varies throughout the year but has a noticeable fall migration which can occur in any habitat. When not in migration they can be found in habitats where milkweeds (*Asclepias* spp.) grow. This species has potential to occur in many training areas as multiple milkweed varieties are present. Milkweed patches are used for food/nectar sources as well as for breeding grounds. Coastal regions are important flyways and so nectar (wild or in gardens) is an important resource in such places (natureserve.org 2023).

4.1.6 Birds

Black Rail

Black rail (*Laterallus jamaicensis*) is federally listed as threatened and has been observed at BT-11 and MCOLF Atlantic (LeBlond et al. 1994, USMC 2001, Tetra Tech 2012). Surveys have been conducted in 1990, 1992, 2011, 2014, 2018, 2021, and again in 2022. All surveys have concluded with numerous detections of the black rail (Dial Cordy 2021). It is expected that some of these may be repeat detections, but the black rail clearly remains present at BT-11.

Marshes of Cedar Island, including those of MCOLF Atlantic around Barry Bay, are well-known for supporting one of the largest breeding populations of black rail in the U.S. (LeBlond et al. 1994, USMC 2001). Black rail also has the potential to occur at Pamlico Point and Maw Point due to the presence of suitable habitat. These birds are ground-nesters and prefer to nest in high salt marsh and shallow freshwater marshes, as well as wet meadows and other flooded grassy communities. Black rail forage primarily on small invertebrates and seeds.

Piping Plover

The piping plover (*Charadrius melodus*) breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. These federally and state threatened birds winter primarily

on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies. Piping plover nests are situated above the high tide line on coastal beaches, sandflats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (*Ammophila breviligulata*) or other vegetation (USMC 2009d).

Atlantic Coast piping plover migration patterns are not well documented. Most piping plover surveys have focused on breeding or wintering sites, and it is sometimes difficult to distinguish local nesting birds and fledged young feeding on neutral feeding areas from non-local breeders on stopover during southward migration. Northward migration to the breeding grounds occurs during late February, March, and early April, and southward migration to the wintering grounds is during late July, August, and September. Both spring and fall migration routes are believed to follow a narrow strip along the Atlantic Coast (USMC 2009d).

In general, wintering plovers on the Atlantic Coast are found at accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets. Plovers appear to prefer sandflats adjacent to inlets or passes, sandy mudflats along prograding spits, and overwash areas as foraging habitats. Roosting plovers are generally found along inlet and adjacent ocean and estuarine shorelines and their associated berms (with wrack and other debris often used as wind-shields), and on nearby exposed tidal flats (USMC 2009d). Based upon representative habitats present, piping plover could potentially occur on Piney Island and MCALF Bogue, although no actual occurrences have been recorded.

Red-Cockaded Woodpecker

RCW is a federally and state endangered species that historically occurred in longleaf pine forests of MCAS Cherry Point. This species has not been observed at MCAS Cherry Point since the 1970's (USMC 2001). In 1980, an abandoned colony was identified in the Ordnance Area of MCAS Cherry Point, and in 1982 some evidence of recent RCW activity ("start" holes on a mature pine tree) were discovered; however, no representatives were observed, and no further activity or evidence of this species occurring at MCAS Cherry Point has been identified since 1982 (Rogers 1999). Subsequent surveys have not identified this species or provided indications of their presence in suitable cavity trees.

Due to the presence of an established colony of RCW at Croatan National Forest, located approximately within 3 miles of suitable longleaf pine habitat at MCAS Cherry Point, there is a potential for RCW to occur. There is also a potential for RCW to occur at MCOLF Atlantic and MCALF Bogue due to the presence of longleaf pine habitat. Surveys at MCALF Bogue have not identified RCW, nor were suitable cavity trees identified that could be utilized for roosting and nesting. There are RCW colonies located within 1 mile of MCALF Bogue, within the Croatan National Forest, so it is possible that RCW could migrate to, and utilize MCALF Bogue habitat. The longleaf pine habitat at MCALF Bogue is not considered to be of high quality for this species, which lowers their potential for occurrence.

Rufa Red Knot

Red knots migrate annually from their breeding and nesting grounds in the Canadian Arctic and wintering grounds in the Southeast U.S., the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America (USFWS 2013a). Wintering habitat generally has large areas of exposed intertidal sediments (USFWS 2013a). Knots use the tidal mudflats in Maryland and along North Carolina's barrier islands during migration. High quality roosting habitat for wintering and migratory stopover is close to foraging areas, provides protection from predators, has sufficient space during high tides, and is free from excessive human disturbance. Disturbances such as off-road vehicles to pedestrians and dogs are widespread on beaches in this region negatively affects this species.

The red knot was listed as threatened by the USFWS in December 2014. Suitable habitat for the Red Knot exists within Carteret County, specifically Piney Island, MCOLF Atlantic, and MCALF Bogue, although no actual occurrences have been recorded. Knots are most easily found along the coast from early May to early June and are most common on the beaches of Portsmouth and Ocracoke islands, though smaller numbers are present along the entire coast (ncbirds.carolinabirdclub.org).

Roseate Tern

The roseate tern breeds primarily on small offshore islands, islets, rocks, and cays; rarely do they breed on large islands. They typically nest near vegetation or jagged rock, close to the waterline on narrow ledges of emerging rocks, on open sandy beaches, or among coral rubble. Habitat for roseate terns exists in Carteret County; however, the species has not been observed in the county for more than 20 years (USMC 2009d).

4.1.7 Marine Mammals

Six whale species could potentially occur in waters adjacent to MCAS Cherry Point properties and range areas, including blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), North Atlantic right whale (*Eubalaena glacialis*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*) (Table 4.1). The blue whale is no longer listed as federally threatened but is protected by the MMPA. The remaining five whale species are federally endangered and protected by the MMPA. Most whale species prefer deep water or oceanic habitats not found within the inshore waters of Pamlico Sound, Bogue Sound, or the Neuse River. The northern right whale is a possible exception, as they have been sighted within inshore waters.

There is a potential for West Indian manatee to occur within offshore waters located adjacent to all MCAS Cherry Point parcels between June and October (Table 4.1), and this species has been observed in vicinity of BT-9, and other areas of Pamlico Sound (USMC 2001). North Carolina Parks manages a large database which includes sightings of certain mammals. According to their data for Carteret County, manatees were sighted around Radio Island in October 2022. Two were observed by a park visitor between a rock jetty and the Coast Guard base at Fort Macon in

September 2011. July 2011 another visitor to Fort Macon State Park observed a manatee just off the shoreline at the inlet beach (NC Parks 2023). The last sighting recorded for Craven County was in September 1994 when three were sighted in the Trent River at the Sheraton Hotel Marina.

This West Indian manatee includes two distinct subspecies, Florida manatee (*Trichechus manatus latirostris*) and Antillean manatee (*Trichechus manatus manatus*); however, the two subspecies share similar physical characteristics, and are distinguished based on their range (USFWS 2010e). Range of Florida manatees is primarily restricted to the southeastern U.S., although they are occasionally observed as far north as Massachusetts, and as far west as Texas. Antillean manatees are found in coastal and riverine systems of South and Central America (from Brazil to Mexico), and in the Greater and Lesser Antilles throughout the Caribbean Basin. West Indian manatee inhabits both marine and freshwater habitats, with a preference for warm water. They are herbivores, feeding on a variety of marine, estuarine, and freshwater plants, including submerged, floating, and emergent vegetation. Juvenile calves may begin feeding on plant material as early as a few months of age. Weaning of juveniles is generally complete by one year of age, and the calf may remain with their mother until about 2 years old. Stock of Florida manatees is thought to number approximately 3,800, and it is believed that the population is stable and perhaps increasing (USFWS 2010e).

4.2 THREATENED AND ENDANGERED SPECIES MANAGEMENT

The MCAS Cherry Point Endangered Species Program can be broken down into three functional areas: protection, conservation, and monitoring. Protection is afforded to listed species by compliance with the ESA and MMPA, which includes the prohibition against take, the requirement for interagency consultation for federal actions that may affect species, and provisions which allow the USFWS or NMFS to permit lawful actions that would otherwise be prohibited by the ESA. Conservation is provided through implementation of federally protected species recovery plan guidelines and recommendations, incorporating principles of ecosystem management into threatened and endangered species management, and conducting periodic and systematic surveys for new populations. Monitoring is achieved through survey and sampling of known populations.

In particular, Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (50 CFR §17.3). Section 7(a)(2) of the ESA requires federal agencies to ensure actions they fund, authorize, or carry out do not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of habitat in areas designated by the USFWS to be critical. Jeopardy determinations are made by the USFWS and NMFS through the Section 7 consultation process. A jeopardy opinion is made for an action that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of the survival and recovery of a listed species by reducing its reproduction, numbers, or distribution (50 CFR §402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with an action.

Pursuant to Section 7 of the ESA, federal agencies must consult (informally or formally) with the USFWS and NMFS if their action “may affect” a federally listed endangered or threatened species (50 CFR §402). The Marine Corps conducts consultations with both agencies according to guidance provided in the Environmental Resources Program Manual, MCO P5090.2A. These consultations may include informal requests on species occurrence, MCAS prepared EA and Biological Assessment (BA) concurrence, preparation of a BO, and/or incidental take or harassment authorizations. MCAS Cherry Point has several procedures and policies in place to ensure actions are appropriately evaluated and analyzed regarding impacts to ESA species.

MCAS Cherry Point’s NEPA program assists with implementation of these procedures and provides in-house support for military training enhancement projects and other required NEPA actions to facilitate current and future military training requirements. Examples of this support include categorical exclusion reviews for minor projects and in-house writing of environmental EAs and BA to provide assessment of the potential for an action to impact listed species. MCAS Cherry Point will consult with the USFWS and NMFS pursuant to Section 7 for any action determined by the NEPA program to have the potential to affect ESA species. Formal consultation regarding programmatic actions such as ongoing delivery of ordnance at BT-9 and BT-11 has already been conducted by the NEPA program in regard to marine mammals and sea turtles as discussed in Section 4.2.6. In addition, MCAS Cherry Point has also received USFWS concurrence regarding an EA prepared for Range Operations that covers all MCAS Cherry Point parcels. MCAS Cherry Point will continue to implement its internal policies and procedures to ensure individual projects are ESA and MMPA compliant and carry out Section 7 consultations as necessary.

Section 7(a)(1) of the ESA also requires federal agencies to utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered species and threatened species. MCAS Cherry Point’s Endangered Species Program provides for the conservation and specific management goals for federally threatened and endangered species through the following principles:

- Conserve and manage federally threatened and endangered species in accordance with all environmental laws and their implementing regulations, and terms and conditions provided in applicable USFWS and/or NMFS consultations and authorizations;
- Implement federally protected species recovery plan guidelines;
- Incorporate principles of ecosystem management into threatened and endangered species management; and
- Conduct periodic and systematic surveys for new populations, and support research on population dynamics of ESA species that will assist in making recommendations that will assist in their survival and recovery.

Specific management needs have been developed for federally listed species known to occur at MCAS Cherry Point; however, in most cases ecosystem management activities, such as the use of prescribed fire and invasive species control, indirectly benefit rare species. For example, restoration of the longleaf pine wiregrass (commonly known as pineland threeawn, *Aristida*

stricta) ecosystem provides habitat for the Bachman's sparrow (*Aimophila aestivalis*), brown-headed nuthatch (*Sitta pusilla*), and rare plant species. Indirect benefits to ESA species are also realized through compliance with other laws and regulations, such as the CWA, NPDES, North Carolina CAMA, and MBTA and implementation/participation in such conservation programs such as the DoD EP Program, Partners in Flight (PIF) Program, and Onslow Bight Conservation Forum (OBCF).

Monitoring of listed species is conducted to gauge the effectiveness of management activities and to assess population trends and is considered an essential component of adaptive management. The intensity of management and monitoring of species varies depending on available scientific knowledge, and the ability of MCAS Cherry Point to take actions that will effectively promote species recovery.

4.2.1 Plants

The EA prepared for MCAS Cherry Point Range Operations, which covered range operations associated with all parcels, as well as offshore at-sea training areas and airspace, concluded that these actions would not adversely impact federally listed plant species (USMC 2009d). The USFWS provided concurrence with the EA determination in a letter dated 15 May 2009. MCAS Cherry Point's three ESA listed plants are afforded additional protection through NEPA-initiated individual project review and subsequent Section 7 consultation, if necessary. There are no direct management actions in place and no species-specific management actions are recommended, but the continuation of ecosystem management activities and conservation programs are supported.

4.2.2 Fish

The EA prepared for MCAS Cherry Point Range Operations, which covered range operations associated with all parcels, as well as offshore at-sea training areas and airspace, concluded that these actions would not adversely impact federally listed fish species (USMC 2009d). A BO was issued by NMFS for ordnance-related activities taking place at BT-9 and BT-11 that may impact marine resources. NMFS concluded that the proposed action would have no effect on the shortnose sturgeon (NMFS 2002). MCAS Cherry Point's ESA listed fish are afforded additional protection through NEPA-initiated individual project review and subsequent Section 7 consultation, if necessary. There are no direct management actions in place and no species-specific management actions are recommended, but the continuation of ecosystem management activities and conservation programs are supported.

4.2.3 Herpetofauna

No specific management measures are in place for American alligator, as this species is considered fully recovered and is listed as threatened due to similarity in appearance with federally endangered American crocodile. In addition, actions that may affect the American alligator do not trigger USFWS Section 7 consultation.

Forestry or military operations that move sediment into streams and water bodies could negatively affect the Neuse River Waterdog. To maintain exemption under the 4(d) rule, operations must follow all state forest practice guidelines for water quality and riparian buffer rules.

Channel restoration and bank stabilization projects are allowed under the 4(d) rule. Channel restoration projects must have surveys completed, prior to restoration action, to determine presence of Neuse River waterdog. If located, waterdogs must be relocated prior to project implementation. Native species vegetation includes woody and herbaceous species appropriate for the region and habitat conditions. These methods will not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures.

Sea turtle management is discussed in Section 4.2.7.

4.2.4 Mammals

To ensure installation activities are consistent with the 4(d) rule, the following management strategies have been implemented: avoid to the maximum extent practicable the cutting of timber during pup season (1 June – 31 July) or breeding season (15 May – 15 August), limit removal of tree snags to only those that pose a safety concern and protect contiguous forested corridors for forage. Creating snags can be done by girdling trees if an area is lacking snags. Prescribed fire may also increase snags and canopy gaps therefore increasing solar radiation reaching roosts. An Eagle Scout project in 2019 constructed and installed bat houses near Catfish Pond to create additional roosting habitat that could support this species.

4.2.5 Insects

The monarch butterfly is a candidate for federal listing. Mowing at key times during the year may boost monarch numbers. Monarchs lay more eggs on young milkweed and new milkweed growth after mowing, specifically in June and July (MSU 2019). Milkweed is the sole food source for the butterflies in their larval stage. Fewer predators visit immature milkweed and therefore providing a better chance for success (MSU 2019). Providing milkweed and nectar plants in pollinator gardens is effective, but implementation across installations is somewhat difficult. Using invasive species removal, prescribed fire, and some herbaceous weed treatments to manage for early successional habitat is best management for this species which thrive in sunny, flower rich habitats.

4.2.6 Birds

The EA prepared by MCAS Cherry Point concluded that range operations would not adversely impact federally listed bird species (USMC 2009d). The USFWS provided concurrence with the EA determination in a letter dated 15 May 2009. In addition to the NEPA initiated individual project review and subsequent Section 7 consultation that afford protection to federally listed bird species known to occur at MCAS Cherry Point, MCAS Cherry Point has a long history of actively managing for longleaf pine wiregrass ecosystem which indirectly benefits the RCW. MCAS

Cherry Point will continue to manage for the longleaf pine wiregrass ecosystem and promote discovery of RCW populations through survey of suitable habitat.

Implementation of ecosystem management practices that support the conservation and management of the black rail has been ongoing. Prescribed fire activities on BT-11 are limited to outside of the nesting season. Wildfires started by munition or flare delivery are allowed to burn naturally and typically result in mosaic burns. This frequent, but patchy fire regime has allowed the black rail population to flourish.

There are no direct management actions in place for the piping plover, red knot, and roseate tern, however shorebird surveys in areas of suitable habitat are recommended.

4.2.7 Sea Turtles and Marine Mammals

The Marine Corps initiated formal consultation with NMFS in March 2002 with the submittal of a BA to address potential impacts to federally protected marine mammal and sea turtle species associated with ongoing delivery of ordnance at BT-9 and BT-11. The BA concluded that such activities would have “no effect” on the fin, humpback, sei, and sperm whales, or the Atlantic hawksbill sea turtle. A “may effect, but not likely to adversely affect” determination was made for the North Atlantic right whale and leatherback sea turtle, and a “may effect, and likely to adversely affect” determination was made for the green, Kemp’s ridley, and loggerhead sea turtles. Subsequently, NMFS issued a BO providing concurrence with this determination, except for the leatherback sea turtle, which it concluded that this species would likely be adversely affected by the action. NMFS reviewed the current status, environmental baseline data, proposed action, MCAS Cherry Point’s actions to reduce adverse effects, and cumulative effects, and concluded that the proposed action will not likely jeopardize the continued existence of the green, Kemp’s ridley, and loggerhead sea turtles.

With the NMFS conclusion is an understanding that “take” of an endangered sea turtle may occur incidentally, and therefore an ITS was included in the NMFS BO. The ITS includes reasonable and prudent measures and terms and conditions for which compliance is required to ensure protective coverage under the ESA. However, the ITS did not provide authorization for the incidental take of marine mammals. As a result, MCAS Cherry Point has coordinated with NMFS on multiple occasions to obtain an IHA or LOA regarding potential impacts to marine mammals.

To address the terms and conditions of the BO, ITS, and IHA, MCAS Cherry Point prepared a Marine Mammal and Protected Species Monitoring Plan (USMC 2010c and Appendix D). The plan has been coordinated with NMFS and provides a summary of requirements of the consultations that have occurred to date with NMFS in regard to marine mammals and sea turtles, as well as other sensitive species such as common bottlenose dolphins. Additional protection of common bottlenose dolphin from activities that occur at BT-9 will occur from implementation of the Passive-acoustic Monitoring (PAM) Protocol that has been developed for MCAS Cherry Point (see Section 4.2.7).

West Indian manatee falls under the jurisdiction of the USFWS. A MCAS Cherry Point prepared EA concluded that range operations would not adversely impact this species (USMC 2009d). The USFWS provided concurrence with the EA determination in a letter dated 15 May 2009. In addition, the West Indian manatee is afforded protection through NEPA-initiated individual project review and subsequent Section 7 consultation, if necessary.

4.2.8 Sea Turtle and Marine Mammal Monitoring and Management



Photograph of a dolphin surfacing during a monitoring survey. MCAS Cherry Point has funded numerous research projects, focusing on marine mammals and sea turtles, which have provided valuable scientific data for environmental documents and development of monitoring protocols.

Source: Secretary of Defense and Secretary of the Navy 2008

As outlined in the MCAS Cherry Point Marine Mammal and Protected Species Monitoring Plan (USMC 2010c) and in accordance with the most recent IHA (issued 18 May 2021), MCAS Cherry Point routinely conducts monitoring activities in the BT-9 and BT-11 bombing areas prior to initiation of bombing exercises. Search and rescue helicopters and specially trained pilots are used to conduct bombing target sweeps prior any planned bombing exercises. Purpose of these sweeps is to ensure bombing areas are clear of fisherman, other personnel, and protected sea turtle and marine mammal species. Sweeps are flown at 100–300 ft above the water surface, at airspeeds of 6–100 knots. These sweeps normally cover both bombing areas and are usually completed in 20–30 minutes.

As time, safety conditions, and mission requirements allow, the helicopter observing an animal within the bombing area, will remain insight of the animal(s), until they are observed leaving the area. Information on

animal sightings and observations of animals leaving the bombing area are immediately provided to range operators through a direct communication channel.

Post-exercise sweeps are conducted the morning after an exercise for training conducted Monday–Thursday, and on the following Monday for training taking place on a Friday. Weekly monitoring sweeps include a maximum of five pre-exercise, and four post-exercise sweeps. The maximum time that may elapse between pre- and post-exercise monitoring sweeps is 3 days, and normally are associated with weekends. Since 2000, when observations of protected species were included in Search and Rescue pre-bombing exercise sweeps, no sea turtles were observed during these monitoring activities; however, numerous common bottlenose dolphins (*Tursiops truncatus*) have been observed (USMC 2010c). In response to the frequent use of the BT-9 area within Pamlico

Sound by dolphins, a PAM protocol (MCAS Cherry Point NRD 2011) has been developed, which will be implemented upon completion of the PAM system that is under development for BT-9.

In addition to monitoring sweeps performed by contracted aircraft, pilots performing bombing exercises also conduct a visual check of the area. Prior to delivery of ordnance, pilots conduct a low, “cold” pass of the bombing area to ensure it is clear of boats, personnel and protected sea turtles and marine mammals. Range operators also reference video feeds from several remotely controlled, tower-mounted cameras installed around the bombing target area to make sure the area is clear, before authorizing pilots to conduct a “hot” pass of the bombing target for delivery of ordnance. Several recently installed cameras are equipped with night vision and infrared capabilities, to assist with monitoring of the area during night-time bombing exercises. If range operators determine that the bombing area is not clear, or if they have received information on the presence of sea turtles, marine mammals, boats, or personnel, they will deny the pilot authorization to conduct a “hot” pass of the bombing target. Additional measures employed to ensure visual identification of protected sea turtle and marine mammals includes the requirement for all small boat operators and other personnel to take Marine Species Awareness Training maintained and promoted by the Navy. Pilots conducting range sweeps are also instructed on the appropriate marine mammal observation techniques during routine Range Management Department briefings.

Of the environmental and training factors analyzed in the NMFS BO (NMFS 2002), boat strike, direct hit from ordnance, and concussive effects from live ordnance explosions were determined to be the most likely factors to impact sea turtle species most likely to occur in the BT-9 and BT-11 training areas. NMFS determined a likelihood of up to one sea turtle (of any species) being struck by boat (either manned or remotely operated) every 10 years. Direct hit by ordnance for a 10-year period was determined to be 0.206 turtles at BT-9, and 0.167 turtles at BT-11 from modeling and analysis of data (impact area, sea turtle density data, shell surface area averages for turtles, and ordnance drop data). NMFS rounded these results to a whole turtle and determined that over a 10-year period up to a total of one turtle may be impacted by a direct hit from ordnance. Modeling and data analysis performed by NMFS also determined up to three turtles could die from extensive lung hemorrhage, up to one sea turtle could suffer slight (recoverable) lung injury, and no more than 21 sea turtles would experience disruption of hearing-based behaviors as a result of temporary threshold shifts resulting from concussive effects from live ordnance explosions (NMFS 2002). Overall, the BO determined that MCAS Cherry Point training activities at BT-9 and BT-11 would not have a significant effect on the four sea turtle species of interest.

Due to frequent observations of common bottlenose dolphins in offshore areas around BT-9 and BT-11, MCAS Cherry Point, in cooperation with Duke University, developed a PAM program for common bottlenose dolphin to determine their usage of BT-9 and BT-11 (Secretary of Defense and Secretary of the Navy 2008, Laura 2009). Phase I of the PAM program involved development of a software program that could be used to recognize dolphin whistles within the area of these targets. Results of this program were successful in determining that a real-time automated device could be used to indicate when dolphins were present in the area due by detection of audible whistles. During Phase I this proto-type unit was fully operational in a near-shore environment and successfully sent text messages to a cell phone when dolphin whistles were detected. Enhancements to the programming code increased the spectrum of dolphin vocalizations detected

(buzzes and clicks) which has improved the utility of the monitoring effort. Phase II of this project is scheduled to be completed in May 2012 and will involve field testing and validation of a permanent proto-type unit installed at BT-9 for continuous receipt of dolphin activity within the area. A PAM Protocol for use of this PAM data was developed for MCAS Cherry Point in 2011 (MCAS Cherry Point NRD 2011) and will be implemented once Phase II of the PAM project is completed. The follow are the long-term goals that have been established for the PAM monitoring program.

- Establish steps for responding to PAM system detections (PAM protocol);
- Integrate the PAM protocol with existing natural resources plans, including the INRMP and Marine Mammal and Protected Species Monitoring Plan. Future revisions and updates to the PAM protocol will be reflected in the INRMP and Marine Mammal and Protected Species Monitoring Plan at the time they are updated;
- Supplement ongoing visual monitoring of the bombing target areas as required by the BO and IHA received from NMFS with real-time dolphin detections;
- Increase awareness of Range Operations and pilots using BT-9 of dolphin presence;
- Use common bottlenose dolphin information obtained (related to behavioral patterns and rates of travel in and around the BT-9 area) to further refine the PAM protocol over time;
- Generate estimations of total risk periods for common bottlenose dolphins occurring in the BT-9 area through analysis of data collected (e.g., how long dolphins remain in the range, and timing of occurrences);
- Ensure risk/injury to marine mammals (dolphins) from acoustic and physical disturbances associated with training activities at BT-9 is minimized; and
- Develop an electronic database for potential use in future analysis of PAM data and for sharing with NMFS, as appropriate.
- PAM system detections of dolphin vocalizations at BT-9 will be relayed via a short message service (SMS) component of mobile communication services to a dedicated cellular phone located at Range Operations at BT-11. This real-time dolphin information will be used to enhance awareness of dolphins potentially present within the BT-9 area during active training activities. The decision tree provided in PAM Protocol will be used to determine the course of action to take when the Range Operations laptop receives communication indicating the potential presence of one or more dolphins in the BT-9 or BT-11 area. If ranges are active, responses to alerts could include: Range Operations staff alerting pilots using the area of the potential presence of dolphins, or the temporary closure of the ranges until the individual has left the area;
- Pilot reporting of any potential animal sightings within the BT-9 or BT-11 area to Range Operations;
- Initiation of a camera search via the two stationary video systems set up at BT-9 and BT-11 by Range Operations trackers to determine if dolphins are observed;

-
- Range Operations notification to pilots using the BT-9 area of the approximate location of dolphins or other animals observed with the BT-9 video system, or from pilot observations; and,
 - Recording of all alerts (with the appropriate time, date, personnel, and action information) received during active training at BT-9 and BT-11.

4.3 THREATENED AND ENDANGERED SPECIES MANAGEMENT OBJECTIVES AND ACTIONS

The following Objectives and Actions have been identified for management of federally listed species known or with the potential to occur at MCAS Cherry Point. These objectives and actions have been developed from measures outlined in the NMFS BO, ITS, and IHA to minimize impacts to the protected sea turtles and marine mammals known or expected to occur.

OBJECTIVE TES4: Develop and maintain a complete and current data set to effectively manage federally listed species on MCAS Cherry Point and its properties while increasing mission flexibility for future training and range development needs.

- **Action 4-09** – MCAS Cherry Point will complete surveys for all federally listed species on the air station and all outlying fields, where appropriate.
- **Action 4-10** – MCAS Cherry Point will implement protective measures for federally listed species and their habitats.
- **Action 4-11** – MCAS Cherry Point will contribute data to relevant data repositories (NA Bat, Avian Knowledge Network, etc.), when appropriate.

OBJECTIVE TES1: Limit potential for interaction with ESA-listed species with impacts from training activities at BT-9 and BT-11.

- **Action 4-01** – MCAS Cherry Point will fully incorporate all “actions to reduce adverse effects” as proposed in the Section 7 Biological Assessment prepared for sea turtles (USMC 2001).
- **Action 4-02** – MCAS Cherry Point will fully comply with the “reasonable and prudent measures,” “terms and conditions,” and “conservation recommendations” outlined in the NMFS BO dated 27 September 2002 (NMFS 2002).
- **Action 4-03** – MCAS Cherry Point will fully comply with the conditions outlined in the most recent IHA/LOA received from NMFS.

OBJECTIVE TES2: Provide aid to individuals of an ESA-listed species that have been impacted by training activities that are in a condition requiring assistance to enhance likelihood of survival.

- **Action 4-02** – MCAS Cherry Point will fully comply with the “reasonable and prudent measures,” “terms and conditions,” and “conservation recommendations” outlined in the NMFS BO dated 27 September 2002 (NMFS 2002).

-
- **Action 4-03** – MCAS Cherry Point will fully comply with the conditions outlined in the most recent IHA/LOA received from NMFS.

OBJECTIVE TES3: Report all interactions with any ESA-listed species resulting from training activities at BT-9 and BT-11.

- **Action 4-02** – MCAS Cherry Point will fully comply with the “reasonable and prudent measures,” “terms and conditions,” and “conservation recommendations” outlined in the NMFS BO dated 27 September 2002 (NMFS 2002).
- **Action 4-03** – MCAS Cherry Point will fully comply with the conditions outlined in the most recent IHA/LOA received from NMFS.

4.4 NORTH CAROLINA THREATENED, ENDANGERED, AND SPECIES OF CONCERN

MCAS Cherry Point is comprised of a number of diverse natural communities that could provide habitat for up to 128 at-risk species. Known or potentially occurring species include 77 vascular plants, 17 birds, 7 freshwater fish, 12 reptiles, 6 mammals, 7 amphibians, and 2 invertebrates (Table 4.2). This section will address species information from the North Carolina Natural Heritage Program (NCNHP) which has identified flora and fauna that are state threatened, endangered and of special concern which could impact the military mission if they were to become listed.

The following classification system is used for Table 4.2:

- **North Carolina Endangered (E)** – any native or once-native species of higher taxon of plant or wild animal whose continued existence as a viable component of North Carolina’s flora/fauna is determined to be in jeopardy or any species of plant/wild animal determined to be an “endangered species” pursuant to the ESA.
- **North Carolina Threatened (T)** – any native or once-native species of plant/wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a Threatened species pursuant to the ESA.
- **North Carolina Species of Concern- Vulnerable (SC-V)** – any species or higher taxon of plant which is likely to become a threatened species within the foreseeable future.
- **North Carolina Special Concern Species (SC)** – any species of wild animal native or once-native to North Carolina which is determined by NCWRC to require monitoring but which may be taken under regulations adopted under provisions of G.S. § 113–331 to §113–350.
- **North Carolina Significantly Rare (SR)** – NCNHP designation; any species which has not been listed as endangered, threatened, or special concern species, but which exists in the state (or recently occurred in the state) in small numbers and has been determined by NC NHP to need monitoring.

**Table 4.2 North Carolina Threatened, Endangered, and
Species of Concern for MCAS Cherry Point and Outlying Fields**

Common Name	Scientific Name	NC Status	Historical presence
American Speedwell	<i>Veronica americana</i>	T	Historical
Baldwin's Nutrush	<i>Scleria baldwinii</i>	T	
Beach Morning-glory	<i>Ipomoea imperati</i>	SC-V	
Blue Witch Grass	<i>Dichanthelium caeruleum</i>	T	
Branched Gerardia	<i>Agalinis virgata</i>	T	
Cabbage Palm	<i>Sabal palmetto</i>	T	Historical
Calcium-fleeing Sedge	<i>Carex calcifugens</i>	SC-V	
Carolina Bogmint	<i>Macbridea caroliniana</i>	E	Historical
Carolina Spleenwort	<i>Asplenium heteroresiliens</i>	E	
Carolina Sunrose	<i>Crocanthemum carolinianum</i>	E	Historical
Chapman's Arrowhead	<i>Sagittaria chapmanii</i>	E	
Chapman's Redtop	<i>Tridens chapmanii</i>	T	
Coastal Beaksedge	<i>Rhynchospora pleiantha</i>	T	
Coastal Goldenrod	<i>Solidago villosicarpa</i>	T	
Comfortroot	<i>Hibiscus aculeatus</i>	T	
Coralbean	<i>Erythrina herbacea</i>	E	Historical
Drooping Bulrush	<i>Scirpus lineatus</i>	T	
Dune Bluecurls	<i>Trichostema nesophilum</i>	SC-V	
Dwarf Bladderwort	<i>Utricularia olivacea</i>	T	Historical
Dwarf Live Oak	<i>Quercus minima</i>	E	Historical
Eaton's Witch Grass	<i>Dichanthelium spretum</i>	E	
Estuary Pipewort	<i>Eriocaulon parkeri</i>	T	
Flaxleaf Seedbox	<i>Ludwigia linifolia</i>	T	
Florida Adder's-mouth	<i>Malaxis spicata</i>	SC-V	
Florida Yellow-eyed-grass	<i>Xyris floridana</i>	SC-V	
Four-angled Flatsedge	<i>Cyperus tetragonus</i>	SC-V	
Fragrant Beaksedge	<i>Rhynchospora odorata</i>	SC-V	
Georgia Sunrose	<i>Crocanthemum georgianum</i>	E	
Giant Spiral Orchid	<i>Spiranthes longilabris</i>	E	
Globe-fruit Seedbox	<i>Ludwigia sphaerocarpa</i>	E	
Godfrey's Sandwort	<i>Mouria paludicola</i>	E	

Grassleaf Arrowhead	<i>Sagittaria weatherbiana</i>	E	
Green Flatsedge	<i>Cyperus virens</i>	SC-V	
Gulfcoast Spikerush	<i>Eleocharis cellulosa</i>	T	
Hairy Smartweed	<i>Persicaria hirsuta</i>	E	Historical
Harper's Beaksedge	<i>Rhynchospora harperi</i>	SC-V	
Harper's Yellow-eyed-grass	<i>Xyris scabrifolia</i>	SC-V	
Hooker's Milkwort	<i>Polygala hookeri</i>	SC-V	
Lace-lip Ladies'-tresses	<i>Spiranthes laciniata</i>	SC-V	
Lanceleaf Seedbox	<i>Ludwigia lanceolata</i>	E	
Leavenworth's Goldenrod	<i>Solidago leavenworthii</i>	E	Historical
Leconte's Thistle	<i>Cirsium lecontei</i>	SC-V	
Little-spike Spikerush	<i>Eleocharis parvula</i>	T	Historical
Long's Bittercress	<i>Cardamine longii</i>	SC-V	Historical
Loose Water-milfoil	<i>Myriophyllum laxum</i>	E	Historical
Many-flower Grass-pink	<i>Calopogon multiflorus</i>	E	
Mudbank Crown Grass	<i>Paspalum dissectum</i>	E	
Peelbark St. John's-wort	<i>Hypericum fasciculatum</i>	E	
Pickering's Dawnflower	<i>Stylisma pickeringii</i> var. <i>pickeringii</i>	SC-V	
Pinebarren Sunrose	<i>Crocanthemum corymbosum</i>	T	
Pineland Yellow-eyed-grass	<i>Xyris stricta</i>	E	
Pondspice	<i>Litsea aestivalis</i>	SC-V	
Raven's Seedbox	<i>Ludwigia ravenii</i>	E	
Rich-woods Sedge	<i>Carex oligocarpa</i>	T	
Ringed Witch Grass	<i>Dichanthelium annulum</i>	E	Historical
Robbins' Spikerush	<i>Eleocharis robbinsii</i>	SC-V	
Savanna Indian-plantain	<i>Arnoglossum ovatum</i> var. <i>lanceolatum</i>	E	
Savanna Milkweed	<i>Asclepias pedicellata</i>	SC-V	
Seabeach Knotweed	<i>Polygonum glaucum</i>	E	
Seven-angled Pipewort	<i>Eriocaulon aquaticum</i>	SC-V	Historical
Shadow-witch	<i>Ponthieva racemosa</i>	T	
Shoreline Sea-purslane	<i>Sesuvium portulacastrum</i>	E	
Slender Sea-purslane	<i>Sesuvium maritimum</i>	E	
Small Butterwort	<i>Pinguicula pumila</i>	T	

Small-flowered Buckthorn	<i>Sageretia minutiflora</i>	T	
Small-leaved Meadowrue	<i>Thalictrum macrostylum</i>	SC-V	
Snowy Orchid	<i>Platanthera nivea</i>	E	
Southern Beaksedge	<i>Rhynchospora microcarpa</i>	T	
Southern White Beaksedge	<i>Rhynchospora macra</i>	T	
Spring-flowering Goldenrod	<i>Solidago verna</i>	T	
Tennessee Bladder-fern	<i>Cystopteris tennesseensis</i>	E	Historical
Thin-wall Quillwort	<i>Isoetes microvela</i>	T	
Twisted-leaf Goldenrod	<i>Solidago tortifolia</i>	E	Historical
Venus Flytrap	<i>Dionaea muscipula</i>	T	
Viviparous Spikerush	<i>Eleocharis vivipara</i>	T	
Widow Sedge	<i>Carex basiantha</i>	E	
Yellow Fringeless Orchid	<i>Platanthera integra</i>	T	
Cape Fear Spike	<i>Elliptio marsupiobesa</i>	SC	Historical
Creeper	<i>Strophitus undulatus</i>	T	Historical
Eastern Lampmussel	<i>Lampsilis radiata</i>	T	Historical
Triangle Floater	<i>Alasmidonta undulata</i>	T	Historical
Bridle Shiner	<i>Notropis bifrenatus</i>	E	
Least Brook Lamprey	<i>Lampetra aepyptera</i>	T	
Mimic Shiner	<i>Notropis volucellus</i>	T	Historical
Carolina Gopher Frog	<i>Rana capito</i>	E	
Carolina Pigmy Rattlesnake	<i>Sistrurus miliarius miliarius</i>	SC	
Carolina Swamp Snake	<i>Seminatrix pygaea paludis</i>	SC	
Carolina Watersnake	<i>Nerodia sipedon williamengelsi</i>	SC	
Diamondback Terrapin	<i>Malaclemys terrapin</i>	SC	
Chamberlain's Dwarf Salamander	<i>Eurycea chamberlaini</i>	SC	Historical
Eastern Chicken Turtle	<i>Deirochelys reticularia reticularia</i>	SC	
Eastern Coachwhip	<i>Coluber flagellum flagellum</i>	SC	Historical
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>	SC	Historical
Four-toed Salamander	<i>Hemidactylium scutatum</i>	SC	
Mabee's Salamander	<i>Ambystoma mabeei</i>	T	

Mimic Glass Lizard	<i>Ophisaurus mimicus</i>	E	
Ornate Chorus Frog	<i>Pseudacris ornata</i>	E	Historical
Outer Banks Kingsnake	<i>Lampropeltis getula sticticeps</i>	SC	Historical
Southern Chorus Frog	<i>Pseudacris nigrita</i>	SC	
Southern Hognose Snake	<i>Heterodon simus</i>	T	Historical
Timber Rattlesnake	<i>Crotalus horridus</i>	SC	
Eastern Big-eared Bat	<i>Corynorhinus rafinesquii macrotis</i>	SC	
Eastern Woodrat	<i>Neotoma floridana floridana</i>	T	
Southeastern Bat	<i>Myotis austroriparius</i>	SC	
Star-nosed Mole - Coastal Plain population	<i>Condylura cristata pop. 1</i>	SC	
Tricolored Bat	<i>Perimyotis subflavus</i>	E	
Graceful Clam Shrimp	<i>Lynceus gracilicornis</i>	SC	Historical
North Carolina Spiny Crayfish	<i>Faxonius carolinensis</i>	SC	
American Oystercatcher	<i>Haematopus palliatus</i>	SC	
Bachman's Sparrow	<i>Peucaea aestivalis</i>	SC	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	
Black Skimmer	<i>Rynchops niger</i>	SC	
Common Tern	<i>Sterna hirundo</i>	E	
Glossy Ibis	<i>Plegadis falcinellus</i>	SC	
Gull-billed Tern	<i>Gelochelidon nilotica</i>	T	
Henslow's Sparrow	<i>Ammodramus henslowii</i>	E	Historical
Least Bittern	<i>Ixobrychus exilis</i>	SC	
Least Tern	<i>Sternula antillarum</i>	SC	
Little Blue Heron	<i>Egretta caerulea</i>	SC	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	SC, W2	
Painted Bunting	<i>Passerina ciris</i>	SC	
Snowy Egret	<i>Egretta thula</i>	SC	
Tricolored Heron	<i>Egretta tricolor</i>	SC	
Wayne's Black-throated Green Warbler	<i>Setophaga virens waynei</i>	E	
Wilson's Plover	<i>Charadrius wilsonia</i>	SC	

4.5 SPECIES AT-RISK MANAGEMENT OBJECTIVES AND ACTIONS

The following objectives and actions have been developed to protect and manage species at-risk known or with the potential to occur at MCAS Cherry Point.

OBJECTIVE SAR1: Integrate consideration of at-risk species into management to avoid further restrictions on military training.

- **Action 4-04** – Survey and monitor species at-risk and their habitats known to occur at MCAS Cherry Point and its properties.
- **Action 4-05** – Create a GIS database for locations of known species at-risk and their associated habitats for MCAS Cherry Point.
- **Action 4-06** – Implement ecosystem management practices that support the conservation and management of habitat for species at-risk.
- **Action 4-07** – If other dead or injured wildlife are observed during the post-exercise sweeps conducted by search and rescue helicopters in the BT-9 and BT-11 areas, these will be reported to NCWRC as appropriate.
- **Action 4-08** – When consistent with the military mission, avoid and minimize impacts to at-risk species through the NEPA process.
- **Action 4-11** – MCAS Cherry Point will contribute data to relevant data repositories (NA Bat, Avian Knowledge Network, etc.), when appropriate.

5.0 MIGRATORY BIRD MANAGEMENT

MCAS Cherry Point provides habitats for a wide variety of birds that migrate annually within and beyond North America. Primary considerations with regard to migratory bird management are in compliance with the MBTA; implementation of migratory bird management actions in accordance with EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds); and support the goals and efforts of the numerous regional migratory bird conservation programs.

5.1 CONSERVATION FRAMEWORK

Virtually all birds that occupy MCAS Cherry Point throughout the year are protected under the MBTA of 1918. The MBTA makes it illegal for people to “take” migratory birds, their eggs, feathers or nests unless appropriate authorizations are obtained. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. Variances to the take stipulation under the MBTA can be obtained through depredation permits and are reserved for birds which are causing serious damage to public or private property, pose a health or safety hazard, or are damaging agricultural crops or wildlife. MCAS Cherry Point coordinates special depredation permits with the USFWS related to taking of migratory birds. These permits allow MCAS Cherry Point to take management actions regarding BASH around airfields. In addition to depredation permits, special purpose permits may be requested that allow for relocation or transport of migratory birds, including raptors from the runway area for management purposes. Management of migratory birds related to BASH activities are discussed in detail in Section 9.0.

Migratory birds are also afforded protection through EO 13186. This EO requires all federal agencies taking actions that have, or may have, a measurable negative effect on migratory bird populations to develop and implement a MOU with the USFWS. In response to the EO a MOU to Promote the Conservation of Migratory Birds between the DoD and USFWS was executed in 2006. The MOU identifies specific activities where cooperation between the DoD and USFWS will contribute substantially to the conservation of migratory birds and their habitats.

Comprehensive bird conservation and management plans for migratory birds have recently been developed by several conservation programs for landbirds, shorebirds, and waterbirds. These plans identify species and priorities for conservation and management of habitat at national and regional scales. Plans that encompass North Carolina that are applicable to MCAS Cherry Point include:

- PIF, North American Land Bird Conservation Plan,
- PIF, Bird Conservation Plan for the South Atlantic Coastal Plain,
- North American Waterfowl Management Plan (NAWMP),
- U.S. Shorebird Conservation Plan (USSCP),
- North American Waterbird Conservation Plan (NAWCP),
- South Atlantic Migratory Bird Initiative (SAMBI), and,
- North American Bird Conservation Initiative (NABCI).

These plans provide the conservation priorities, goals, and objectives, comparable to the INRMP goals and objectives, for various migratory bird species and their habitats within the manageable area of MCAS Cherry Point. Consistent with these plans, and within the framework of mission-focused conservation, MCAS Cherry Point's conservation management will continue to support migratory bird conservation efforts. Conservation of forested wetlands and maritime forests and restoration of longleaf pine/wiregrass communities are just some of MCAS Cherry Point's efforts that contribute valuable habitat benefits to migratory birds.

5.2 POPULATION MONITORING

Migratory bird surveys and breeding bird counts provide a strong, statistically valid framework for detecting trends in migratory bird populations and assist managers in meeting their bird conservation goals. Since 2001, sixty-nine (69) point count stations have been continuously monitored using standard protocols (USMC 2008). Additional point count stations may be added based upon changes to habitat and landscape condition related to forest management activities. Point count stations are monitored for a set period of time to collect data on the number and species of birds observed. After each monitoring period, data are entered into a database for storage and analysis. These data will be used to compare avian biodiversity among MCAS Cherry Point's various habitat types and also to facilitate informed decision-making for vegetation management actions within an airfield environment (see Section 9.1.3 related to BASH activities).

Since 2001 data have routinely been collected from the point count stations at MCAS Cherry Point. Point count stations were established at MCOLF Atlantic and MCALF Bogue in 2001 for the purpose of gathering data for a wildlife hazard assessment that was completed for MCAS Cherry Point; however, no data have been collected from the point count stations located at the outlying airfields since 2001. In 2011, a call-playback survey was conducted at BT-11 to continue to monitor the sensitive marsh birds (Tetra Tech 2012). The study was designed to be repeatable and established 21 road and 16 shoreline survey stations.

5.3 IMPORTANT HABITATS

5.3.1 Longleaf Pine and Wiregrass Savanna Habitat

Longleaf pine and wiregrass savannas on MCAS Cherry Point provide high quality habitat for several migratory bird species and rare species of amphibians and reptiles. This habitat type is known to support species of high concern including some non-migratory federally-listed ESA species in areas located in proximity to MCAS Cherry Point. The high level of biodiversity found in natural longleaf pine forests is primarily based upon condition of the ground layer. Composition of the ground layer supports many of the plant and animal species unique to longleaf pine ecosystems. MCAS Cherry Point has progressively increased the frequency of prescribed fires during the growing season to maintain native warm season grasses, forbs, and vines, which keeps the shrub layer to a minimum over a burning cycle of a few years. Management emphasizes late successional stands, and prescribed fire regimes that promote high quality ground cover/understory habitat in longleaf pine forests. MCAS Cherry Point also conducts silvicultural activities to

encourage conversion of off-site timber stands toward establishment of a longleaf pine dominated landscape (see Section 6.0, Forest Management and Protection).

5.3.2 Maritime Forest Scrub/Shrub Communities

Maritime forest communities and scrub–shrub woodlands, found along coastal areas and on barrier islands, have long been recognized as important bird habitat. Live oaks and numerous understory shrubs that dominate maritime forest scrub–shrub communities on MCAS Cherry Point are indicative of the most advanced successional stage among maritime woodlands. MCAS Cherry Point recognizes that maritime forest scrub–shrub habitat is important for migratory birds moving to and from their wintering grounds as well as other wildlife found in this unique system. Existing high quality maritime woodland and shrub–scrub habitats of MCALF Bogue and Cat Island provide benefits to many migrating bird species.

5.3.3 Forested Wetlands, Pocosins, Carolina Bays, and Other Wetlands

Forested wetlands are among some of the most important bird habitat in the Southeastern U.S. Forested wetlands on MCAS Cherry Point are diverse and include high and low pocosins, Carolina Bays, and riparian wetlands. Isolated wetlands provide habitat for many species of reptiles and amphibians and will be protected to the maximum extent practicable. Wetlands management and protection is addressed in Section 7.0. Management and silvicultural activities conducted at MCAS Cherry Point consider the ecological value of forested wetlands and are consistent with the overall goal of maintaining and restoring predominantly mature forested wetlands. MCAS Cherry Point does not actively harvest timber of bottomland hardwood drains.

5.3.4 Estuarine Emergent Scrub/Shrub

The North Carolina coast has vast expanses of tidal marsh associated with barrier islands, sounds, and lower river systems. Estuarine (brackish and salt-marsh) communities compose the entire extent of Piney Island and are also a major component of Pamlico Point, Maw Point, Cat Island, and various shoreline areas around MCAS Cherry Point. This coastal estuarine environment is a haven for marsh birds and supports significant populations of ducks, geese, and swans. The estuarine marshes of Piney Island that separate the lower Neuse River from West and Long Bay of Pamlico Sound are known to support populations of black rails and nesting seaside sparrows (*Ammodramus maritimus*), among other sensitive marsh bird species (Tetra Tech 2012). Cedar Island NWR, located immediately to the east of Piney Island and adjacent to MCOLF Atlantic, supports North Carolina's largest breeding population of black rails. All of these coastal habitats, in association with their tidal influence, are important habitat for these and other species of wading birds, shorebirds, waterfowl, and passerines.

5.3.5 Migratory Bird Management Objectives and Actions

The following Objectives and Actions have been identified for management of MCAS Cherry Point migratory birds.

OBJECTIVE MIG1: Support conservation and management of migratory birds and their habitat.

- **Action 4-04** – Survey and monitor species at-risk and their habitats known to occur at MCAS Cherry Point.
- **Action 4-05** – Create a GIS database for locations of known species at-risk and their associated habitats for MCAS Cherry Point.
- **Action 4-06** – Implement ecosystem management practices that support the conservation and management of species at-risk.
- **Action 4-07** – If other dead or injured wildlife are observed during the post-exercise sweeps conducted by search and rescue helicopters in the BT-9 and BT-11 areas, these will be reported to NCWRC as appropriate.
- **Action 4-08** – When consistent with the military mission, avoid and minimize impacts to at-risk species through the NEPA process.
- **Action 5-01** – Participate in/conduct annual International Migratory Bird Day summer bird count.
- **Action 5-02** – Conduct coordinated waterfowl and shorebird surveys in support of SAMBL.
- **Action 5-03** – Implement relevant bird conservation measures as outlined in PIF North American Land Bird Conservation Plan and Bird Conservation Plan for the South Atlantic Coastal Plain, NAWMP, USSCP, NAWCP, and NABCI that do not interfere with the military mission.
- **Action 5-04** – Promote restoration of native warm season grass habitats in association with restoration of longleaf pine forest habitat as feasible.
- **Action 5-05** – Continue point count surveys to monitor population trends.
- **Action 6-02** – Use prescribed fire and mechanical and chemical (if necessary) control methods to manage stands to promote forest health and growth.
- **Action 4-11** – MCAS Cherry Point will contribute data to relevant data repositories (NA Bat, Avian Knowledge Network, etc.), when appropriate.

6.0 FOREST MANAGEMENT AND PROTECTION

Undeveloped forested areas are essential to military training, offering a variety of conditions under which to develop combat skills. Forest management involves many components, including the support of the military mission, maintenance and enhancement of the ecological integrity of forestlands, compliance with all environmental laws and regulations, and generation of revenue to support active forest ecosystem management. Most forest management activities such as timber production, prescribed burning, insect and disease prevention and control, and wildlife management are aligned with providing the appropriate forest characteristics that facilitates training (e.g., cover, open understory, access), as well as promotes ecosystem health. MCAS Cherry Point forests are also managed to reduce fire hazard risks, and provide recreation opportunities such as hunting, hiking, camping, and wildlife viewing to increase the quality of life for troops stationed at MCAS Cherry Point.

6.1 GENERAL FOREST MANAGEMENT

Forest management at MCAS Cherry Point is the responsibility of MCAS Cherry Point's NRD Forester. The Forester works closely with other NRD staff and military officials to ensure forest management efforts support the military mission, are in compliance with environmental laws, and maintain a sustainable flow of forests products. The Forester ensures forest resources of MCAS Cherry Point are appropriately inventoried (e.g., cruised) and areas for forest management activities are identified. These areas are marked for sale, contracts are written, and the contractors are monitored to insure adherence to standard forestry best management practices (BMPs). Forest management actions and stand/compartment information are documented within MCAS Cherry Point's timber management database.

Forestlands of MCAS Cherry Point have been actively managed since 1975 (USMC 2001) to provide open understory training areas for military troops, reduce wildland fire hazards, protect and improve habitat for wildlife, enhance ecological integrity of forestlands and to prevent the spread of timber disease and insect infestations. Ongoing forest management practices include timber harvests, prescribed burns, wildland fire management, reforestation, timber stand improvements, ecosystem restoration, and forest pest management. The forest on the outlying fields are very diverse, and are managed similarly to those at MCAS Cherry Point.

6.1.1 Forest Cover Types

Pine Dominated Forest

The majority of forests aboard station and its outlying fields are pine-dominated forests consisting of more than 70% conifer in the overstory. Species present are loblolly pine, longleaf pine, pond pine with scattered shortleaf pine. The mid- and understory of these stands consists mostly of sweetgum, blackgum, red maple, tulip poplar, various red and white oaks, and pocosin-like vegetation.

The mixed pine overstory has been subject to hurricane damage, prescribed burning, and repeat thinning over the years. Many of the pine stands appear to be 2-aged, with a distinct pine overstory and thick mid-understory. There are very few mixed age stands.

As the pines begin to become overmature, clearcutting is the preferred harvest type for these stands. Additionally, as trees become larger than 32" in diameter, it is increasingly difficult to find mills taking wood that large. Red-heart rot is a concern for these overmature pines as well. It is imperative that the oldest stands be harvested soon to salvage the value present.

Longleaf pine management and restoration is a priority but is limited by the soils on station. Not every site is conducive for longleaf pine management. Therefore, where longleaf pine cannot be successfully restored, loblolly pine will be the preferred species for timber management. Loblolly pine can be grown more intensively than longleaf pine giving quicker yields per acre on soils that longleaf pine would struggle on.

Timber management may involve a series of pre-commercial thinning, first-, second- or third thinning's, and final harvests. Seed trees and shelterwood harvests are options for natural regeneration but can be difficult to properly execute on existing timber contracts.

Mixed Forest Types

The second most prevalent forest cover type on MCAS Cherry Point and its outlying fields are mixed forests. These stands have less than 70% pine or hardwood overstory are classified as mixed. Pine-Hardwood forests have a heavier pine component while hardwood-pine forests have a heavier hardwood component.

Managing these forest types can be tricky as routine thinning may not be an option. Any mid-rotation management can damage future crop trees and create openings for pests. These stands have been allowed to self-thin and therefore have longer final rotation ages. However, if properly marked and damage can be controlled, these stands may be viable candidates for uneven-aged forests.

Hardwood Dominated Forest

The upland hardwood forest biome is a closed canopy forest containing deciduous trees in the canopy and various shrubs in the subcanopy. This forest type is present primarily along river and stream banks at MCAS Cherry Point. Common species of upland hardwood forests are white oak, live oak, southern red oak, water oak, willow oak, cherrybark oak, swamp chestnut oak, laurel oak, pignut hickory, mockernut hickory, red maple, tulip poplar, blackgum, and sweetgum.

Bottomland hardwood forests are present at MCOLF Oak Grove and in isolated areas on MCAS Cherry Point. They are occasionally flooded, which builds up the alluvial soils. Trees often develop unique characteristics to allow submergence, including cypress knees and fluted trunks but cannot survive continuous flooding. Common bottomland hardwood species present are

swamp tupelo, water tupelo, laurel oak, water oak, willow oak, overcup oak, swamp chestnut oak, cherrybark oak, American sycamore, green ash, water hickory, sweetgum, red maple, and rarely cottonwood. Although not a hardwood, baldcypress is grouped into bottomland species and commonly present.

Most of the upland hardwood forests on MCAS Cherry Point exist on steep slopes along creeks and drainages. Forest management is limited in these areas because of the terrain. This cover type is very unique as it hosts many mast producing species such as mockernut hickory, American beech, and various oaks. In some areas on station, the transition from upland coastal hardwood to bottomland hardwood is continuous and provides unique wildlife corridors.

Maritime Forest

Maritime forests are shoreline estuaries that grow along coastal barriers. They consist of shrub-like thickets of wax myrtle, holly, and stunted oaks, protecting an interior made up mostly of live oaks, American holly, red maple and loblolly pine. This forest cover type is only present at MCALF Bogue.

6.1.2 Management

There are several factors driving timber harvests and management across MCAS Cherry Point and its outlying fields. Silvicultural prescriptions are based on immediate needs, future desired conditions, and the overall health of the forest. Forest management activities require close coordination with natural resource managers and military training planners to ensure that forest management plans benefit both the military training mission and ecosystem management goals and requirements.

Timber Harvest and Sales

In accordance with MCO P5090.2A Ch.3, installations containing forests or lands with the potential to grow and produce merchantable forest products shall ensure the optimum sustainable yield of forest products and the improvement of forest resources consistent with the military mission and local ecosystem condition. MCAS Cherry Point contracts annually for the sale of timber. Proceeds collected from the sale of forest products support the Forest Management Program and support the salary for a forestry fire technician.

6.2 RESTORATION EFFORTS

MCAS Cherry Point is currently implementing a program to restore longleaf pine habitat and bottomland hardwoods, due to its historic significance and importance to wildlife, and the overall ecology of region. Both forest types have been in decline regionwide as forest management techniques changed, a lack of prescribed fire, drainage, and market conditions.

6.2.1 Restoration of the Longleaf Pine Forest

Longleaf pine forest historically dominated the southern landscape fostering ecosystems diverse of plants and animals. Starting in southwest Virginia, the longleaf pine forest stretched southward through nine states eventually stopping in east Texas. Today longleaf pine is absent from much of the historic range, having been replaced with other southern pine dominated forests known to support lower plant and animal species richness and diversity. MCAS Cherry Point's restoration program is managed in conjunction with regional efforts to restore this important ecosystem through the management of existing longleaf pine stands and conversion of loblolly pine dominated stands to longleaf pine where they historically occurred.

A study for reestablishing prescribed fires within coastal plain habitats, including habitats of MCAS Cherry Point, was completed in 2005 as part of a Legacy Resource Management Program project titled "Reintroduction of Prescribed Fire in Coastal Plain Ecosystems to Reduce Wildland Fire Risk" (Mickler 2006). This study included an assessment of pre-settlement vegetation patterns including the historic range of longleaf pine. Data collected from this study have been and will continue to be used develop a priority list of restoration and conversion sites at MCAS Cherry Point to restore longleaf pine stands.

Since forestry practices were initiated at MCAS Cherry Point, longleaf pine habitat has been, or is in the process of being restored. Often restoration is in the form of conversion from loblolly pine dominated stands to longleaf pine. However, several existing longleaf pine stands have been managed to promote the structure and function of historic habitats. Historic habitats were described as a fire maintained, longleaf dominated stands; with a conspicuous lack of midstory and a well-developed ground layer, dominated by bunch grasses and highly diverse herbaceous species.

Since 2016, prescribed burning in longleaf pine has been limited and the understory of many stands have quickly regenerated with mixed undesirable hardwoods. Since 2020 midstory management has been done primarily by mechanical means and occasionally with chemical and fire. Wildland fire remains the preferred means for mid and understory management. Using a combination of these treatments for timber stand improvement is a continuous effort. Current results are favorable for native grasses and forbs while hardwood regeneration is still present.



Photograph showing one of the best stands of longleaf pine at Cherry Point.

Source: Mickler 2006

6.2.2 Bottomland & Hardwood Restoration

Loblolly pine has been the dominant overstory species across eastern North Carolina in recent history. Historically this area was known for a rich diversity of longleaf pine and coastal bottomland hardwoods and baldcypress swamps. Large scale development efforts have ditched and drained the landscape which has led to drastic changes in species composition.

Bottomland species present on MCAS Cherry Point are, but not limited to: baldcypress, swamp tupelo, swamp chestnut oak, overcup oak, cherrybark oak, green ash, bitternut hickory, ironwood, sycamore, sweetgum, red maple, and blackgum. MCAS Cherry Point has many unique landforms as it is surrounded by Slocum Creek, Hancock Creek, and the Neuse River. The bluffs along these water features are unique with their upland hardwoods but fall quickly to swamp flats which house many of these species. MCALF Bogue has unique areas of brackish forested hardwood swamps on its shorelines. MCOLF Atlantic has areas of hardwood swamp but is primarily a pine dominated forest type. MCOLF Oak Grove contains the most expansive bottomland cypress-tupelo swamp along the Trent River.

Many forest stands were damaged in 2018 by Hurricane Florence, but were not salvage cut. Forested wetlands are present across MCAS Cherry Point and its properties; some of these areas are not suited for longleaf pine or loblolly pine. If left to naturally regenerate, sweetgum and red maple will typically dominate the area. MCAS Cherry Point is making efforts to replant baldcypress and mixed hardwoods in the appropriate areas after timber harvest to increase species diversity and restore bottomland and hardwood swamps. No swamp harvests are planned at this time.

6.3 REGENERATION PRACTICES

MCAS Cherry Point will continue to restore and enhance longleaf pine dominated communities on sites where they historically occurred, focusing on priority restoration areas. Existing longleaf pine trees are retained in stands selected for conversion and are favored in stands which are prescribed for thinning.

Where residual timber is of the quality desired for a seed source, and land type is appropriate, natural regeneration is the preferred stand replacement method for both pine and hardwood stands. Natural regeneration techniques are less labor intensive, more cost effective, and may produce healthier stands that are better suited for reforestation of the site.

Artificial regeneration will be used in areas where a suitable seed source is not available and species-specific restoration is desired. MCAS Cherry Point utilizes planting stock that consists of containerized longleaf seedlings, grown from North Carolina seed stock which are collected locally to ensure seedlings are genetically suited to MCAS Cherry Point. Loblolly pine and hardwoods may be planted in areas where longleaf pine is not best suited.

6.3.1 Site Preparation

Proper site preparation for regeneration after harvest is an essential component of successful ecosystem restoration. A well-prepared site provides for control of desirable and undesirable species, densities, and volumes. In most cases the least intensive site preparation method is desired. Ideally, prescribed burn treatments will be the only site preparation needed to maintain regenerating stands. However, in regenerating stands containing high concentrations of competing vegetation, more intensive site preparation methods will need to be used. These methods include, but are not limited to, V-shear or KG, drum-chopping, bedding, and herbicidal treatments. Any combination of natural, mechanical, or chemical methods may be used depending on site conditions. The methods chosen will be site-specific.

6.3.2 Midstory Management

Ideally, prescribed burning (Figure 4-23) is the preferred treatment prescribed to maintain regenerating longleaf stands; however, in regenerating stands containing high concentrations of competing brush and/or hardwood species, herbicides such as Velpar®, Arsenal®, or Garlon® may be used to reduce or eliminate these competing species.

6.3.3 Timber Stand Improvements

Timber stand improvement projects are initiated to ensure desirable species establishment, improve vigor and productivity of residual trees, reduce forest fuel levels, create browse, and improve wildlife habitat. Timber stand improvement can be accomplished by commercial timber harvest, herbicide, or pre-commercial thinning.

Pre-commercial thinning is often used to remove undesirable species and reduce densities and competition to promote growth. Mechanical methods such as brush saws, chain saws, drum choppers or a hydro-ax mower may also be used to reduce competition for seedlings, improve wildlife habitat, and help eliminate buildup of forest fuels during the period seedlings are most susceptible to damage from intense wildfire. The work is generally accomplished before the seedlings/saplings reach a height greater than 5 ft.

Vegetation mowing (mulching) is the use of small machinery to remove undesirable understory vegetation from timber stands. This mowing is used to mitigate fire intensity, to facilitate restoration of the herbaceous layer and to enhance the availability of browse for wildlife. Mowing should be followed with herbicide as hardwoods will vigorously sprout.

Mid rotation herbicide is a means of removing undesirable species from the understory in order to facilitate the restoration of native herbaceous layers in forest stands.

6.3.4 Carbon Sequestration

The forest is the ultimate carbon sink on MCAS Cherry Point. This new field of management looks to trees and other vegetation to take carbon dioxide from the air and store it in biomass, above and below ground. Timber harvesting and reforestation at MCAS Cherry Point and its

properties directly influences carbon sequestration. Newly established forests are better at converting and storing carbon than older trees. The long rotation age combined with large timber, prime for wood products, ensures that most of the timber will be in a sink and not reenter the atmosphere. There is no current measurement of above and below ground biomass for effectively knowing carbon offsets on MCAS Cherry Point and its properties.

6.4 WILDLAND AND PRESCRIBED FIRE MANAGEMENT

Eastern North Carolina was historically a fire-maintained ecosystem. Wildland fires are part of the historical ecosystem processes of the region and can provide a positive benefit to the natural community (e.g., longleaf pine restoration). Many species native to the region have adapted to conditions resulting from wildfires, including plant species that are dependent upon fire for reproduction and growth. However, since European settlement of North America the natural wildland fire process has been altered through fire suppression, development, and alteration of natural fuel types and quantities. To restore these natural processes and provide fire protection, MCAS Cherry Point administers an aggressive wildland fire management program directed toward forest management, ecosystem restoration, and wildland fire hazard reduction.

The MCAS Wildland Fire Program is responsible for controlling wildfires and for planning and implementation of an annual prescribed burn plan at Cherry Point. The six goals of the MCAS Wildland Fire Program are to:

- Use prescribed burns to support the military training mission by maintaining an open understory, managing fuel loads, increasing and improving game and non-game wildlife habitat, and restoring natural communities;
- Apply an aggressive prescribed burn program to reduce the intensity of wildland fires by decreasing the amount of available fuels;
- Utilize the appropriate wildland fire suppression response, which emphasizes the use of natural and man-made barriers to reduce wildland fire impacts on training areas and the environment;
- Identify, prioritize, and treat high hazard areas in the wildland/urban interface to mitigate the potential for wildland fire to damage private or MCAS Cherry Point property;
- Focus prescribed burns on restoration of the landscape to more closely mimic pre-settlement conditions, and to maintain and improve the sustainability and native diversity of ecosystems; and
- Mechanically treat fire neglected areas to allow for more effective fire management.



Representative photograph of a prescribed burn in forest habitat.

Source: USFS 2011

To sustain and enhance the high-quality military training environment available currently and into the future, MCAS Cherry Point must have an effective wildland fire management program. An effective wildland fire management program minimizes threat from wildfire thereby helping to ensure that environmental encroachments to training are minimized while still achieving natural resource management goals.

The Wildland Fire Management Plan (WFMP) is the primary guidance outlining MCAS Cherry Point's activities for meeting these goals. Developed in accordance with MCO 5090.2A, the WFMP helps to guide wildland fire management so appropriate measures are taken during both wildfire and prescribed fire scenarios to enhance and maintain the goals of military training and natural resources management. The WFMP is a tool that describes in detail the fire management programs, activities and methods utilized by fire resources staff to attain habitat and land management objectives established for MCAS Cherry Point. Ultimately, the WFMP was developed to reduce wildfire potential, outline program safety, protect and enhance valuable natural resources, integrate applicable State and local permit and reporting requirements, and implement ecosystem management goals and objectives at MCAS Cherry Point. The Main Station, Piney Island (BT-11), MCOLF Atlantic, MCOLF Oak Grove, and MCALF Bogue are covered by the WFMP. Designated Wildland Fire Management Compartments at each of these locations determine how wildland fires are managed based on results of a fuel model analysis, location of military and private property, and environmental resources.

Prescribed burning on MCAS Cherry Point properties is a top priority for NRD Forestry. Units are prioritized every year according to mission critical needs and forest management needs such as site preparation and hazard reduction. Burning windows are narrow between weather, personnel, and mission-related factors which must be taken into consideration before every burn. When possible, growing season burns are preferred for species benefits and habitat improvements. MCAS Cherry Point Fire Department, Range Maintenance Department, Air Traffic Control, and the NRD Natural Resources Manager work with the Wildland Fire Program Manager to plan prescribed burns.

6.4.1 Wildland Fire Risk and Planning

Assessing and understanding the fire danger of an area gives the wildland fire or natural resource manager a tool to assist in making the day-to-day "fire business" decisions. Fire danger rating information should be considered in addition to the manager's local knowledge of the area and consequences of the decision when determining the most appropriate solution.

Operational preparedness planning at MCAS Cherry Point identifies what actions should be taken and what resources will be needed under certain weather conditions, what actions are required if a wildfire occurs in a given area of the installation, and what key indicators prompt preparedness actions. Fire danger ratings are often reflective of general conditions over an extended area that affect and initiate wildfire. Such ratings are developed for either current or predicted situations and are used to plan management actions two or three days in advance, as well as to compare the severity of one day or season to another.

Within the WFMP are detailed descriptions of fuel models for MCAS Cherry Point and all outlying fields. Fuel models are tools to help estimate fire behavior. Fire managers must be flexible and adaptive when utilizing this aid and remember that fire burns in the stratum best supporting the fire. Results of the fuel model provides an assessment of the rate of spread or flame length for fires for a given area, based on the amount and type of combustible material available to burn. Moisture content, volume, ratio of live-dead vegetation, size, genetic composition, and arrangement of fuel within a given area are factored into the fuel model (USMC 2009b). Fuel types are grouped as grass, shrub, timber, or logging slash with grass, shrub, and timber being the most common wildland fire fuel types present at MCAS Cherry Point.

A pre-season wildfire risk analysis provides a basis for wildland fire management actions such as pre-positioning of critical resources, requesting additional funding, or modifying applicable cooperative agreements to meet anticipated needs. A pre-season wildfire risk analysis checklist for MCAS Cherry Point is used with fire danger ratings and predictive weather outlooks to predict the severity and duration of the wildfire season at MCAS Cherry Point.

This information is considered when preparing MCAS Cherry Point's annual prescribed burn plan. Prescribed burns and mechanical treatments are used as a land management tool throughout the year to decrease wildland fire hazards and to provide critical support of fire-dependent species, including federally protected species. Generally, burns are performed on a 3–5 year cycle; however, each potential burn site is included in the yearly pre-season wildlife risk analysis to determine the need for performing a prescribed burn. Recent efforts have shown that growing season burns are more effective at reducing understory competition and fuel loads than those performed during the winter and early spring and therefore are encouraged when conditions allow.

6.4.2 Fire Management Partnerships

MCAS Cherry Point has established several partnerships with State and federal agencies for coordinated fire management activities through the sharing of personnel and other resources. Interagency cooperation is a key component of wildland fire planning and operations. MCAS Cherry Point has developed a functional and working relationship with the USFS Croatan District for prescribed fire and wildland fire suppression. The interagency agreement with USFS is a primary mechanism for meeting annual fire management goals.

An interagency agreement has also been established with USFWS Cedar Island NWR that provides the cooperative framework for wildfire suppression and use of prescribed fire to maintain or restore wildlife habitats, ecosystems, endangered or threatened species, and provides for the limited interchange of personnel, equipment, and information. This relationship has been key to burning at BT-11 and MCOLF Atlantic and surrounding areas.

A Mutual Aid Agreement has been established with North Carolina Forest Service that secures the benefits of mutual aid in response to wildfires that occur on either property. Each organization

offers unique skill sets, fire equipment and personnel, and training opportunities that are mutually beneficial.

6.5 FOREST PEST MANAGEMENT

North Carolina has seen an increase in forest pests in recent history. MCAS Cherry Point Forestry actively traps for gypsy moth, but also monitors for southern pine beetle, emerald ash borer, and laurel wilt. There are many other pests and pathogens that affect forest management, but these are the most destructive. Given MCAS Cherry Point and its managed properties location on the coastal plain, the forests are susceptible to hurricane damage and therefore predisposed to additional stress from

MCAS Cherry Point annually receives gypsy moth traps from the US Forest Service – Trapping Program Manager in Asheville, NC. Traps are set along the woodline near public use areas and are checked monthly. At the end of the year, the traps are taken down and a trap record form is sent back to Asheville with data. No gypsy moths have been found on any of the properties. Trapping only occurs at MCAS Cherry Point.

The southern pine beetle is the forest pest of most concern for MCAS Cherry Point and its managed properties. This beetle has heavily impacted a loblolly pine population of MCALF Bogue, which received damage from Hurricanes Bertha and Fran in 1995 (USFS 1997). Timber harvesting at MCALF Bogue was done to prevent the spread of the beetle infestation. MCAS Cherry Point Forestry will continue to monitor stands and implement remedial actions as necessary to control beetle infestations.

Flash droughts combined with hurricane stressed trees has increased pine mortality due to ips beetle infestations. These infestations are normally localized to small patches of one to 5 trees. Ground inspections are performed when dying trees are located. If infestations worsen, salvage harvests would be planned.

One of the more recent major forest pests to move into Craven County is the emerald ash borer. This bright green beetle has not been found on any MCAS Cherry Point managed properties but has been found on multiple locations along the Neuse River in Craven County. The emerald ash borer larvae girdle ash trees and mortality can happen as fast as one year from time of infestation. MCOLF Oak Grove will likely have the most damage as it has more green ash in the bottomland swamps of the Trent River. No forest management techniques are known to stop or control the spread as the emerald ash borer will infest small saplings. MCAS Cherry Point Forestry does not have a plan to harvest ahead of this pest as ash is not the primary overstory timber species and there will be minimal loss of income from potential mortality.

Pathogens such as fusiform rust and annosus root rot are prevalent across the poorly drained, sandy soils of Eastern NC. Laurel wilt is a new pathogen to the area that affects red bays and other tree species in the laurel family. This is introduced to the tree by the red ambrosia beetle which is a fungus farmer. The fungal disease is generally fatal to these trees. Laurel wilt is known to exist

in Onslow County. This fungal disease would drastically change the understory composition on all of MCAS Cherry Point properties. The best way to prevent the spread onto MCAS Cherry Point is to limit the movement of firewood onto the properties. Burning and chipping may help contain an infestation if found. Laurel wilt is not known to exist on any MCAS Cherry Point properties at this time and the forestry office will continue to monitor forest health for its presence.

6.6 FOREST MANAGEMENT AND PROTECTION OBJECTIVES AND ACTIONS

The following Objectives and Actions have been identified for management and protection of MCAS Cherry Point forest habitats.

OBJECTIVE FMP1: Manage forests to support the military mission and promote a healthy and natural forest ecosystem. Support conservation and management of migratory birds and their habitat.

- **Action 6-01** – Align forest management with the military mission, such as providing accessibility for training, recreation/hunting/fishing, and promoting wildlife habitat.
- **Action 6-02** – Use prescribed fire and mechanical and chemical (if necessary) control methods to manage stands to promote forest health and growth.
- **Action 6-03** – Restore longleaf pine habitat in historic locations designated as priority restoration sites.
- **Action 6-04** – Monitor and improve forest health for pests and disease.
- **Action 6-09** – Promote effective carbon sequestration with reforestation and understory management.
- **Action 6-10** – Restore and promote bottomland hardwood habitat and wetland sites.
- **Action 5-04** – Promote restoration of native warm season grass habitats in association with restoration of longleaf pine forest habitat as feasible.

OBJECTIVE FMP2: Promote responsible timber harvesting.

- **Action 6-05** – Manage Forests to maintain a sustainable flow of forest products.
- **Action 6-06** – Maintain a forestry inventory, prescriptions, and sales database.
- **Action 6-07** – Develop a Timber Management Plan to guide harvest decisions.
- **Action 6-08** – Develop, execute, and monitor timber harvests to ensure they are done sustainably and in accordance with existing guidelines.

OBJECTIVE FMP3: Manage forests to reduce loss of training time and potential damage to properties due to wildfire.

- **Action 6-11** – Implement fire suppression, preparation, documentation, and cooperative activities in accordance with the WFMP.

OBJECTIVE FMP4: Integrate prescribed fire with the military mission to support training and natural, healthy ecosystems.

- **Action 6-12** – Implement annual prescribed burn plan.

7.0 AQUATIC RESOURCE AND WATER QUALITY MANGEMENT

MCAS Cherry Point is located in the Neuse River Basin and contains 1,234 acres of USACE-verified wetlands. Groundwater is near or at the surface in the broad, level terraces. The soils are poorly drained due to the low relief and water retention capacity of loam soils. The best-drained soils are above the slopes along the stream valleys. The many small tributaries of the larger creeks are fed by groundwater, and stream flow is intermittent, especially inland. Although precipitation is greater during the growing season, this increase is offset by higher evapotranspiration, the combination of evaporation and the release of water vapor by plants (transpiration). Water level of groundwater and small streams therefore tend to be higher during winter. The Neuse River, Slocum Creek, Hancock Creek, and their larger tributaries are drowned valleys subject to tidal fluctuations mostly due to wind action. Winds from the west and southwest cause low water conditions, and winds from the northeast and east raise water levels throughout the area.

Natural resource managers use a watershed-based approach to manage operations, activities, and lands to avoid or minimize impacts to wetlands, ground water, and surface waters on or adjacent to MCAS Cherry Point in accordance with the guidelines and goals established in the Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (Federal Register Volume 65, pp. 62565–62572).

Due to the importance of wetlands and water quality to ecosystem health and the human environment, a large number of State, federal, and local laws regulate land use and actions that have the potential to degrade wetlands and water quality. EO 12088 (Federal Compliance with Pollution Control Standards), EO 11990 (Protection of Wetlands), DoDI 4715.3 (Environmental Conservation Program [DoD 1996]), and the CWA require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In accordance with these requirements, MCAS Cherry Point obtains all appropriate federal, State, interstate, and local certifications; and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, and stormwater management programs for any action that may impact water quality. In addition, any action that requires these types of authorizations are assessed under NEPA, and if no practicable alternative is found, appropriate mitigation measures are taken, as agreed to by both NCDEQ and USACE.

7.1 WETLANDS AND SURFACE WATER PROTECTION

Under Section 404 of the CWA, discharge of dredged and fill material into waters of the U.S., including wetlands, is prohibited unless authorized by USACE. MCAS Cherry Point utilizes a number of USACE Nationwide Permits (NWP), which are available to streamline the permitting process for activities that would have minimal adverse effects on aquatic environments. Activities such as the maintenance of existing structures and reshaping existing drainage ditches may be permitted under NWPs. The maximum acreage limit for wetland or surface water impacts of most NWPs is ½ acre, though notification to the USACE District Engineer for activities that would result in loss of more than 1/10 acre of waters of the U.S. is generally required (Federal Register Volume 86,). If project impacts are expected to exceed these criteria, an individual permit that may require public review must be sought.

Through proactive planning, MCAS Cherry Point strives to achieve no net loss of size, function, and value of wetlands in accordance with EO 11990, the White House Office on Environmental Policy, and DoDI 4715.3 (DoD 1996). Federal agencies may impact wetlands after finding an alternative that avoids or minimizes impacts to aquatic resources to the maximum extent practicable. When avoidance of wetlands and other waters of the U.S. is not practicable, and impacts have been minimized, participation in an approved off-site mitigation bank or in-lieu fee instrument is encouraged as sound conservation planning and is authorized by USC Title 10 §2694(b).

Some wetlands, such as isolated wetlands or those lacking a significant nexus to traditionally navigable waters of the U.S. may not be regulated by the USACE but may be regulated by local and state laws. In North Carolina State General Permit for Impacts to Isolated and Other Non-404 Jurisdictional Wetlands and Waters (Permit #IWGP100000) authorizes impacts to isolated wetlands and other wetlands and surface waters not regulated by Section 404 of the CWA. If certain conditions are met, this general permit authorizes projects to impact less than 1 acre of wetlands, less than 250 ft of streams, and/or less than $\frac{1}{3}$ acre of surface waters not regulated by Section 404 of the CWA. If impacts meet the minimum criteria for notification as outlined in the regulation, written approval from the NCDEQ Division of Water Quality is required. For impacts greater than 1 acre, individual permits are required.

Military construction and other projects with the potential to disturb wetlands are reviewed individually with regard to wetland impacts, and the appropriate permits sought as needed. Any land-disturbing activities having the potential to impact wetlands and/or surface waters regulated by the USACE or NCDEQ are required to conduct a wetland delineation so that impacts can be assessed, avoided, or minimized. MCAS Cherry Point has conducted wetland delineations on most of its properties. The current focus of wetland management is to reverify existing delineations for MCAS Cherry Point on a project-by-project basis as needed. Wetland delineations are approved by the USACE and are necessary in the early stages of project planning in order to avoid or minimize impacts to wetlands.

7.2 WATERSHED PROTECTION

7.2.1 Neuse Watershed

The Neuse River Basin has protective rules in place, including protection and maintenance of riparian buffers, as administered by NCDEQ for the river basin. MCAS Cherry Point and MCOLF Oak Grove are situated within the Lower Neuse River Basin (HUC 03020204) (Figure 2.9). Both areas are subject to the Neuse River Basin: Nutrient Sensitive Waters Management Strategy – Protection and Maintenance of Existing Riparian Buffers (15A NCAC 2B .0233) (Neuse River Buffer Rule). The Neuse River Buffer Rule, initiated in 1997 and managed by NCDEQ, applies to all perennial and intermittent streams, lakes, ponds and estuaries in the Neuse River Basin. The rule protects forest vegetation in the riparian areas directly adjacent to surface waters as a means of removing nitrogen before it reaches streams, rivers, ponds, lakes and estuaries.

Military construction and other projects with the potential to disturb buffers are reviewed individually with regard to buffer impacts, and the appropriate permits acquired as needed. Standard BMPs are required in order to ensure diffuse flow into riparian areas. Many areas of MCAS Cherry Point are exempt from this rule due to land uses that are present and ongoing prior to 1997; however, in areas that are not subject to the rule, buffers are left intact to the greatest extent practicable. Where feasible, areas that were once exempt from the buffer rules will be allowed to transition to native vegetation to allow for enhanced water quality benefits.

7.2.2 White Oak Watershed

No specific guidance for riparian buffer systems has been established for the White Oak Watershed. The North Carolina Coastal Resources Commission administers the CAMA permitting program for construction activities located in the coastal zone or within designated Areas of Environmental Concern (AECs). Detailed information on the CAMA program and permitting requirements are provided in Section 7.5.

7.2.3 Tar-Pamlico Watershed

The Tar-Pamlico River Basin has protective rules in place, including protection and maintenance of riparian buffers, as administered by NCDEQ for the river basin. MCOLF Atlantic and Maw Point are situated within the Pamlico Sound Subbasin (HUC 030200105) (Figure 2.9). Both areas are subject to the Tar-Pamlico River Basin: Maintenance of Existing Riparian Buffers (15A NCAC 2B .0734) (Tar Pam Buffer Rule). The rule, initiated in 1997 and managed by NCDEQ, applies to all perennial and intermittent streams, lakes, ponds and estuaries in the Tar Pamlico River Basin. The rule protects forest vegetation in the riparian areas directly adjacent to surface waters as a means of removing nitrogen before it reaches streams, rivers, ponds, lakes and estuaries.

Military construction and other projects with the potential to disturb buffers are reviewed individually with regard to buffer impacts, and the appropriate permits acquired as needed. Standard BMPs are required in order to ensure diffuse flow into riparian areas. Many areas of are exempt from this rule due to land uses that are present and ongoing prior to 1997; however, in areas that are not subject to the rule, buffers are left intact to the greatest extent practicable. Where feasible, areas that were once exempt from the buffer rules will be allowed to transition to native vegetation to allow for enhanced water quality benefits.

7.3 FLOODPLAIN PROTECTION

USACE is more restrictive regarding discharges of dredged or fill materials into wetlands within 100-year floodplains, as identified through FEMA's flood maps. Many NWPs cannot be obtained for projects expected to impact wetlands in the 100-year floodplains and typically would require that the USACE District Engineer be notified. Floodplains receive additional protection through EO 11988 (Floodplain Management), which instructs federal agencies to reduce the risk of flood loss by restricting building of structures within floodplains and requiring restoration and preservation of the natural and beneficial values served by floodplains.

7.4 STORMWATER MANAGEMENT

Stormwater management is an important part of water quality protection. Runoff from impermeable and exposed surfaces into MCAS Cherry Point stormwater drainage systems can facilitate the transport of industrial pollutants into receiving waters. MCAS Cherry Point maintains a Stormwater Pollution Prevention Plan (SPPP) (USMC 2023) for Air Station and outlying facilities in accordance with Section 402(p)(3)(B) of the CWA and provisions set forth by the NCDEQ Division of Energy Mineral and Land Resources (DEMLR) and MCAS Cherry Point's NPDES Permit. The purpose of the SPPP is to identify and map potential pollutant sources that may be expected to contribute to contamination of stormwater discharges from permitted outfall drainage areas and to provide an overview of the regulatory requirements and recommendations for control of stormwater runoff from MCAS Cherry Point into onsite or adjacent streams and other water bodies. Implementation of the SPPP is subject to annual review by DELMR and MCAS Cherry Point is required to update the SPPP whenever a change in design, construction, operation, or maintenance will have a significant effect on the potential for discharge of pollutants to waters of the State.

Responsibility for implementation of the MCAS Cherry Point SPPP occurs at three levels. At the top level (Tier 1) the Stormwater Program Manager is responsible for managing all aspects of the MCAS Cherry Point SPPP. Below the Program Manager are personnel responsible for on the ground-implementation of the SPPP (Tier 2 and Tier 3). In addition, the Stormwater Pollution Prevention Team assists the Program Manager with implementing, evaluating, and updating of the SPPP. This team is made up of staff from different MCAS Cherry Point departments.

The Integrated Contingency Plan (ICP) and Spill Prevention, Control, and Countermeasure Rule are also important components of stormwater management. The ICP includes control measures and actions to take in the event of a discharge that could impact surface waters. The Spill Prevention, Control, and Countermeasure Rule provides requirements for oil spill prevention, preparedness, and response to avoid oil discharge to navigable waters.

Monitoring of outfalls is a requirement of the MCAS Cherry Point NPDES Permit number NCS000314, which was renewed on October 2, 2021. There are five representative outfalls located on Air Station that require both analytical and qualitative monitoring as a condition of the MCAS Cherry Point NPDES Permit. These outfalls are located on Schoolhouse Branch, Sandy Branch, Luke Rows Gut, Mill Creek, and Jack's Branch. The purpose of the outfall monitoring is to evaluate the effectiveness of the SPPP and to identify any new sources of stormwater pollution.

In addition to stormwater runoff, industrial activities that occur at Air Station and outlying facilities create potential sources of pollution, including outdoor industrial activities and processing areas; material storage and handling areas; areas where hazardous material/hazardous waste/or petroleum, oil, and lubricant products are stored; construction and demolition sites; and land areas where chemicals are applied. The SPPP provides a review of the numerous reports and plans that outline management procedures for handling, transport, accumulation, secondary containment,

disposal, reuse, waste minimization, training, inspections, and spill response for various materials. These plans are updated and modified as needed.

Stormwater management is implemented through an integrated system of structural and non-structural BMPs. The structural measures reduce, remove and/or prevent pollutants from entering the stormwater system. Examples of structural measures used at MCAS Cherry Point include absorbent booms, sluice gates used for spill control, oil/water separators, catch basins, retention/detention basins, and grassy swales. Non-structural BMPs are the policy and procedures, when applied, that reduce the amount of pollutant inputs into the environment by managing the source of the pollutants or minimizing exposure to stormwater through source reduction, pollution prevention, education, and land use management. Training of personnel is part of the MCAS Cherry Point's Stormwater Program and includes educating the public with outreach programs. The Environmental Affairs Department and the Stormwater Program Manager are responsible for ensuring personnel at all levels of responsibility are trained in accordance with the goals of the Stormwater Program.

7.5 COASTAL ZONE PROTECTION

The Coastal Zone Management Act (CZMA) was passed by Congress in 1972 in response to concerns about the rapid deterioration of coastal areas throughout the nation. Administered by NOAA, the CZMA law authorized funding for state coastal programs around the country to improve the environmental and economic health of America's coastal areas by establishing federal-state partnerships, and provided the legal framework related to management of the nation's coastal resources.

The North Carolina Coastal Zone includes 20 coastal counties that are entirely or partly adjacent to, adjoining, intersected, or bounded by the Atlantic Ocean or any coastal sound. North Carolina established the CAMA in 1974 for the purpose of establishing a cooperative coastal area management program between local and State governments. Additionally, the CAMA required each county located in the North Carolina Coastal Zone to prepare a LUP that complied with CAMA requirements. The coastal zone is managed by the North Carolina Coastal Management Program, which was created in 1981 pursuant to the CZMA.

The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife supported by those habitats. The CZMA grants North Carolina and other coastal states that have a federally approved coastal management program the authority to review federal activities, federal license or permit activities, and federally funded activities to ensure that federal actions that may affect its coastal area meet the "enforceable policies" of the State's coastal program. The process by which a state decides whether a federal action meets its enforceable policies is called federal consistency review. Federal consistency applies to any activity that is in, or affects land use, water use or any natural resource in the coastal zone, if the activity is conducted by or on behalf of a federal government agency, requires a federal license or permit, receives federal funding, or is a plan for exploration, development or production from any area leased under the Outer Continental Shelf Lands Act.

Federally owned properties may be excluded from the coastal zone; however, federal activities that are reasonably expected to affect any land or water use, or natural resource within a coastal zone outside the federal property are still subject to a federal consistency review. Therefore, any activity that may affect natural resources down gradient of the federal property boundary is subject to a federal consistency review.

NCDEQ Division of Coastal Management has established Areas of Environmental Concern (AECs), which are defined as areas of natural importance. Areas that may qualify as an AEC include areas that are susceptible to erosion or flooding, or areas that have been identified as having environmental, social, economic, or aesthetic importance (NCDEQ Division of Coastal Management 2008). AECs categories include: estuarine and ocean system, ocean hazard system, public water supplies, or natural and cultural resource areas.

AECs were established to protect them from uncontrolled development, and development within designated AECs is limited by CAMA regulations and minimum use standards. Development activities that would likely require a CAMA permit include dredge or fill activities within coastal waters or wetlands; and construction of marinas, piers, docks, bulkheads, oceanfront structures or roads. Any project that is located in a designated CAMA county that is located on navigable waters, marsh or wetlands, within 75 ft of the mean high water line along an estuarine shoreline, near the ocean beach, near an inlet, within 30 ft of the normal high water level of areas designated as inland fishing waters by North Carolina Marine Fisheries Commission, or near a public water supply would also require a CAMA permit (NCDEQ Division of Coastal Management 2008). The Coastal Resource Commission guidelines for development within coastal shoreline areas are provided in 15A NCAC 7H. Some of the key points provided in this guidance include:

- Project activities should not weaken or eliminate natural barriers to erosion;
- Projects should limit impervious surfaces such as buildings, paved parking lots and roads to the amount necessary to support the use and generally not exceed 30% of the AEC area of the lot, except along the shoreline of an ORW where the built-upon limit is 25% of the AEC area; and
- Projects should maintain a buffer zone for a distance of 30 ft landward of the normal water level, except along shorelines where the Environmental Management Commission has adopted its own buffer standards.

AECs designated in Craven County include estuarine waters and shorelines, public trust areas, coastal wetlands, areas of excessive slope (>12%) or erosion, and fragile natural resource areas (including SNHAs and other protected lands) (Craven County 2009). Within Carteret County the waters and shorelines of the White Oak River, Bogue Sound, and Atlantic Ocean have been designated as AECs (Carteret County 2005). Coastal wetlands within the county are also designated as AECs, including coastal wetland areas located adjacent to Bogue Sound. AECs designated with in Pamlico County include estuarine waters and shorelines, and coastal wetlands (Pamlico County 2004).

The NRM should consider and be aware of any activities that could impact the coastal zone, including but not limited to sedimentation problems. In ecosystem terms, a reasonable level of

consciousness should be exhibited by MCAS Cherry Point concerning contribution to regional drainage basins, such as the Neuse River, which drains into Pamlico Sound and the Albemarle–Pamlico National Estuary. Location of MCAS Cherry Point properties on the coast necessitates close cooperation and coordination with representatives from the North Carolina Division of Coastal Management, and other State and local agencies responsible for coastal zone management and protection.

7.6 AQUATIC RESOURCES AND WATER QUALITY MANAGEMENT OBJECTIVES AND ACTIONS

The following objectives and actions have been established to protect MCAS Cherry Point’s aquatic resources and water quality.

OBJECTIVE WET1: Integrate wetland conservation and surface water protection into MCAS Cherry Point’s facility and range development process.

- **Action 7-01** – Support new wetland delineations and renewal of existing jurisdictional determinations to identify aquatic resource limits and jurisdiction.
- **Action 7-02** – Comply with Section 404 of the CWA and any CWA and State authorizations in regard to water resource protection.
- **Action 7-03** – Identify suitable stream and wetland restoration areas and monitor sensitive wetland areas.
- **Action 7-04** – Ensure BMPs recommended in the MCAS Cherry Point SPPP and Integrated Contingency Plan (ICP) are implemented appropriately, and that the SPPP and ICP are updated periodically to reflect current management issues.
- **Action 7-05** – Create, where practical, expanded riparian and wetland buffers beyond mandated protection requirements.

This page intentionally left blank.

8.0 LAND MANAGEMENT

It is USMC policy to maintain the quality of land, air, and water to protect human and environmental health. Within these policies, MCAS Cherry Point provides planned and coordinated management for development, improvement, maintenance, and conservation of the installation's resources in a manner consistent with the military mission. General land-use management is guided by the MCAS Cherry Point Master Plan and supported by the INRMP, ICRMP, and other local directives. This planning integration ensures the sustainability of MCAS Cherry Point for future generations.

Long-range planning of military lands is necessary to ensure training lands are maintained and managed for compatible uses. Constant use of land for military training combined with occasional significant weather-related events can result in erosion problems that affect quality of training and reduce the land's ability to recover naturally. As an air-centric facility, heavy infantry style military training is generally absent, with the exception of Marine Wing Support Squadrons engineering assets which are utilized in designated areas. While these specific activities are routinely confined to discreet areas of the installation, neglect of affected areas can result in (1) eroded sediment entering adjacent streams and wetlands, (2) impassable roads used for training and natural resources management, (3) eroded shorelines encroaching into military lands threatening buildings and infrastructure, and (4) the abandonment of unsuitable areas restricting training area and exceeding training capacity of other lands, leading to new erosion problems.

The Sedimentation Pollution Control Act of 1973 (G.S Chapter 113A Article 4) was enacted by the State for protection of surface waters and wetlands from pollution caused by erosion and sedimentation. The Act provided the impetus for creation, administration, and enforcement of an erosion and sedimentation program for North Carolina, and for the adoption of minimal mandatory standards that ensure development activities are conducted with the least detrimental effects from pollution by sedimentation.

The NCDEQ Division of Land Resources Sedimentation Control Commission oversees compliance with Sedimentation Pollution Control Act requirements and requires that an erosion and sedimentation control plan be submitted at least 30 days prior to land disturbance for any project disturbing one or more acres. Details and requirements for erosion and sedimentation control plans are provided in Chapter 4 of the Erosion and Sediment Control Planning Design Manual (State of North Carolina 2013). In addition, MCAS Cherry Point's SPPP describes potential sources of sediment and includes recommendations on appropriate BMPs to prevent erosion and sedimentation from MCAS Cherry Point activities from entering onsite or adjacent streams and other water bodies (USMC 2023).

The MCAS Cherry Point SPPP is reviewed annually and updated as-needed to reflect any instances or changes affecting the potential for discharge of pollutants to waters of the State. Additionally, stormwater training is provided to MCAS Cherry Point personnel, to include identification and management of potential spills, good housekeeping practices (keeping projects sites clean and storage of hazardous materials in a manner to reduce the potential for spills, and project site inspections), and recognizing toxic and hazardous substances located at MCAS Cherry Point to

ensure proper storage and handling procedures are followed (USMC 2023). The ICP is also an important component of stormwater management, which identifies control measures and actions to take in the event of a discharge that could impact surface waters. Community outreach is also performed to educate MCAS Cherry Point personnel and residents on proper recycling and disposal procedures.

8.1 EROSION AND SEDIMENT CONTROL

Stormwater runoff from construction/demolition activities can be detrimental to the water quality of a receiving stream. Sediment runoff caused by the erosion of exposed soil is the primary source of water quality impairment generated by land-disturbing activities. BMPs for control of sediment runoff are divided into two categories: erosion controls and sediment controls. Erosion controls are designed to protect soils before erosion occurs while sediment controls are designed to remove sediment from runoff before it is discharged into a waterbody. Construction activities such as clearing, grubbing, and grading and other activities that remove vegetation and disturb the soil greatly increase the risk of erosion and the subsequent discharge of sediment-laden water and therefore require the implementation of protective measures, such as temporary or permanent seeding, sod stabilization, installation of vegetative buffer strips, and protection of trees. Seeding or plantings of eroded areas utilize native species to the extent practicable.

Proposed construction projects that disturb 1 acre or more must obtain authorization under the erosion and sedimentation control permit and a general NPDES stormwater discharge permit (USMC 2023). The land disturbing permit and a project specific stormwater management permit is obtained from the NCDEQ DEMLR prior to commencing work.

Erosion and sediment control is practiced throughout MCAS Cherry Point, especially during construction projects (USMC 2023). The Environmental Affairs Department is in charge of overseeing timely and appropriate employment of erosion and sediment control BMPs as directed in the Erosion and Sediment Control Plan (ESCP) submitted for each construction site, which includes periodic monitoring of BMPs for effectiveness. The Facilities Maintenance Department Contracts Division ensures that all erosion and sediment control contract terms are completed during the project and prior to project closeout.

8.2 LAND MANAGEMENT OBJECTIVES AND ACTIONS

The following objectives and actions have been established to protect MCAS Cherry Point soils and topography.

OBJECTIVE SOI1: Integrate training and other mission requirements for land use with sound natural resources management.

- **Action 8-01** – Monitor training effects on inland soils and in coastal areas and use results to provide recommendations for soil conservation.
- **Action 8-02** – Close, restore, and reopen selected eroded sites to training.

-
- **Action 8-03** – Use an interdisciplinary approach to review proposed actions at MCAS Cherry Point and its properties.
 - **Action 8-04** – Prepare necessary erosion and sedimentation control plans for qualifying projects.

8.3 LANDSCAPE AND VEGETATION MANAGEMENT

EO 12856 (Environmentally and Economically Beneficial Landscaping Practices) requires all federal agencies to develop sustainable landscaping practices to address environmental concerns. These include, but are not limited to, water conservation, energy conservation, erosion control, and a reduction in use of fertilizers and pesticides. DoD guidance for ecosystem management of landscape and vegetation at MCAS Cherry Point includes:

- Inclusion of soil capabilities, water management values, landscaping needs, erosion control, and conservation of natural resources during project planning, design, and construction;
- Establish low maintenance species, enhancement of wildlife habitat, and tree plantings to minimize costs for maintaining grounds;
- Ensure proper placement of trees, shrubs, and other plants for long term savings in grounds maintenance, water, and energy costs;
- Reduce grounds maintenance costs in terms of energy, human power, equipment, and chemicals, including use of fertilizer and pesticide;
- Maximize use of non-turf ground covers, wildflower plantings, and other landscape improvements that require lower maintenance in comparison to lawns;
- Improve building energy efficiency with effective landscape practices;
- Incorporate proper use of mulches in landscaping to effectively conserve water, reduce weeds, and control erosion;
- Ensure that landscaping is functional in nature, simple and informal in design, compatible with adjacent surroundings, and complementary to overall natural setting of the area;
- Increase recycling of green yard and lawn wastes, and make use of recycled water and/or high efficiency irrigation systems;
- Maximize use of native and locally adapted plant species, and promote establishment of low maintenance, self-sustainable varieties of native trees, grasses, and flowering plants, such as those included in Appendix E;
- Identify and conduct an inventory of vegetative cover and compile a comprehensive plant species list; and
- To the extent practicable and in consideration of the military mission, preserve, restore, and expand remnants of natural communities.

8.4 LANDSCAPE AND VEGETATION MANAGEMENT OBJECTIVES AND ACTIONS

The following objectives and actions have been established to protect MCAS Cherry Point's landscapes and vegetation.

OBJECTIVE LVM1: Integrate consideration of natural communities and native vegetation into management strategies to avoid restrictions on military training and mission support requirements.

- **Action 8-05** – Consider DoD guidance for ecosystem management of landscape and vegetation when implementing projects.
- **Action 8-06** – Support ecosystem services focused initiatives.

9.0 WILDLIFE AND FISHERIES MANGEMENT

The conservation and enhancement of biological diversity on the public's military lands have emerged as significant components of the DoD's overall environmental and natural resources management programs. As a result, MCAS Cherry Point's approach to wildlife and fisheries management is to focus on the processes necessary for sustaining biodiversity and ecosystem integrity. Recognizing the importance of providing ecosystems rich in species diversity to the Nation and the military mission, the DoD formally established a policy for an ecosystem approach to natural resources management and for the conservation of biological diversity in its 1996 Conservation Instruction (DoDI 4715.3).

The following is the overarching goal of the policy for ecosystem management adopted from DoDI 4715.3:

To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations (Benton et al. 2008).

Also adopted by MCAS Cherry Point, DoD Directive 4715.3 provides the following goals to promote biodiversity conservation on DoD lands and waters when consistent with the mission and practicable to achieve:

- Maintain or restore remaining native ecosystem types across their natural range of variation;
- Maintain or reestablish viable populations of all native species in an installation's areas of natural habitat, when practical;
- Maintain evolutionary and ecological processes, such as disturbance regimes, hydrological processes, and nutrient cycles;
- Manage over sufficiently long-time periods for changing system dynamics; and
- Accommodate human use in those guidelines.

The Environmental Affairs Department is responsible for wildlife and fisheries management activities on MCAS Cherry Point. In addition to, and in support of, the DoD's ecosystem management and biodiversity conservation goals, the Environmental Affairs Department implements wildlife and fisheries practices in accordance with sound scientific management principles. Additionally, MCAS Cherry Point considers the North Carolina Wildlife Action Plan (NCWAP) within the context of decision-making related to overall wildlife and fisheries actions. North Carolina was the first state to develop, and have endorsed by USFWS, a State wildlife action plan (the NCWAP). The NCWAP includes a long-term strategy to conserve fish, wildlife and natural areas; to enhance wildlife populations; and to enhance the quality of life for residents and visitors of North Carolina (NCWRC 2005). The NCWAP is a strategic plan intended to provide

the basis for agencies, organizations, industries, and academics across the State for implementing sound fish and wildlife management practices and improving management strategies over time.

The following five core goals were developed for the NCWAP, and were the result of feedback and input received from conservation stakeholders:

- Improve understanding of species diversity in North Carolina and enhance the ability to make conservation or management decisions for all species;
- Conserve and enhance habitats and communities they support;
- Foster partnerships and cooperative efforts among natural resource agencies, organizations, academia, and private industry;
- Support educational efforts to improve understanding of wildlife resources by the general public and conservation stakeholders; and
- Support and improve existing regulations and programs aimed at conserving habitats and communities (NCWRC 2005).

9.1 WILDLIFE MANAGEMENT

The primary objectives of wildlife management at MCAS Cherry Point are to identify and implement actions to meet ecosystem management and biodiversity conservation goals. The NRD is responsible for developing and administering wildlife management programs and providing important consultation services to other Environmental Affairs Department staff in regard to habitat improvement projects and how their actions can benefit wildlife (e.g., forest management and protection). NRD staff are also responsible for working closely with MCAS Cherry Point staff, State agencies, and federal entities to ensure wildlife management program objectives are aligned with recommendations, plans, environmental law, and the military mission.

The majority of MCAS Cherry Point's habitat improvement projects are implemented under the forest management and protection program and through other actions promoted by the Environmental Affairs Department. A summary of annual wildlife management activities includes: administering the game management program (e.g., collection of harvest data and developing regulations); developing and implementing habitat improvement projects (e.g., wildlife openings, artificial nest boxes), and implementation of the Integrated Wildlife Damage Management (IWDM) program (e.g., BASH, invasive species management).

9.1.1 Game Management

MCAS Cherry Point's game management program focuses on a variety of species including upland game birds, small game, big game, furbearers and migratory waterfowl. Hunting and trapping seasons for permitted species are controlled by State and federal regulations and are supplemented with MCAS Cherry Point programs and policy regulations. Hunting and fishing are allowed on more than 10,000 acres, including designated hunting and fishing areas at MCAS Cherry Point, and hunting within designated areas of MCALF Bogue, MCOLF Oak Grove, and MCOLF Atlantic (MCAS Cherry Point NRD 2007).

NCWRC collects harvest and biological data for deer as part of its overall State-wide deer management program. At MCAS Cherry Point, biological data are collected for each deer harvested to assist the State in determining the health of the deer population and tracking harvests. Recreational hunting is responsible for the majority of deer harvested at MCAS Cherry Point. Sufficient harvest of deer is critical to airfield safety and MCAS Cherry Point has the opportunity to participate in the State Deer Management Assistance Program (DMAP) as situations warrant. The DMAP program is designed to improve harvest of antlerless deer in urban environments, in agricultural settings where deer damage is occurring, and on properties where traditional harvest techniques are reducing the overall quality of native vegetation communities as a result of high deer densities.

Approximately 30 acres of land are managed annually to improve the quality of recreational hunting experiences at MCAS Cherry Point. Sixteen contiguous acres are rotationally managed for the production of small grain and seeds beneficial to a variety of birds, game species, and other wildlife. Maintenance schedules and methods are designed to reduce annual tillage requirements for operational cost savings and maximizing a continuous flow of forage opportunities for wildlife. These managed openings are located away from the primary airfield surface to avoid unintentional impacts to aircraft safety. The following game management activities have been completed, or are ongoing:

- Planting of wildlife openings with wildlife food plants;
- Ongoing selling of hunting permits and collection of funds in accordance with DoD regulations;
- Operating a seasonal hunter check station for safe coordination and collection of harvest data;
- Providing big game harvest authorizations to successful hunters as required for legal possession of harvested game;
- Sharing of big game harvest and biological information with State biologists for inclusion in county and State harvest figures;
- Stocking, capture, and transfer of native game species for purposes of reintroduction; and
- Installing and maintaining wildlife nesting boxes for wood ducks.

9.1.2 Non-game Management

Nongame wildlife includes all wild animals except those that can legally be taken by hunting, trapping, and fishing. Many of these species are common backyard and forest inhabitants of the region, but some species are habitat specialists and can only be found in specific habitat such as wetlands. Federally-listed threatened and endangered species, species at-risk and migratory birds are given more attention due to their ecological importance and (with the exception of some waterfowl) are not hunted. Threatened and endangered species and species at-risk management are described in Section 4.0, and programs and actions related to migratory birds are addressed in Section 5.0.

Management of non-game wildlife occurs in the context of MCAS Cherry Point's ecosystem management and biodiversity conservation goals. MCAS Cherry Point's basic strategy is to manage the landscape to provide a variety of habitat types which are in various states of ecological succession. This is primarily accomplished through its forest management and protection activities, such as longleaf pine restoration and prescribed burning programs. These activities provide significant benefits to non-game wildlife species promoting native and diverse habitats. Non-game species also benefit from the various land management activities aimed toward enhancing hunting opportunities, such as the wildlife clearings program. Other efforts have been directed towards a specific species, such as the eastern fox squirrel, where reintroduction efforts have taken place. The eastern fox squirrel prefers habitats composed of mature, open pine-oak and longleaf pine forests and known to historically occur at MCAS Cherry Point. As part the reintroduction program for this species, 15 fox squirrel nest boxes were installed in the Ordnance Area of MCAS Cherry Point prior to the release of 19 fox squirrels obtained from participating properties. The project is being monitored continuously through observations of fox squirrels in previously unoccupied habitat.

MCAS Cherry Point continues to support studies that assist land managers in understanding the diversity and distribution of MCAS Cherry Point's wildlife resources. Examples of these studies include monitoring of neotropical migrant birds and invertebrates (butterflies), and herpetofauna (amphibians and reptiles) surveys (Mitchell and Hall 2007). Often these studies are small and site-specific, and it is recommended that MCAS Cherry Point support larger efforts to characterize fauna when resources are available. In particular, those species identified as sensitive or indicators of ecosystem health or identified as non-native species that may threaten ecosystem health should be targeted.

9.1.3 Integrated Wildlife Damage Management (BASH)

Bird/wildlife strikes with aircraft pose great threats to DoD personnel. The BASH program is designed to evaluate these threats and develop and implement actions to reduce threats. MCAS Cherry Point Station Order 3000.2B established the Bird Hazard Working Group (BHWG), and the 2d MAW Order 3710.40B established the standard operating procedures for BASH avoidance and risk management in 2007. The BHWG is tasked with collecting, compiling, and reviewing bird strike data; identifying and recommending actions to reduce BASH hazards; recommending changes in operational procedures; preparing informational programs for aircrews; and serving as the point of contact for off-installation BASH incidents (USMC 2009a). Other Navy and USMC instructions that are in place for implementation of the BASH program include Chief of Naval Operations Instruction (OPNAVINST) 3750.6R, OPNAVINST 5090.1B, and NAVFAC Procedural Manual P-73.

MCAS Cherry Point's aggressive BASH program is a model among USMC and Navy installations. In cooperation with the USDA, MCAS Cherry Point has provided necessary BASH services to all of its properties. As a result of the BASH program, deer, wild turkey, and waterfowl have been identified as primary threats to aircraft. The use of deer and waterfowl hunting to facilitate reduction in deer/aircraft strike hazards on the airfield is a major element of the Integrated

Wildlife Damage Management (IWDM) program. Spotlight counts are conducted frequently to help managers monitor deer and other wildlife activity in the vicinity of the airfields.

Other coordinated activities to reduce wildlife hazards to aircraft include hazing of birds and animals with pyrotechnics and other devices, relocation, chemical repellents, and lethal control when other non-lethal approaches are deemed ineffective. Through the BHWG, cultural modification to facilities and land areas (e.g., netting, excluders, spikes, fencing, vegetation management) are recommended and employed as identified within the Wildlife Hazard Assessment for MCAS Cherry Point. Additional recommendations to reduce wildlife hazards are entered into the decision-making process through project planning reviews and field observations.

MCAS Cherry Point currently maintains Migratory Bird Depredation and Special Airport Depredation permits that are renewed annually with USDA, USFWS, and NCWRC. These permits authorize MCAS Cherry Point to disperse or remove deer, birds, and other wildlife in the vicinity of the airfield that pose a threat to aircraft safety.

MCAS Cherry Point has developed educational materials that are disseminated to MCAS Cherry Point residents and other tenants that describe recommendations and preventative measures for reducing the potential for wildlife/human interactions.

9.1.4 Invasive Species Control

Invasive species are those not native to a given ecosystem, and whose introduction causes or is likely to cause economic or environmental harm and/or harm to human health (EO 13112, February 1999). Invasive species are recognized as a leading threat to natural ecosystems and biodiversity and are a leading cause of federal and state listing of native plant species, due to their ability to alter natural ecosystems and diminish the abundance or survival of native species. Pimentel et al. (2005) estimated that 42% of species protected by the ESA are at risk primarily because of nonnative, invasive species. Although the majority of invasive species are plants, their indirect impact on wildlife habitat can be large as habitat diversity and characteristics important to native wildlife are often degraded.

Several statutes and EOs including: EO 11987, Exotic Organisms; and EO 13112, Invasive Species, address the control of invasive, nonnative species on federal facilities. EO 11987 specifically restricts the introduction of harmful exotic species into native ecosystems, and to the extent practicable and permitted by law, EO 13112 requires that federal facilities:

- Prevent the introduction of invasive species,
- Detect and control such species,
- Monitor invasive species populations,
- Provide for restoration of native habitats that have been invaded,
- Conduct research on invasive species to prevent introduction and for sound control, and
- Promote public education on invasive species.

The control of invasive species is a primary natural resources management issue on military installations because of the potential impacts invasive species have on military training and readiness, and degradation they can cause to the natural environment (USMC 2001). To assess the presence and extent of invasive species at MCAS Cherry Point and provide information for the development of a management plan, field surveys to evaluate the existing condition were conducted in 2004 and 2005. Results were used to develop MCAS Cherry Point's Invasive Species Survey and Management Plan (NAVFAC Atlantic 2006). Following the recommendations of the management plan, MCAS Cherry Point initiated treatment of invasive species on five of its properties in 2008 with additional treatments conducted in 2009 and 2010 (NAVFAC Atlantic 2010).

The following plant species were treated in 2009 and 2010 using several different herbicides and a variety of application methods (NAVFAC Atlantic 2010):

- Monitor invasive species populations,
- Privet (*Ligustrum sinensis*),
- Kudzu (*Pueraria montana*),
- Mimosa (*Albizia julibrissin*),
- Autumn olive (*Elaeagnus umbellata*),
- Thorny olive (*Elaeagnus pungens*),
- Scarlet firethorn (*Pyracantha coccinea*),
- Chinese bushclover (*Lespedeza cuneata*),
- Japanese stiltgrass (*Microstegium vimineum*),
- Multiflora rose (*Rosa multiflora*),
- Pampas grass (*Cortaderia selloana*), and
- Shrubby lespedeza (*Lespedeza bicolor*).

Retreatment of these species is scheduled to occur in 2023 through 2026.

9.1.5 Nuisance Wildlife Control

Nuisance wildlife is wildlife that, because of their feeding or nesting habits, interfere with the military mission or well-being of native animals, other wildlife, or humans. Many species of wildlife do not cause damage in the traditional sense but can be considered nuisances merely by their presence in a particular location. Wildlife that cross roads, nest and feed in and around homes, make noise, and leave their droppings are common occurrences which can often interrupt everyday life. Many nuisance wildlife that present potential danger to aircraft operations are managed through MCAS Cherry Point's BASH Program and other invasive species like the southern pine beetle are managed through the forestry program. Primary nuisance wildlife that may be problematic outside of the BASH program include: feral cats, Canada geese, opossum, nutria, raccoon, and white-tailed deer. Outside of BASH and legal hunting and trapping, there are no active programs to control nuisance wildlife and most incidents and problems are handled on a case-by-case basis by the Environmental Affairs Department and within the confines of environmental law.

9.2 WILDLIFE MANAGEMENT OBJECTIVES AND ACTIONS

The following objectives and actions have been developed for management of wildlife at MCAS Cherry Point.

OBJECTIVE WFM1: Provide a variety of landscapes that support ecosystem management and biodiversity conservation goals.

- **Action 6-02** – Use prescribed fire and mechanical and chemical (if necessary) control methods to manage stands to promote forest health and growth.
- **Action 6-03** – Restore longleaf pine habitat in historic locations designated as priority restoration sites.
- **Action 6-04** – Monitor and improve forest health for pests and disease.
- **Action 9-01** – Implement wildlife habitat improvement projects (e.g., wildlife openings, nest boxes).

OBJECTIVE WFM2: Provide a variety of hunting opportunities to authorized recreational users.

- **Action 6-01** – Align forest management with the military mission, such as providing accessibility and recreation.
- **Action 9-02** – Provide a quality hunting program through support and management of game species.
- **Action 9-03** – Provide hunting opportunities for wounded warriors through participation in the Wounded Warrior Project.
- **Action 9-04** – Maintain NCWRC Wildlife Cooperator Agent status for reporting harvest data.

OBJECTIVE WFM3: Conserve native fauna and species that are indicators of habitat and ecosystem health.

- **Action 9-05** – Support general, sensitive, and indicator species surveys.
- **Action 9-06** – Support reintroduction programs as necessary to restore native fauna.

OBJECTIVE WFM4: Protect the health and safety of MCAS Cherry Point tenants and aircraft from BASH.

- **Action 9-07**– Implement BASH Program.
- **Action 9-08** – Coordinate wildlife damage control measures with the BHWG.
- **Action 9-09** – Maintain updated Migratory Bird Depredation, and Special Airport Depredation, and Bald Eagle Depredation permits (when required) to address wildlife damage control situations.
- **Action 9-10** – Integrate wildlife damage control measures with the hunting program, when feasible, to reduce potential for aircraft strikes with deer, waterfowl, wild turkey, and other wildlife.

OBJECTIVE WFM5: Treat and control invasive species to conserve and enhance native flora and fauna and the functional value of natural systems.

- **Action 9-12** – Prioritize and treat existing invasive species populations.
- **Action 9-13** – Survey for new infestations of invasive flora and fauna.
- **Action 9-14** – Monitor treated populations.
- **Action 9-15** – Implement recommendations of the MCAS Cherry Point Complex Invasive Species Survey and Management Plan (NAVFAC Atlantic 2006).
- **Action 9-16** – Participate in, as appropriate, DoD initiatives related to invasive species management and control.

9.3 FISHERIES MANAGEMENT

The primary objectives of fisheries management at MCAS Cherry Point are to provide quality recreational fishing opportunities for the military community and to identify and implement actions to meet ecosystem management and biodiversity conservation goals for native fisheries and habitat found in MCAS Cherry Point controlled waters. NRD staff are responsible for working closely with other MCAS Cherry Point staff, State agencies, and federal entities to ensure fisheries management program objectives are aligned with State recommendations, plans, environmental law, and the military mission.

Annual fisheries management activities are associated with support of recreational fishing and essential fish habitat (EFH) management. Recreation fishing is supported through the maintenance of MCAS Cherry Point marina's, recreational fishing ponds, boat ramps and other access points, and as well as the enforcement of fishing laws and regulations. In addition, an important component of fisheries management is the assessment, study, and management of EFH habitat.

9.3.1 Recreational Fishing

Inland and coastal fisheries resources and waterways in and around MCAS Cherry Point are jointly managed by the NCWRC and North Carolina Department of Marine Fisheries, and are open to the general public unless access is specifically prohibited or restricted by 33 CFR 334.430 and 33 CFR 334.420. Recreational and commercial uses within these CFR controlled areas are enforced, with violations referred to the Special Assistant United States Attorney for adjudication.

MCAS Cherry Point's fisheries management program focuses on a variety of species including freshwater and marine species. Fishing seasons for permitted species are controlled by State and federal regulations and are supplemented with MCAS Cherry Point programs and policy regulations. The following fisheries management activities are ongoing at MCAS Cherry Point:

- Selling fishing permits and collecting funds in accordance with DoD regulations;
- Annual stocking of sport and management fish (e.g., grass carp) at managed ponds;
- Managing and maintaining pond shorelines;
- Operating and maintaining marina's and boat ramps and other access points;

-
- Installing new trash racks, as needed, at managed ponds to prevent fish escape;
 - Enforcing fishing laws and regulations;
 - Hosting an annual Kids Day Fishing Tournament in June (Bartlett, Duck and Catfish ponds); and
 - Managing EFH.

9.3.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is the primary law governing marine fisheries management in federal waters of the U.S. The MSFCMA, enacted in 1976, created eight regional fishery management councils that are responsible for regional conservation and management of federal managed fish species. The MSFCMA was amended in 1996, which required the fishery management councils to identify EFH that is necessary for federally managed fish species to perform their basic life functions (NOAA 2007). Specifically NOAA defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Habitat Areas of Particular Concern (HAPC) are a subset of EFH, and represent EFH areas that provide extremely important ecological functions and/or are especially vulnerable to degradation. Federal agencies are required to consult with NMFS (and the appropriate fisheries management council) when actions may adversely impact EFH or HAPC. The regional fisheries management councils responsible for consultation on MCAS Cherry Point actions are the Mid-Atlantic Fishery Management Council and South Atlantic Fishery Management Council (Navy 2007).

To comply with the MSFCMA, MCAS Cherry Point completed an EFH assessment study in 2007 that identified numerous wetland, nearshore, and offshore areas as EFH, as well as those areas that would meet the criteria of HAPC (Navy 2007). Detailed maps of all the EFH areas are provided in the report. A supplemental EFH survey was conducted in 2022 to further validate those results.

Twelve (12) EFH habitat types were identified for MCAS Cherry Point, including:

- Tidal freshwater (palustrine),
- Estuarine and emergent wetlands,
- Tidal palustrine forested areas,
- Estuarine and marine SAV,
- Subtidal and intertidal non-vegetated flats,
- Oyster reefs and shell banks,
- Salinity based habitat,
- Unconsolidated bottom habitat,
- State designated nursery areas,
- Tidal creeks,
- Macroalgae, and
- Bays and estuaries (Navy 2007).

Two temperate species, eight subtropical species, and three highly migratory species are associated with EFH and HAPC identified for MCAS Cherry Point and include both fish and invertebrate species. Table 9.1 summarizes the fish and invertebrate species and associated EFH habitat types that have been identified for each area of MCAS Cherry Point. The EFH report (Navy 2007) provides detailed information on the habitat and life history requirements for each species, as well as detailed maps of the EFH and HAPC areas associated with MCAS Cherry Point. Cat Island, Maw Point, and Pamlico Point were not included in the EFH study; however, these locations have intrinsic value as they contain estuarine and emergent wetland habitat. MCAS Cherry Point is required to consult with NMFS prior to implementing any projects or actions that may adversely affect EFH (Navy 2011). An adverse affect to EFH is described as “any impact that reduces the quality and/or quantity of EFH.” Further clarification of adverse effects to EFH is provided in 50 CFR §600.910(a) and additional information on NMFS consultation requirements are provided on the NMFS Habitat Conservation website (NMFS Habitat Conservation undated).

9.4 FISHERIES MANAGEMENT OBJECTIVES AND ACTIONS

The following management objectives and actions have been developed for management of fisheries and EFH at MCAS Cherry Point.

OBJECTIVE WFM6: Provide quality and sustainable fishing opportunities by managing recreational fishing ponds and populations of game fishes.

- **Action 9-17** – Align fisheries management with the military mission, such as providing accessibility and recreation opportunities (e.g., boat ramp and shoreline maintenance, Kids Day Tournament).
- **Action 9-18** – Provide a quality recreational fishing program through support and management of sport fish (e.g., stocking program, biological control).

OBJECTIVE WFM7: Consider designated EFH areas associated with MCAS Cherry Point in natural resources management and planning.

- **Action 9-19** – Develop plans to implement recommendations of the MCAS Cherry Point EFH Study.
- **Action 9-20** – Ensure EFH is considered in all action evaluations.
- **Action 9-21** – MCAS Cherry Point will consult with NMFS for any potential project or action that may adversely affect EFH under their jurisdiction.

Table 9.1. Essential Fish Habitat and Associated Fish and Invertebrate Species of MCAS Cherry Point Complex.

Common Name	Scientific Name	Life Stage	Air Station	Piney Island (BT-11)	MCOLF Atlantic	MCALF Bogue	Brant Island Shoal (BT-9)
Temperate Species							
Bluefish	<i>Pomatomus saltatrix</i>	Juvenile	SBH	SBH	SBH	SBH	SBH
		Adult	SBH	SBH	SBH	SBH	SBH
Summer flounder	<i>Paralichthys dentatus</i>	Larva	SBH	SBH	SBH	SBH	SBH
		Juvenile	SBH	SBH	SBH	SBH	SBH
		Adult	SBH	SBH	SBH	SBH	SBH
Subtropical Species							
Black sea bass	<i>Centropristis striata</i>	Juvenile	EMW, EMS, UBS, and TC	EMW, EMS, UBS, TC, MA, and ORSB	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, TC, and MA
		Adult	EMS	EMS	EMS	EMS	EMS
Brown shrimp	<i>Farfantepenaeus aztecus</i>	Juvenile	TFP, EMW, TPF, and EMS	EMW, EMS, and SINF	TFP, EMW, TPF, EMS, and SINF	EMW, TPF, EMS, and SINF	EMW, EMS, and SINF
Cobia	<i>Rachycentron canadum</i>	Egg	EMS	EMS*, SNA, and BE*	EMS*, SNA, and BF*	EMS*, SNA, and BE*	EMS*, SNA, and BE*
		Larva	EMS	EMS*, SNA, and BE*	EMS*, SNA, and BF*	EMS*, SNA, and BE*	EMS*, SNA, and BE*
		Juvenile	EMS	EMS*, SNA, and BE*	EMS*, SNA, and BF*	EMS*, SNA, and BE*	EMS*, SNA, and BE*

Common Name	Scientific Name	Life Stage	Air Station	Piney Island (BT-11)	MCOLF Atlantic	MCALF Bogue	Brant Island Shoal (BT-9)
		Adult	EMS	EMS*, SNA, and BE*	EMS*,SNA, and BF*	EMS*, SNA, and BE*	EMS*, SNA, and BE*
Subtropical Species (cont'd)							
Gray Snapper	<i>Lutjanus griseus</i>	Juvenile				EMW, EMS, ORSB, UBS, and TC	
		Adult				EMS	
King mackerel	<i>Scomberomorus cavalla</i>	Egg	SNA	SNA	SNA	SNA	SNA
		Larva	SNA	SNA	SNA	SNA	SNA
		Juvenile	SNA	SNA	SNA	SNA	SNA
		Adult	SNA	SNA	SNA	SNA	SNA
Pink shrimp	<i>Farfantepenaeus duorarum</i>	Juvenile	TFP, EMW, TPF, and EMS	EMW, EMS, and SINF	TFP, EMW, TPF, EMS, and SINF	EMW, TPF, EMS, and SINF	EMW, EMS, and SINF
Red drum	<i>Sciaenops ocellatus</i>	Egg	TFP, EMW, EMS, UBS, and TC	EMW, EMS, ORSB, UBS, and MA	TFP, EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC
		Larva	TFP, EMW, EMS, UBS, and TC	EMW, EMS, ORSB, UBS, and MA	TFP, EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC
		Juvenile	TFP, EMW, EMS, UBS, and TC	EMW, EMS, ORSB, and UBS, MA	TFP, EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC
		Adult	TFP, EMW, EMS, UBS, and TC	EMW, EMS, ORSB, UBS, and MA	TFP, EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC	EMW, EMS, ORSB, UBS, and TC
Spanish mackerel	<i>Scomberomorus maculatus</i>	Egg	SNA	SNA	SNA	SNA	SNA
		Larva	SNA	SNA	SNA	SNA	SNA

Common Name	Scientific Name	Life Stage	Air Station	Piney Island (BT-11)	MCOLF Atlantic	MCALF Bogue	Brant Island Shoal (BT-9)
		Juvenile	SNA	SNA	SNA	SNA	SNA
		Adult	SNA	SNA	SNA	SNA	SNA
White shrimp	<i>Penaeus setiferus</i>	Juvenile	TFP, EMW, TPF, and EMS	EMW, EMS, and SINF	TFP, EMW, TPF, EMS, and SINF	EMW, TPF, EMS, and SINF	EMW, EMS, and SINF
Highly Migratory Species							
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	Neonate	BE	BE	BE	BE	BE
		Juvenile	BE	BE	BE	BE	BE
Dusky shark	<i>Carcharhinus obscurus</i>	Neonate	BE	BE	BE	BE	BE
		Juvenile	BE	BE	BE	BE	BE
Tiger shark	<i>Galeocerdo cuvier</i>	Juvenile	BE	BE	BE	BE	BE

Habitat codes: TFP – tidal freshwater (palustrine); EMW – estuarine and marine emergent wetlands; TPF – tidal palustrine forested areas; EMS – estuarine and marine submerged aquatic vegetation; SINF – subtidal and intertidal non-vegetated flats; ORSB – oyster reefs and shell banks; UBS – unconsolidated bottom sediments; SBH – salinity based habitats; SNA – State designated nursery areas; TC – tidal creeks; and BE – bays and estuaries.

*Only high salinity (>19 PSU) areas are considered EFH for this species.

Source: Navy 2007

10.0 PUBLIC ACCESS AND OUTDOOR RECREATION

The Marine Corps permits public access to natural resources to the extent appropriate and consistent with the military mission and safety and security requirements. Airfield operations and other training activities occurring at MCAS Cherry Point, including live firing ranges, require that it be closed to public access for both safety and security.

The availability of resource-based outdoor recreational activities is vital for many members of our military community. Outdoor recreation activities provide many physical and psychological benefits and enhance quality of life.

10.1 PUBLIC ACCESS

Typically, the general public is allowed access to MCAS Cherry Point if accompanied by USMC active duty or civilian staff, or if they are eligible participants in a military sponsored program. The military mission requires that public access to MCAS Cherry Point for recreational purposes be limited to military personnel and their dependents, civilian employees of MCAS Cherry Point, and guests of the above. However, there are special occasions, such as hosting of an air show, where the general public is invited to participate. Other opportunities for public access exist through Marine Corps Community services sponsored activities and events.



Example of air show activities.

Source: USMC 2010h

10.2 NATURAL RESOURCE-BASED OUTDOOR RECREATION

Natural resources staff of MCAS Cherry Point's Environmental Affairs Department ~~scientifically~~ manage wildlife and fisheries resources to meet the demand of recreational users, and to balance wildlife with habitat conditions. The following summarizes the recreation opportunities and recreational use of MCAS Cherry Point.

- Archery range maintained by the Environmental Affairs Department
- Skeet/trap range managed by the Cherry Point Range Management Division.
- 20 acres of freshwater ponds, 12 miles of streams and creeks, and 67 miles of shoreline for fishing. In addition to freshwater ponds there is a marina, multiple boat launches, and access to remote river and estuary waters to provide valuable fishing opportunities. All persons taking advantage of MCAS Cherry Point fishing opportunities are required to be properly licensed.
- Annual stocking of fish in the three freshwater recreational fishing ponds.
- 12,000 acres of forests for hunting.
- On average 1,000 hunting, fishing and trapping permits are issued annually, resulting in over 2,000 annual hunter trips and over \$10,000 annually in revenue.
- MCAS Cherry Point includes integration of youth and youth/adult hunting opportunities when possible.

-
- Opportunities for residents to participate in hiking, biking, wildlife watching around MCAS Cherry Point.

Hunting areas are designated at MCAS Cherry Point, MCOLF Atlantic, MCALF Bogue, and MCOLF Oak Grove. Hunting areas generally follow ground maneuver training area boundaries to provide a consistent approach for land management. Approximately 1,000 acres are reserved for archery only, and 11,000 acres are available for open hunting (bow, shotgun, or muzzleloader). Section 9.0 provides additional details on MCAS Cherry Point's hunting and fishing programs. The management objectives and actions described in this section and Section 9.0 are also applicable to natural resource-based outdoor recreation activities. MCAS Cherry Point also provides recreational hunting opportunities to disabled service members by providing hydraulic stands that are handicapped accessible.

As authorized by MCO 5090.2A, MCAS Cherry Point has established a program for issuance of permits and collection of fees for access to natural resource dependent outdoor recreation activities. Fees or proceeds from hunting, fishing, and trapping licenses are used to fund, or supplement the fish and wildlife management programs. All recreational activities, including cutting firewood, fishing, hunting, and trapping, conducted at MCAS Cherry Point are subject to applicable federal laws, State laws, and regulations specific to MCAS Cherry Point.

Support of the military mission takes precedence over all outdoor recreation activities conducted at MCAS Cherry Point. Outdoor recreational activities are permitted within training and operational areas when they are not scheduled for military use or other land management activities, such as prescribed fire or intensive natural resource surveys. When necessary to ensure the safety of MCAS Cherry Point residents, security measures may also temporarily postpone or cancel outdoor recreational activities.

MCAS Cherry Point is designated as a North Carolina Wildlife Resources Commission Wildlife Cooperator Agent. Cooperator agent status permits MCAS Cherry Point to provide hunters with an authorization number to legally possess a harvested animal. MCAS Cherry Point maintains three separate Cooperator Agent numbers to correctly manage animal harvests.

10.3 PUBLIC ACCESS AND OUTDOOR RECREATION OBJECTIVES AND ACTIONS

The following management objective and action have been developed for public access and outdoor recreation at MCAS Cherry Point.

OBJECTIVE REC1: Manage access of general public to MCAS Cherry Point's conservation program.

- **Action 10-01** – Promote general public awareness of conservation-based recreational opportunities on MCAS Cherry Point.

11.0 CONSERVATION LAW ENFORCEMENT

The Conservation Law Enforcement (CLE) Office of the Environmental Affairs Department function is to ensure compliance with all federal and State criminal laws and MCAS Cherry Point regulations pertaining to natural and cultural resources by conducting a full range of complex investigations and law enforcement techniques resulting in the arrest of persons or parties suspected of violations. MCAS Cherry Point employs three full-time Conservation Law Enforcement Officers (CLEOs) (USMC 2007, USMC 2008). CLEOs work closely with the NRM for protection of land and wildlife resources, threatened and endangered species, forestry, and archeology; and in support of fish and wildlife management programs, through biological data collection from animals and fish harvested by sportsmen, or as a result of illegal activities. CLEOs also provide valuable insight on species abundance and recommendations for protection and enforcement.

The CLEOs enforce criminal laws of the U.S. to include federal, State, and local natural and cultural resource regulations pertaining to wildlife, fisheries, plants, historic resources, trespass, and other applicable environmental regulations. Authority to enforce conservation laws at MCAS Cherry Point is granted by MCO 5090.4A (Conservation Law Enforcement Program), the Station Commanding Officer, and a cooperative agreement with the USFWS which allows the MCAS Cherry Point CLEOs to provide law enforcement support to agencies and lands outside the MCAS Cherry Point boundaries. Prosecution of violators is administered through the Special Assistant U.S. Attorney in federal magistrate court, or through a Conservation Hearing Officer in MCAS Cherry Point court.

CLEOs must attend the Land Management Police Training course at the Federal Law Enforcement Training Center, Glynco, Georgia, to comply with the standard requirements of MCO 5090.4A. CLEOs also attend in-service training annually at various DoD installations, as well as attend specialty environmental law enforcement training offered by, but not limited to, the U.S. National Parks Service and the U.S. Department of Justice. In addition, MCO 5090.4 and the USFWS MOA require CLEOs receive and comply with firearms training requirements. All CLEOs must comply with all training standards set forth by MCO 5090.4.

MCAS Cherry Point CLEOs participate in and support several programs within the NRD. Officers support wildlife damage control programs for nuisance, injured, and orphaned animals. They also provide support as required to the BASH mitigation program and participate in and support wildland fire suppression operations and prescribed burns conducted on MCAS Cherry Point property and property controlled by other agencies with whom MCAS Cherry Point maintains cooperative agreements for wildland fire.

11.1 CONSERVATION LAW ENFORCEMENT OBJECTIVES AND ACTIONS

The following management objective and actions have been developed for CLE at MCAS Cherry Point.

OBJECTIVE ENF1: Maintain an effective and safe enforcement program integrated with conservation management and the military mission.

- **Action 11-01** – Continue to fund the CLE program positions.
- **Action 11-02** – Provide Federal Law Enforcement Training Center Land Management Police Training to new CLE Officers.
- **Action 11-03** – Provide Federal Law Enforcement Training Center Land Management Police Training through annual In-Service CLE activities and other training courses as necessary to support conservation management and the military mission.
- **Action 11-04** – Cooperate with state, local, and federal enforcement authorities on joint enforcement operations consistent with Navy Marine Corps Directive 5090.4A within jurisdictional limits.

12.0 REGIONAL CONSERVATION

12.1 OVERVIEW OF REGIONAL CONSERVATION

The major threats to the sensitive ecosystems and critical habitats associated with eastern North Carolina include commercial and residential development (land use conversion) and pollution impacts. Regional development can also impact natural resources management and military training. MCAS Cherry Point recognizes the development and maintenance of regional conservation partnerships is essential to sustain mission capabilities and ecosystem integrity in the face of rapid population growth and urban expansion along its boundaries.

12.1.1 North Carolina Onslow Bight Conservation Forum

The Onslow Bight Conservation Forum (OBCF) was formed in 2003, and is composed of several federal and State agencies, and NGOs dedicated to sustainable natural resource management. Forum participants represent a broad spectrum of land managers and conservation organizations. Some are custodians of large areas of public land held primarily for resource conservation and utilization or national security. Some modify the resource base by their own construction activities, and some are conservation advocates with little or no land base of their own. All are dedicated to sustainable natural resource management, providing for human needs while retaining our natural heritage. Participants are attempting to foresee potential resource conflicts and conservation opportunities and, within their authority and consistent with their individual missions, work to protect and maintain ecologically viable areas within the Onslow Bight landscape.

MCAS Cherry Point collaborates with OBCF members and other local, State and federal agencies and organizations to conserve biological diversity native to this area. MCAS Cherry Point participates in local county planning efforts and combined with involvement and support of regional OBCF natural resources management initiatives, is contributing to their presence beyond the property boundaries. This partnership helps to ensure compatible land use in the region and helps minimize current and future environmental restrictions on military training lands and the military mission.

The mission of the OBCF is to: *“To provide for open discussion among the participants concerning the long-term conservation and enhancement of biological diversity and ecosystem sustainability throughout the Onslow Bight landscape compatible with the land use, conservation and management objectives of the participating organizations and agencies.”* (NCWRC 2005). The Onslow Bight Conservation Design Plan was adopted in 2004, which defines the conservation targets, conservation priorities within the landscape, and identifies actions that OBCF members may take individually or in mutual cooperation to work towards achieving the OBCF vision. This plan is intended to evolve as conservation work is initiated and completed, and new data and information is obtained. The Conservation Design Plan has recently incorporated components of inshore marine and open water ecosystems.

MCAS Cherry Point attends several OBCF meetings each year to provide assistance and feedback on fostering sustainable natural resource management in the region. Collaboration with forum

members to conserve biological diversity native to the region is key to providing for human needs while retaining our natural heritage. The participants are attempting to foresee potential resource conflicts and conservation opportunities and, within their authority and consistent with their individual missions, work to protect and maintain ecologically viable areas of the Onslow Bight landscape.

MCAS Cherry Point's objectives for participation in the OBCF are to promote encroachment partnering and compatible land use in the vicinity of key training areas and ranges, and to promote preservation of habitat to assist MCAS Cherry Point in avoiding future restrictions associated with endangered species protection. MCAS Cherry Point's participation in encroachment partnering and establishments of restrictive easements described in Section 1.2.6 is part of this process. MCAS Cherry Point continues to work with OBCF participants to identify opportunities to ensure compatible development and conserve local natural resources.

12.1.2 Readiness and Environmental Protection Integration Program

In 2003, DoD created the Readiness and Environmental Protection Integration (REPI) Program in response to incompatible development and loss of habitat around military installations. The goal of the REPI program is to advance mission sustainability through buffer projects, landscape partnerships, and stakeholder engagements. Through the REPI program, DoD funds and supports installation cost-sharing agreements with state and local governments and private conservation organizations to acquire easements or other land interests for the purpose of establishing encroachment buffers. REPI also encourages broader landscape partnerships that address shared cross-boundary issues linking military readiness, conservation, working land, and communities with federal and state partners. REPI emphasizes stakeholder engagements that bring federal, state, and local governments together to develop policy and regulatory solutions to incompatible development and other mission sustainability issues.

12.1.3 Encroachment Partnering

Encroachment Partnering (EP), as a program, is part of the Installation Commander's Encroachment Management Program, which is delegated to the Community Plans & Liaison Office for primary execution. The Environmental Affairs Department promotes INRMP goals through active participation in external natural resources forums such as the Onslow Bight and internal forums such as the Installation Encroachment Management Action Team (EMAT). The Installation EMAT is a cross functional forum for internal coordination, planning, and input on mission sustainment and encroachment issues. The EMAT annually reviews projects for REPI Program funding requests. For additional information regarding EP, refer to the Installation Encroachment Action Plan.

12.3 REGIONAL CONSERVATION OBJECTIVES AND ACTIONS

The following management objectives and actions have been developed for regional conservation at MCAS Cherry Point.

OBJECTIVE CON1: Promote compatible land use and regional habitat conservation with North Carolina Onslow Bight Conservation Forum participants, local governments, and others.

- **Action 12-01** – Continue participation in OBCF meetings.
- **Action 12-03** – Participate, as appropriate, in sub-committees of the OBCF to ensure military training requirements are factored into regional conservation planning.
- **Action 12-04** – Collaborate with OBCF participants and other regional representatives to identify encroachment partnering opportunities.
- **Action 12-05** – Participate in Installation EMAT and assist with development of REPI projects when required.

This page intentionally left blank.

13.0 CONSERVATION OUTREACH AND EDUCATION

13.1 OVERVIEW OF CONSERVATION OUTREACH AND EDUCATION

MCAS Cherry Point's Conservation Outreach and Education Program targets both active-duty Marines and civilian employees, students of MCAS Cherry Point's school system, and Marine families. Outreach includes public affairs and public relations that promote opportunities for the public to become involved and participate in conservation activities and inform the public or specific groups about its natural resource management program and the INRMP. Involving local communities, and interested stakeholders increases public understanding, reduces misinformation and speculation, and generates support for MCAS Cherry Point's natural resources management programs.

The primary focus of conservation outreach and education at MCAS Cherry Point revolves around activities promoted by the Hunting and Fishing Program. The Annual Kids Fishing Tournament and Wounded Warrior Project (described in Section 10.0) help to promote participation in the program. MCAS Cherry Point also provides opportunities to enhance and protect the natural environment through activities promoted as part of annual National Public Lands Day (NPLD) and Earth Day celebrations.

13.2 CONSERVATION OUTREACH AND EDUCATION OBJECTIVES AND ACTIONS

The following management objectives and actions have been developed for conservation outreach and education at MCAS Cherry Point.

OBJECTIVE EDU1: Educate Marines of the legal and ecological basis for federal and State environmental laws, DoD Instructions, MCOs, MCAS Cherry Point Orders, and other regulations and instructions.

- **Action 13-01** – Design and implement an environmental outline for training and education opportunities for each stage of a Marine's career at MCAS Cherry Point.
- **Action 13-02** – Develop procedures for educating visiting military units of MCAS Cherry Point's conservation goals and objectives prior to their use of facilities.
- **Action 13-03** – Cooperate with State and federal agencies on development of a natural resources-based recreational guide for military/civilian personnel.
- **Action 13-04** – Cooperate with USFS representatives to develop an information packet or handout that can be provided to new Marines that identifies proper use and restrictions associated with National Forest lands, including Croatan National Forest.

OBJECTIVE EDU2: Provide environmental and conservation education and opportunities to civilian employees, contractors, and the families of Marines.

- **Action 13-05** – Sponsor a Conservation Volunteer Program.
- **Action 13-06** – Continue to promote participation in MCAS Cherry Point's Hunting and Fishing Program, and NPLD activities.

This page intentionally left blank.

14.0 RESILIENCY AND CLIMATE CHANGE

14.1 Resiliency

In recent years, it has become evident that military installations are facing a “new” national security threat that has tangible and demonstrated impacts to military readiness (REPI 2021). Climate change and its effects have shown vulnerabilities on installations and have provided impetus to increase installation resilience. In 2018, Hurricane Florence came ashore in coastal NC; MCAS Cherry Point saw damage to many structures and interruption of utility services.

In order to minimize impacts to national security in the future, MCAS Cherry Point is actively pursuing ways to increase installation resilience. Congress expanded the REPI 2684a authority in the John S. McCain National Defense Authorization Act for FY 2019 (Public Law 115-232) to include agreements that enhance or improve military installation resilience. In addition, consideration of the resilience of adjacent property owners is important to increase the installations’s resilience. The DoD Office of Local Defense Community Cooperation (OLDCC) program prioritizes installation resilience through partnerships with state, territorial, and local partners by issuing grant funding to those local partners.

Resiliency refers to the degree to which an installation’s built environment and its natural resources are prepared to adapt and overcome the impacts of climate change. Ways to increase resilience include natural infrastructure (living shorelines, restoring wetlands to absorb storm surge, reducing forest fuel loads to prevent wildfires) and built infrastructure (microgrids to sustain power in the event of an outage, renewable energy sources, constructing critical facilities in areas not prone to flooding).

14.2 Climate Change

Climate change is referred to by the national Academy of Sciences as any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer) (reference?). Given the role of natural ecosystems in military training and testing, it is essential to ensure the continued function of ecosystems in the face of climate change to maintain military readiness.

There has been an increase in the scientific understanding of how the climate is changing and expectations of change for the future. Climate related risks for DoD installations can be described by the three primary climate-related factors below (DoD 2014):

- Rising global temperatures
- Changing precipitation patterns and extreme storms
- Rising sea levels and associated storm surge

14.2.1 Rising Global Temperatures

Long-term temperature records indicate overall increases in temperatures globally, including in terms of local averages and extremes. Data also suggests that “very rare extremes” will occur more frequently, as often as annually, while extreme and rare minimum temperatures are expected to no longer occur (Stein et al 2019). These shifts in temperature regimes will have impacts on our natural resources and built infrastructure. Temperature shifts could result in shifts in populations and ecosystems including changes to vegetation, which could include expansion of invasive species and pests (threats to native wildlife populations). Temperature shifts could also result in increased maintenance requirements for infrastructure (cooling buildings and climate controlled equipment, heat damage to roads, etc), strain on electrical supply, and increased drought (associated wildfire danger).

14.2.2 Changing Precipitation Patterns and More Frequent Storms

While projections of precipitation change are harder to quantify, research seem to predict little change to average annual rainfall totals. However, variability of precipitation will increase, meaning there will be the potential for extreme swings from drought to wetter seasons. The most notable impacts from climate change is frequency and intensity of storms. Research indicates that heavy downpour events associated with hurricanes and thunderstorms are predicted to increase in all regions. This is primarily due to higher water vapor content in the air which is the result of higher overall temperatures (Stein et al 2019).

Changing precipitation patterns and increasing extreme storm events will lead to the risk of severe shoreline erosion from storm surge and from overland storm water flow. These erosional impacts can degrade habitat and cause fragmentation, which is detrimental to ecosystems. More frequent drought can stress plant and animal populations which could increase their susceptibility to disease and potential die-off events. Drought also increases wildfire potential and severity (Stein et al 2019).

Built infrastructure will need to withstand higher frequency extreme events, as 100-year storms that may happen annually. Infrastructure will need to be prepared to weather flash flooding events, debris laden waters, and embankment erosion around critical infrastructure. More frequent and intense storms will require the ability to independently sustain power to critical infrastructure to ensure mission readiness at all times (Stein et al 2019).

14.2.3 Rising Sea Levels and Associated Storm Surge

On a global scale, Sea Level Rise (SLR) can be attributed to thermal expansion (as water temperatures rise, water expands) and the melting of land-based ice (Hall 2016). On a regional scale, SLR variation is also driven by ocean circulation, wind, salinity, and land surface characteristics. (subsidence, compaction of sediments, pumping of groundwater, etc.) (Stein et al 2019).

Built infrastructure will need to be relocated to higher ground in order to withstand higher average water levels and increased storm surges. Infrastructure will need to be prepared to weather flash

flooding events, debris laden waters, and embankment erosion around critical infrastructure. More frequent inundation of habitats may affect ecosystem dynamics (Stein et al 2019).

14.3 Climate Adaptation

14.3.1 Principles for Effective Adaptation

MCAS Cherry Point will utilize existing tools to assess the potential impacts of climate change to natural resources on the installations and will maintain adaptive management strategies to ensure the long-term sustainability of resources. Effective adaptation will be reliant on the ability to adjust management strategies to meet conservation goals and objectives when/if impacts from climate change unexpectedly shift. Principles outlined by the DoD to keep in mind for effective adaptation include:

- Act with intentionality; link actions to climate risks
- Manage for change, not just persistence
- Reconsider management goals, not just strategies
- Integrate adaptation into existing work

14.4 Resiliency and Climate Change Objectives and Actions

The following management objectives and actions have been developed for regional conservation at MCAS Cherry Point.

OBJECTIVE RES1: Increase knowledge of installation resilience and potential impacts of climate change at MCAS Cherry Point and its properties.

- **Action 14-01** – Complete resilience evaluations and vulnerability assessments of all MCAS Cherry Point properties.
- **Action 14-02** – Utilize tools provided by DoD to increase local knowledge of threats due to potential climate change.
- **Action 14-03** – Ensure information sharing throughout Facilities and other Directorates.

OBJECTIVE RES2: Prepare Vulnerability Assessments for species and habitats.

- **Action 14-01** – Complete resilience evaluations and vulnerability assessments of all MCAS Cherry Point properties.

OBJECTIVE RES3: Ensure future development is completed taking into mind potential climate change.

- **Action 8-03** – Use an interdisciplinary approach to review proposed actions at MCAS Cherry Point and its properties.
- **Action 14-04** – Ensure project designs adequately incorporate resilience and the ability to adequately respond to potential changes.

OBJECTIVE RES4: Develop natural resources projects that will increase resiliency and provide adaptations for climate change both inside and outside the installation fenceline.

- **Action 14-01** – Complete resilience evaluations and vulnerability assessments of all MCAS Cherry Point properties.
- **Action 14-05** – Implement projects and management techniques recommended through resilience evaluation and vulnerability assessments.
- **Action 14-06** – Develop projects in partnership with local partners to capitalize on funding opportunities (e.g. OLDCC grants, etc).

15.0 SUMMARY

15.1 INRMP Purpose

As discussed in Section 1.0, the purpose of this INRMP is to guide natural resources management for the 5-year period of 2023–2027 in support of the MCAS Cherry Point military mission. The objectives described in Sections 4.0 through 12.0 have been selected to coordinate management of MCAS Cherry Point’s natural resources with the intent of the following six natural resources priorities outlined in Section 3.0:

- (1) **Range Management and Training Land Condition** – Maintain ranges, airfields, and military training areas (ground training and airfield clear zones).
- (2) **BASH** – Maintain a safe operating environment for aircraft.
- (3) **Wildland Fire** – Ensure fires associated with MCAS Cherry Point activities do not affect facilities, timber, and adjacent private properties.
- (4) **Quality of Life** – Ensure the quality of life for military personnel is maintained and, where possible, improved.
- (5) **Water Quality** – Maintain/improve surface water quality and protect/preserve wetlands in compliance with the CWA.
- (6) **Regional Ecosystem Management** – Preserve/enhance natural resources of regional importance.

This INRMP identifies 79 actions and measures of success to meet the natural resource objectives (Appendix B). These actions include “must-fund” actions (Funding Class 0 or I) that must be performed to maintain compliance with laws and regulations, and desirable actions (Funding Class II or III), which will be carried out if funding and personnel are available. Some of the actions meet multiple objectives, while others meet a specific objective.

MCAS Cherry Point has a well-established record of providing measurable and important benefits to species, including managing forest habitat to promote establishment of longleaf pine through longleaf pine restoration projects and the prescribed burning program. This INRMP builds on the previous decades of sound stewardship and benefits to natural resources that are provided as a result of MCAS Cherry Point’s comprehensive natural resource program.

15.2 INRMP Provides Adequate Management of Species

The USFWS and NOAA may decline to designate critical habitat where there exists a plan that provides for the adequate management or protection for listed species. The USFWS uses the following three-point criteria to determine if an INRMP provides adequate management or protection.

1. **The plan provides a conservation benefit to the species.** The cumulative benefits of management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species’ population, or the enhancement or restoration of its habitat within the area covered by the plan (i.e., those areas deemed

essential for conservation of the species). A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies. This revised INRMP provides many benefits to listed species including active monitoring of the bombing target areas for protected sea turtle and marine mammal species, as well as managing and restoring MCAS Cherry Point's longleaf pine habitat forests.

- 2. The plan provides certainty that the management plan will be implemented.** Persons charged with plan implementation are capable of accomplishing the objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all the necessary authorizations or approvals. An implementation schedule (including completion dates) for conservation effort is provided in the plan. MCAS Cherry Point's conservation program is adequately funded and has a well-trained staff of biologists, foresters, enforcement personnel, technicians, and contractors to ensure plan implementation.
- 3. The plan provides certainty that the conservation effort will be effective.** The following criteria are considered when determining the effectiveness of the conservation effort. The plan includes: (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided; and (5) a duration sufficient to implement the plan and achieve the benefits of its goals and objectives.

As described in the previous sections of this INRMP and in Appendices C and D, this updated INRMP provides the necessary objectives, monitoring, measurable standards for success, and provisions for future reporting to ensure effectiveness of the conservation effort for the following species: green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and West Indian manatee.

15.3 INRMP PROVIDES A BENEFIT TO KNOWN SPECIES

The ESA was revised via the NDAA, and states that: "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an integrated natural resources management plan prepared under Section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." An installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species and manages for the long-term conservation of the species. This revised INRMP specifically addresses the benefits of management of these

actions for these species or habitats. The benefits are clearly identifiable in the document and are included in the table of contents of the INRMP.

The USFWS has used the following three-point criteria to determine if the INRMP provides a benefit to the species:

1. **A current INRMP must be completed and provide a benefit to the species.** This updated INRMP includes the provisions of previous consultations with NOAA and provides many benefits to listed species including RCW habitat protection and restoration, and sea turtle and marine mammal habitat protection.
2. **The plan provides assurances that the conservation management strategies will be implemented.** MCAS Cherry Point’s conservation program has a history of adequate funding and has a well-trained staff of biologists, foresters, enforcement personnel, technicians, and contractors to ensure plan implementation.
3. **The plan provides assurances that the conservation management strategies will be effective, by providing for adaptive management.** MCAS Cherry Point and NMFS have been working closely on endangered and threatened species issues. The management programs described in this INRMP and in MCAS Cherry Point directives avoid and minimize impacts to the species and are consistent with current and ongoing Section 7 consultations with the NMFS. MCAS Cherry Point’s monitoring, adaptive management approach and ongoing cooperative relationship with NMFS and the Section 7 consultation process ensure that conservation efforts identified in the INRMP will be effective for listed species known to be present at MCAS Cherry Point.

As described in the previous sections of this INRMP and in Appendices C and D, this updated INRMP meets the “Provides a Benefit” criteria for applicable protected species.

15.4 COMPLIANCE WITH OTHER ENVIRONMENTAL REQUIREMENTS

Land management has the potential to affect regulated resources other than threatened and endangered species, such as wetlands and water quality. As part of the NEPA process, other regulatory agencies and the public have had the opportunity to comment prior to finalizing the 2023 INRMP. In addition, some permits or approvals may be necessary prior to implementing particular INRMP actions, such as securing a Section 404 permit as required by the CWA prior to initiating ground-disturbing activities associated with a project. Other permits may be required prior to implementing site-specific projects listed in this updated INRMP.

15.5 INRMP BENEFITS

15.5.1 Environmental Benefits

The actions in this INRMP provide a clear benefit to natural resources entrusted to MCAS Cherry Point’s care for the INRMP period of 2024–2028. These include, for example, Actions 4-01 and Action 4-03 that provide protection for federally listed species known to occur at MCAS Cherry

Point, and Action 6-02 and Action 6-03 that are designed to restore and promote establishment of longleaf pine habitat. A complete list of actions that will promote conservation, restoration, and management of MCAS Cherry Point's natural resources are provided in Appendix B, and include actions to protect and manage at-risk species, migratory birds, forests, aquatic resources and water quality, military lands, and wildlife and fisheries. Natural resources management actions are also provided for management of public access, outdoor recreation, and enforcement; regional conservation; and conservation outreach and education.

15.5.2 Military Mission Benefits

Integration of natural resources management with mission support and training requirements and responsibilities will help ensure MCAS Cherry Point meets the challenges of ensuring military readiness, providing homeland security, and protecting against bio-terrorism, while protecting and preserving ecosystem health and fulfilling its stewardship and regulatory responsibilities. Implementation of this plan will better integrate sustainable natural resource management with mission support and training requirements and responsibilities, affording more realistic training opportunities in support of MCAS Cherry Point's military mission.

The INRMP benefits military actions in at least five ways:

1. It facilitates compliance with environmental laws and regulations such as SAIA, CWA, and ESA, and obviates the need for federal critical habitat designation through consultation with NMFS regarding potential impacts to protected sea turtle and marine mammal species.
2. It provides actions that support training activities, while still providing protection to the environment and threatened and endangered species (e.g., sea turtle and marine mammal monitoring, managing forest habitats to promote establishment of longleaf pine habitat, identifying species of concern before they restrict military actions, and reducing wildland fire threat with an aggressive prescribed fire program).
3. It provides programs to deal with BASH and wildlife damage.
4. It provides for increased education of Marines and visiting units to promote responsible use of training areas and ranges in order to avoid future restrictions of military actions and required measures to protect federally threatened and endangered species associated with MCAS Cherry Point.
5. It provides for regional conservation and encroachment partnering initiatives to reduce or prevent current and future mission restrictions.

15.5.3 Community Relation Benefits

This INRMP provides continual support for MCAS Cherry Point's community relations. It includes specific actions to continue recreational and educational activities, such as participation in Wounded Warrior Project hunts, continued stocking of fish in the managed freshwater ponds, providing a quality hunting program, issuance of hunting and fishing permits, and a variety of

programs designed to provide natural resources education and outreach for MCAS Cherry Point residents. The document also considers and recommends actions dealing with encroachment, and public and military awareness of on-going environmental efforts. Finally, as with any planning process, this INRMP allows for continued cooperation with federal and State natural resources agencies such as USFWS, NMFS, NCWRC, and the NCDEQ.

15.6 CONCLUSION

This updated INRMP reflects MCAS Cherry Point's approach to natural resource management actions and summarizes baseline information and agreements through which compliance with regulatory and planning processes, such as those provided by SAIA, NEPA, ESA, and CWA is accomplished. It provides the guidance and direction for natural resource management activities and serves as the foundation for sustaining and enhancing the military mission.

This page intentionally left blank.

16.0 LITERATURE CITED

- Bailey, R.G., P.E. Avers, T King, and W.H. McNab, eds. 1994. Ecoregions and subregions of the United States (map). Washington, DC: U.S. Geological Survey. Scale 1:7,500,000. Colored. Accompanied by a supplementary table of map unit descriptions compiled and edited by W.H. McNab, and R.G. Bailey. Prepared for the USDA Forest Service.
- Benton, N., J.D. Ripley, and F. Powledge, eds. 2008. Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers. Arlington, Virginia: NatureServe. Available online at: <http://www.dodbiodiversity.org>.
- Carteret County. 2021. Carteret County 2021 Land Use Plan Update. Carteret County, North Carolina. Available online at: <https://www.carteretcountync.gov/DocumentCenter/View/10775/2021-Carteret-County-CAMA-Land-Use-Plan?bidId=> (Accessed 10 October 2022).
- City of Havelock, 2023. City of Havelock, NC, CAMA Land Use Plan. Havelock, NC. Available online at: <https://edocs.deq.nc.gov/CoastalManagement/DocView.aspx?dbid=0&id=311945> (Accessed 05 June 2024).
- Conant, R. and J.T. Collins. 1998. Reptiles and Amphibians of Eastern and Central North America, Third Ed. Houghton and Mifflin Company. 616 pp.
- Cornell Lab of Ornithology. 2011. All About Birds. Available online at: <http://www.allaboutbirds.org/Page.aspx?pid=1189> (Accessed 17 February 2011).
- Craven County. 2009. Craven County, North Carolina CAMA Core Land Use Plan. Available online at: <https://www.deq.nc.gov/documents/pdf/land-use-plans/cravencountylup-30oct2009/download> (Accessed 05 June 2024).
- Data USA. 2021 Available online at: <https://datausa.io/profile/geo/craven-county-nc/> (Accessed 01 June 2023)
- Dunning, J.B. 2006. Bachman's Sparrow (*Peucaea aestivalis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available online at: <http://bna.birds.cornell.edu/bna/species/038doi:10.2173/bna.38> (Accessed 9 March 2011).
- Department of Defense (DoD). 1996. Department of Defense Instruction (DoDI) 4715.3. Environmental Conservation Program. 3 May 1996.
- Ernst, Carl and J. E. Lovich. 2009. Turtles of the United States and Canada, 2nd ed. Johns Hopkins University Press. Baltimore, MD. 827 pp.

Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Neuse River Waterdog, Endangered Species Status for Carolina Madtom, and Designations of Critical Habitat. 86 Fed. Reg. 30688. June 9, 2021. 50 CFR Part 17.

Farmer, N.A., Garrison, L.P., Horn, C. et al. (2022). The distribution of manta rays in the western North Atlantic Ocean off the eastern United States. *Sci Rep* 12, 6544. <https://doi.org/10.1038/s41598-022-10482-8>.

Hall, J.A., S. Gill, J. Obeysekera, W. Sweet, K. Knuuti, and J. Marburger. 2016. Regional Sea Level Scenarios for Coastal Risk Management: Managing the Uncertainty of Future Sea Level Change and Extreme Water Levels for Department of Defense Coastal Sites Worldwide. U.S. Department of Defense Strategic Environmental Research and Development Program. 224 pp.

Headquarters, U.S. Marine Corps (HQ USMC). 2007. Handbook for Preparing, Revising, and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations. Land Use & Military Construction Branch, Natural Resources Section. October 2007.

Hightower, J. E. 2001. Status of shortnose sturgeon in the Neuse River, North Carolina. Unpublished North Carolina State University research proposal.

Laura, A-M. 2009. Using passive acoustics to monitor bottlenose dolphin (*Tursiops truncatus*) use of two military ranges in Pamlico Sound, North Carolina. Master Project, Nicholas School of Environment, Duke University.

LeBlond, R.J., J.O. Fussell, and A.L. Braswell. 1994. Inventory of the Rare Species, Natural Communities, and Critical Areas of the Cherry Point Marine Corps Air Station, North Carolina. Edited by I.K. Smith. Prepared for the North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment, Health, and Natural Resources, Raleigh, North Carolina. June 1994.

Legrand, H. E., C.C. Frost, J. O. Fussell III. 1992. Regional Inventory for Critical Natural Areas, Wetlands Ecosystems, and Endangered Species of the Albemarle–Pamlico Estuarine Region: Phase 2. N.C. North Carolina Natural Heritage Program, Division of Parks and Recreation Department of Environment, Health, and Natural Resources.

MCASCP Economic Impact Statement, 2021 Available online at: <https://www.cherrypoint.marines.mil/Public-Affairs/Economic-Impact/>

Michigan State University. "Mowing for monarchs." *ScienceDaily*. ScienceDaily, 12 March 2019. www.sciencedaily.com/releases/2019/03/190312123626.htm

Mickler, R.A. 2006. Reintroduction of Prescribed Fire in Coastal Plain Ecosystems to Reduce Wildland Fire Risk. Department of Defense Legacy Resource Management Program. Report Number: 05-252. September 2006.

-
- Mitchell, J.C. 2001. Monitoring and Management of a Sensitive Resource: A Landscape-level Approach with Amphibians. March 2001 Report to the Legacy Resource Management Program.
- Mitchell, J.C. 2002a. Monitoring and Management of a Sensitive Resource: A Landscape-level Approach with Amphibians. September 2002 Report to the Legacy Resource Management Program.
- Mitchell, J.C. 2002b. Guide to Inventory and Monitoring of Amphibians on Dare County Bombing Range, Cherry Point Marine Corps Air Station, and Marine Corps Base Camp Lejeune, North Carolina. Supplement to Monitoring and Management of a Sensitive Resource: A Landscape-level Approach with Amphibians. August 2002 Report to the Legacy Resource Management Program.
- Mitchell, J.C, and J. Hall. 2007. Amphibian Survey of the Mitigation Wetland Site on MCAS Cherry Point. 26 December 2007.
- National Marine Fisheries Service (NMFS). 2002. National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion for Ongoing Ordnance Delivery at Marine Corps Air Station Cherry Point Bombing Range Target 9 and Bombing Target 11 in Pamlico Sound, North Carolina. 27 September 2002 from Joseph E. Powers, Ph.D., National Marine Fisheries Service Acting Regional Administrator, to Mr. William H. Rogers, Natural Resources Manager, Marine Corps Air Station Cherry Point.
- National Marine Fisheries Service (NMFS). 2021. Incidental Harassment Authorization to Harass Marine Mammals Incidental to Military Training Exercises at U.S. Marine Corps Air Station Cherry Point Range Complex, North Carolina. Issued 18 May 2021.
- National Marine Fisheries Service (NMFS). 2011. Bottlenose Dolphin (*Tursiops truncatus*). Available online at:
<http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bottlenosedolphin.htm>
(Accessed 17 February 2011).
- National Marine Fisheries Service (NMFS) Habitat Conservation. Undated. Essential Fish Habitat Consultations. Available online at:
<http://www.habitat.noaa.gov/protection/efh/consultations.html> (Accessed 4 May 2011).
- National Marine Fisheries Service (NMFS). In preparation. National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion for Ongoing Ordnance Delivery at Marine Corps Air Station Cherry Point Bombing Range Target 9 and Bombing Target 11 in Pamlico Sound, North Carolina.
- National Oceanic and Atmospheric Administration (NOAA). 2007. Essential Fish Habitat. Available online at:
-

http://www.nmfs.noaa.gov/sfa/reg_svcs/Council%20stuff/council%20orientation/2007/2007TrainingCD/TabT-EFH/EFH_factsheet.pdf (Accessed 18 November 2010).

National Oceanic and Atmospheric Administration (NOAA). 2023. Giant Manta Ray. Available online at: <https://www.fisheries.noaa.gov/species/giant-manta-ray> (Accessed 4 October 2023).

National Oceanic and Atmospheric Administration (NOAA). 2023. Section 7 Species Presence Information: Oceanic Whitetip Sharks in the Greater Atlantic Region. Available online at: <https://www.fisheries.noaa.gov/consultations/section-7-species-presence-information-oceanic-whitetip-sharks-greater-atlantic> (Accessed 4 October 2023).

NatureServe Explorer. 2010. An Online Encyclopedia of Life. Available online at: <http://www.natureserve.org/explorer> (Accessed 30 January 2023).

Naval Facilities Engineering Command (NAVFAC) Atlantic. 2006. MCAS Cherry Point Complex Invasive Species Survey and Management Plan. April 2006.

Naval Facilities Engineering Command (NAVFAC) Atlantic. 2010. Treatment of Invasive Plant Species at MCAS Cherry Point, North Carolina. 24 January 2010.

Navy Public Works Center. 2001. Hydrographic Survey of Range BT-9 (Pamlico Sound).

North Carolina Center for Geographic Information and Analysis (NCCGIA). 2006. 20060330, onemap_prod.SDEADMIN.cb100sl_poly: Raleigh, North Carolina. <ftp://ftp.nconemap.com/outgoing/vector/cb100sl.zip>.

North Carolina Department of Agriculture and Consumer Services. 2010. Plant Industry – Plant Conservation. Protected Plant List. Available online at: <http://www.ncagr.gov/plantindustry/plant/plantconserve/plist.htm> (Accessed 28 September 2010).

North Carolina Department of Environment and Natural Resources (NCDENR). 2010. Natural Heritage Element Occurrences. November 2010. Division of Parks and Recreation, Natural Heritage Program, Raleigh, North Carolina. Available online at: <ftp://ftp.nconemap.com/outgoing/vector/nheo.zip> (Accessed December 2010).

North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality, 2024. Surface Water Classifications. Available online at: <https://www.deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/classifications> (Accessed 05 June 2024).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2023. Natural Heritage Program 2023 Biennial Report. Available online at: <https://webservices.ncleg.gov/ViewDocSiteFile/74411> (Accessed 05 June 2024).

-
- North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2022. Natural Heritage Program List of Rare Animal Species of North Carolina. Available online at: <https://www.ncnhp.org/references/publications/2022-rare-animal-list> (Accessed 14 January 2023).
- North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2022. Natural Heritage Program List of Rare Plant Species of North Carolina. Available online at: <https://www.ncnhp.org/references/publications/2022-rare-plant-ist> (Accessed 14 January 2023).
- North Carolina Department of Environment and Natural Resources (NCDENR), Natural Resources Planning and Conservation. 2009. North Carolina Natural Heritage Program Biennial Protection Plan. List of Significant Heritage Areas. Raleigh, North Carolina.
- North Carolina Geological Survey. 1991. Generalized Geologic Map of North Carolina. Reprinted, 1996.
- North Carolina Geological Survey. 2004. Physiography of North Carolina. Modified from 1991 Generalized Geologic Map. Digital representation by M.A. Medina, J.C. Reid, and R.H. Carpenter.
- North Carolina Native Plant Society (NCNPS). 2008. Recommended Native Species. Chapel Hill, North Carolina. Available online at: <http://www.ncwildflower.org/natives/recommend.htm#Contents#Contents> (Accessed 23 August 2011).
- North Carolina Natural Heritage Program (NCNHP). 2023. Natural Heritage Program 2023 Biennial Report. Raleigh, North Carolina. Available online at: <https://webservices.ncleg.gov/ViewDocSiteFile/74411> (Accessed 22 June 2024).
- North Carolina Office of Environmental Education. 2010. Discover North Carolina's River Basins (Interactive Map). Available online at: <http://www.eenorthcarolina.org/public/eoaddress/riverbasins/riverbasinmapinteractive.htm> (Accessed 2 November 2010).
- North Carolina State Parks. 2023. Mammals of North Carolina: Their Distribution and Abundance. Available online at: https://auth1.dpr.ncparks.gov/mammals/county_records.php?speciesID=85&county=_Carteret_inshore&Submit=Submit (Accessed 14 January 2023).
- North Carolina State Parks. 2023. Vascular Plants of North Carolina. Available online at: <https://auth1.dpr.ncparks.gov/flora/index.php> (Accessed 14 January 2023).
- North Carolina Wildlife Resources Commission (NCWRC). 2005. North Carolina Wildlife Action Plan. Raleigh, North Carolina. Available online at:
-

-
- http://www.ncwildlife.org/plan/WSC_WAP_Downloads.htm (Accessed 14 January 2011).
- North Carolina Wildlife Resources Commission (NCWRC). 2008. Protected Wildlife Species of North Carolina. Available online at:
http://www.ncwildlife.org/Wildlife_Species_Con/documents/protected_species.pdf
(Accessed 28 September 2010).
- North Carolina Wildlife Resources Commission (NCWRC). 2012. Conservation of the Gopher Frog (*Rana capito*) in North Carolina. Available online at:
<http://ncwrc.conservancyregistry.org/projects/15863#fulldescr> (Accessed 26 April 2012).
- Pamlico County. 2012. Pamlico County Joint CAMA Land Use Plan. Available online at:
<http://dcm2.enr.state.nc.us/planning/Pamlico%20Co/Pamlico%20Land%20Use%20Plan.pdf> (Accessed 16 November 2023).
- Petranka, J. 1998. Salamanders of the U.S. and Canada. Smithsonian Institution Press, Washington. 587 pp.
- Pimentel, D., R. Zuniga and D., Morrison, 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52:273–288.
- Rachelle, M. 2008. *Hemidactylium scutatum*. In: Fire Effects Information System [Online]. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available online at:
http://www.google.com/imgres?imgurl=http://www.fs.fed.us/database/feis/animals/amphibian/hesc/RxfireofFordetal99.jpg&imgrefurl=http://www.fs.fed.us/database/feis/animals/amphibian/hesc/all.html&usq=__V5xcz25MbbXJ4cxhb7SEIus8hQU=&h=189&w=249&sz=18&hl=en&start=4&zoom=0&um=1&itbs=1&tbnid=XUdIuCfFayFYGM:&tbnh=84&tbnw=111&prev=/images%3Fq%3DU.S.%2BForest%2BService%2Bnorth%2Bcarolina%2Bfire%2Bphotographs%26um%3D1%26hl%3Den%26tbn%3Disch&ei=3QunTZOZLoKasAPTpe27CA (Accessed 14 April 2011).
- REPI. 2021. *Building Resilience to Climate Change Through Off-Base Natural Infrastructure Solutions: A REPI guide for installations and partners*. Washington, D.C., USA. Available online at:
https://www.repi.mil/Portals/44/Documents/Resilience/REPI_ResiliencePrimer.pdf
(Accessed 2 February 2023).
- Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E. Young, and J.R. Zook. 2003. Digital Distribution Maps of the Birds of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA. Available online at:
http://www.natureserve.org/explorer/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehens
-

[ive.wmt&summaryView=tabular_report.wmt&elKey=105170&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=105170&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=105170](http://www.wmt&summaryView=tabular_report.wmt&elKey=105170&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=105170&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=105170) (Accessed 9 March 2011).

Rogers, W. 1999. Personal communication regarding sightings of red-cockaded woodpeckers at MCAS Cherry Point. November 1999.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina; Third Approximation. North Carolina Natural Heritage Program. Pp. 326.

Snakes of North Carolina. 2011. Snakes of North Carolina. Davidson University. Available online at:
http://www.bio.davidson.edu/projects/herpcons/herps_of_nc/snakes/snakes.html#
(Accessed 9 March 2011).

State Climate Office of North Carolina. 2010. Overview. Available online at: <http://www.nc-climate.ncsu.edu/climate/ncclimate.html> (Accessed 1 November 2010).

State of North Carolina. 2013. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, North Carolina Department of Environment Quality, Division of Energy, Mineral, and Land Resources. Raleigh, NC. Available online at: <https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/erosion-and-sediment-control/erosion-and-sediment-control-planning-and-design-manual> (Accessed 21 November 2023).

Stein, B.A., D.M. Lawson, P. Glick, C. M. Wolf, and C. Enquist. 2019. *Climate Adaptation for DoD Natural Resources Managers: A guide to Incorporating Climate Considerations into Integrated Natural Resource Management Plans*. Washington, D.C.: National Wildlife Foundation.

Tetra Tech, Inc. 2012. BT-11 Marsh Bird Survey on Marine Corps Air Station Cherry Point, North Carolina. Unpublished report prepared for the Marine Corps Air Station Cherry Point, Natural Resources Division, by Tetra Tech, Inc., Arlington, Virginia.

The Nature Conservancy (TNC). 2010a. Places we protect in the Coastal Plain. Available online at:
<http://www.nature.org/wherewework/northamerica/states/northcarolina/preserves/art18334.html> (Accessed 3 November 2010).

The Nature Conservancy (TNC). 2010b. Coastal Plain: Onslow Bight. Available online at:
<http://www.nature.org/wherewework/northamerica/states/northcarolina/preserves/art17462.html> (Accessed 3 November 2010).

-
- The University of North Carolina Herbarium (UNC Herbarium). 2010. Flora of the Southern and Mid-Atlantic States, Working Draft of 8 March 2010 (by Alan S. Weakley). Available online at: <http://www.herbarium.unc.edu/WeakleyFlora2010Mar.pdf> (Accessed 17 February 2011).
- U.S. Census Bureau. 2000. Demographic Profiles: North Carolina. Available online at: <http://censtats.census.gov/cgi-bin/pct/pctProfile.pl> (Accessed 25 October 2010).
- U.S. Census Bureau. 2009. Population Finder. Available online at: <http://www.census.gov/> (Accessed 25 October 2010).
- U.S. Department of Agriculture (USDA). 2005. Description of “Ecological Subregions: Sections of the Conterminous United States”. First Approximation. U.S. Department of Agriculture, Forest Service. Ecosystem Management Coordination. Washington, DC 20250.
- U.S. Department of Agriculture (USDA) Forest Service. 2011. USDA Forest Service Fire Effects Information System Database. Available online at: <http://www.fs.fed.us/database/feis/plants/> (Accessed 16 February 2011).
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2007. Soil Survey Geographic (SSURGO) database for Pamlico County, North Carolina. Available online at: <http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NC137>
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2008. Soil Survey Geographic (SSURGO) database for Carteret County, North Carolina. Available online at: <http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NC031>.
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2009. Soil Survey Geographic (SSURGO) database for Craven County, North Carolina. Available online at: <http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NC049>
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2011. PLANTS Database. Available online at: <http://plants.usda.gov/java/> (Accessed 17 February 2011).
- U.S. Fish and Wildlife Service (USFWS). Undated. Bogue Inlet. Available online at: http://www.fws.gov/nc-es/pubs/fwca/bogue/section_5-5.pdf (Accessed 18 January 2011).
- U.S. Fish and Wildlife Service (USFWS). 2003. Sensitive Joint-vetch (Virginia joint-vetch) in North Carolina. Available online at: <http://www.fws.gov/nc-es/plant/sensjointv.html> (Accessed 27 September 2010).
- U.S. Fish and Wildlife Service (USFWS). 2008a. U.S. Fish and Wildlife Service Fact Sheet: American Alligator (*Alligator mississippiensis*). Available online at:
-

-
- <http://www.fws.gov/endangered/esa-library/pdf/alligator.pdf> (Accessed 16 November 2010).
- U.S. Fish and Wildlife Service (USFWS). 2008b. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available online at: <http://www.fws.gov/migratorybirds> (Accessed 11 October 2010).
- U.S. Fish and Wildlife Service (USFWS). 2009. Migratory Birds. Conserving the Nature of America. Available online at: <http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtandx.html#e> (Accessed 11 October 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010a. Cedar Island National Wildlife Refuge. Available online at: <http://www.fws.gov/refuges/profiles/index.cfm?id=42531> (Accessed 9 November 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010b. U.S. Fish and Wildlife Service, Raleigh Ecological Services Field Office. Conservation Partnerships. Available online at: http://www.fws.gov/raleigh/conservation_partnerships.html (Accessed 10 November 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010c. Threatened and Endangered Species in North Carolina: Seabeach Amaranth (*Amaranthus pumilus*). Available online at: <http://www.fws.gov/nc-es/es/countyfr.html> (Accessed 8 October 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010d. Species Profile: American alligator (*Alligator mississippiensis*). Available online at: <http://www.fws.gov/nc-es/es/countyfr.html> (Accessed 29 October 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010e. Species Profile: West Indian manatee (*Trichechus manatus*). Available online at: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A007> (Accessed 10 November 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010f. Cadastral Geodatabase. Available online at: <http://www.fws.gov/wetlands/Data/DataDownload.html> (Accessed December 2010).
- U.S. Fish and Wildlife Service (USFWS). 2010g. National Wetlands Inventory. Available online at: <http://www.fws.gov/GIS/data/CadastralDB/> (Accessed December 2010).
- U.S. Fish and Wildlife Service (USFWS) North Carolina Ecological Services. 2011. Seabeach Amaranth (*Amaranthus pumilus*). Available online at: <http://www.fws.gov/nc-es/plant/seabamaranth.html> (Accessed 12 April 2011).

-
- U.S. Marine Corps (USMC). 2012. Integrated Natural Resources Management Plan for Marine Corps Air Station Cherry Point, North Carolina. September 2012.
- U.S. Marine Corps Air Station Cherry Point (MCAS Cherry Point) Natural Resources Division (NRD). 2011. Passive Acoustic Monitoring Protocol, Range Operations, Marine Corps Air Station Cherry Point. Final November 2011.
- U.S. Marine Corps (USMC). 2010a. United States Marine Corps, Marine Corps Air Station Cherry Point, USMC Cherry Point Range Complex, Marine Mammal and Protected Species Monitoring Plan. 17 August 2010.
- U.S. Marine Corps (USMC). 2010b. Assessment of the Commercial and Recreational Usage of Waters Surrounding Piney Island and Brant Island Shoal.
- U.S. Marine Corps (USMC). 2010c. MCAS Cherry Point History. Available online at: http://www.militarynewcomers.com/CHERRYPOINT/resources/01_his.html (Accessed 1 April 2011).
- U.S. Marine Corps (USMC). 2010d. Geographic Information System (GIS) data for MCAS Cherry Point Essential Fish Habitat.
- U.S. Marine Corps (USMC). 2009a. Final Environmental Impact Statement. U.S. Marine Corps Grow the Force at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina. Prepared in cooperation with the U.S. Army Corps of Engineers. December 2009.
- U.S. Marine Corps (USMC). 2009b. Wildland Fire Management Plan for Marine Corps Air Station, Cherry Point, Craven County, North Carolina. Final. June 2009.
- U.S. Marine Corps (USMC). 2009c. Environmental Assessment MCAS Cherry Point Range Operations. January 2009.
- U.S. Marine Corps (USMC). 2008. Integrated Natural Resources Management Plan Implementation Report, FY08, Marine Corps Air Station Cherry Point, North Carolina.
- U.S. Marine Corps (USMC) Air Station Cherry Point Natural Resources Division (NRD). 2007. Hunting regulations. Cherry Point, NC.
- U.S. Marine Corps (USMC). 2004. Pest Management Plan for Marine Corps Air Station Cherry Point, NC.
- U.S. Navy (Navy). 2006. Invasive Plant Species Survey and Management Plan. Marine Corps Air Station Cherry Point Complex. Final. April 2006.
- U.S. Navy (Navy). 2007. Essential Fish Habitat Assessment and Study of the Marine Corps Air Station (MCAS) Cherry Point's Area of Responsibility: Bogue Field, Atlantic Field,
-

MCAS Cherry Point, BT-11 and Piney Island, BT-9 and Brant Island Shoal. Final. October 2007.

U.S. Navy (Navy). 2011. Navy Policy Regarding Essential Fish Habitat Assessments and Consultations. 22 March 2011.

U.S. Secretary of Defense and U.S. Secretary the Navy. 2008. Natural Resources Conservation Large Installation Environmental Award. FY2008. Available online at: https://secnavportal.donhq.navy.mil/portal/server.pt/gateway/PTARGS_6_0_2866_302_37451_43/http%3Bportalcontent.donhq.navy.mil%3B7087/publishedcontent/publish/secnav_portal/dasn_e_/awards_natural_resources_conservation_large/nrc_lg_install/usmc_nominee_1_5.pdf (Accessed 10 November 2010).

Wounded Warrior Project. 2010. Wounded Warrior Project Mission. Available online at: <http://www.woundedwarriorproject.org/content/view/412/875/> (Accessed 18 November 2010).

This page intentionally left blank.

APPENDIX A

2024–2028 INRMP External Stakeholder Comments

This page intentionally left blank.

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
1.	1-9	3 rd paragraph	Jeff Hall/NCWRC	<i>American alligator (Alligator mississippiensis) is the only federally listed species known to occur;</i>	Neuse River Waterdogs are present at Oak Grove and they are now federally listed. Also, spotted turtles are currently "at-risk" and I'm sure they are present on Cherry Pt.	<i>Sentence revised.</i>
2.	2-2	Fauna section	Jeff Hall/NCWRC	<i>Common herpetofauna include box turtle (Terrapene spp.), common garter snake (Thamnophis sirtalis), eastern diamondback rattlesnake (Crotalus adamanteus), timber rattlesnake (Crotalus horridus),</i>	The eastern diamondback rattlesnake is very rare in NC and I know of no records for occurrence at Cherry Pt. Timber rattlesnakes are likely present, but definitely not "common." There are many species of amphibians that are quite common on the site including green treefrog, squirrel treefrog, eastern spadefoot, and southern toad.	<i>Revised.</i>
3.	2-2	Surface Water section	Jeff Hall/NCWRC	<i>Surface Water</i>	I would also note there are numerous small, isolated wetlands on the Cherry Pt landscape and these are very important for amphibians.	<i>Section revised.</i>
4.	3-2	3.1.3 Wildland Fire	Jeff Hall/NCWRC	<i>Fire</i>	A greater emphasis on prescribed fire for management of coastal habitats would be beneficial rather than just noting to minimize wildland fire.	<i>Goal 3 added.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
5.	4-6	Neuse River Waterdog section	Jeff Hall/NCWRC	<i>Neuse River Waterdog</i>	I would guess this species does not occur at MCAS Cherry Pt, based on NCWRC surveys conducted nearby but upstream. The species does occur at MCOLF Oak Grove as noted by the doc.	<i>Revised.</i>
6.	4-14	Herpetofauna section	Jeff Hall/NCWRC	<i>Herpetofauna</i>	Where do federal "at-risk" species come into play? Spotted turtle would be present at several of these sites. It's also possible that another at-risk species, the gopher frog, could be present at MCALF Bogue.	<i>Concur. Table 4.2 revised.</i>
7.	4-23	Herpetofauna section	Jeff Hall/NCWRC	<i>Dwarf Salamander</i>	The species present in the Cherry Pt complexes would not be the state listed one, but rather Chamberlain's Dwarf Salamander (<i>Eurycea chamberlaini</i>). These species were split some year ago.	<i>Revised</i>
8.	4-24	Herpetofauna section	Jeff Hall/NCWRC	<i>Eastern diamondback and Pine Barrens treefrog</i>	Neither of these species is likely to occur on this landscape.	<i>Revised</i>
9.	5-2	5.3.1	Jeff Hall/NCWRC	<i>Longleaf Pine</i>	This habitat type is also important for many rare species of reptiles and amphibians.	<i>Revised</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
10.	5-3	5.3.3	Jeff Hall/NCWRC	<i>Forested Wetlands</i>	Isolated wetlands are extremely important for many species of reptiles and amphibians and worth noting in this section.	<i>Revised.</i>
11.	6-4	6.2.1	Jeff Hall/NCWRC	<i>Restoration of longleaf</i>	There is much discussion of using mechanical and chemical means to replace prescribed fire on the landscape. As much as possible, I would suggest moving towards prescribed fire. Chemical means of opening forest stands can have negative impacts to reptiles and amphibians and should be minimized if possible.	<i>Noted.</i>
12.	6-8	Last paragraph of 6.4	Jeff Hall/NCWRC	<i>Prescribed burning...</i>	Growing season fires, if at all possible, would be best for the most species inhabiting coastal habitats, but particularly important in conservation of reptiles and amphibians.	<i>Revised. Add to WFMP.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
13.	7-2	Second paragraph	Jeff Hall/NCWRC	<i>Some wetlands...</i>	It is worth noting in this section that many isolated wetlands smaller than 1 acre are very important for amphibians and as such, care should be taken in any impacts to these, especially where rare species may be found such as ornate chorus frog, which does have historical presence on MCAS Cherry Pt.	<i>Noted.</i>
14.	13-3	13.0	Jeff Hall/NCWRC	<i>Conservation Outreach and Education</i>	Wonderful to see this section! Very important.	<i>No response needed.</i>
15.	3-3	3.1.8 External Stakeholders	Hope Sutton/NCWRC	<i>NCDENR</i>	This department no longer exists. The Department of Environmental Quality now houses Coastal Management and Water Resources (and other divisions) while the Department of Natural and Cultural Resources houses the Natural Heritage Program (and other programs and divisions)	<i>Edited sentence.</i>
16.	4-3	Table 4.1 Federal Threatened and Endangered Species	Hope Sutton/NCWRC	<i>Eastern black rail – NC status</i>	State status changed from SC to T as of February 1, 2023 (NCAC 15A 10I .0104)	<i>Edited table.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
17.	4-2	Table 4.1 Federal Threatened and Endangered Species	Hope Sutton/NCWRC	<i>Neuse River waterdog – NC status</i>	State status changed from SC to T as of February 1, 2023 (NCAC 15A 10I .0104)	<i>Edited table.</i>
18.	4-3	Table 4.1 Federal Threatened and Endangered Species	Hope Sutton/NCWRC	<i>Tricolored bat – NC status</i>	State status changed from SR to E as of February 1, 2023 (NCAC 15A 10I .0104)	<i>Edited table.</i>
19.	4-8	4.1.4 Mammals	Hope Sutton/NCWRC	<i>Tricolor Bat description</i>	And state listed as endangered	<i>Edited sentence.</i>
20.	4-9	4.1.6 Birds	Hope Sutton/NCWRC	<i>Eastern black rail description</i>	And state listed as threatened	<i>Revised sentence.</i>
21.	4-19	Section 4.3 Threatened and Endangered Species Management Objectives and Actions	Hope Sutton/NCWRC	<i>OBJECTIVE TES4: Action 4-11 – MCAS Cherry Point will contribute data to relevant data repositories, when appropriate.</i>	Acknowledge and appreciate the sharing of TE species data with data repositories. Is sharing data with NCWRC as a repository of NC data included in this action?	<i>Further discussion required to determine requested data, but yes, we are open to data sharing.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
22.	4-21	Table 4.2 North Carolina Threatened, Endangered, and Species of Concern	Hope Sutton/NCWRC		Eastern diamondback rattlesnake is mentioned as occurring on site on page 2-2. While not officially a candidate species, it is currently under review. Consider noting this along with listed species requiring monitoring and/or in the at-risk section.	<i>Removed as per C. Kent.</i>
23.	4-21	Table 4.2 North Carolina Threatened, Endangered, and Species of Concern	Hope Sutton/NCWRC		Although Saltmarsh Sparrow is not currently listed, it is on the USFWS for review in 2024. Consider noting this along with listed species requiring monitoring and/or in the at-risk section.	<i>Noted.</i>
24.	4-24	Table 4.2 North Carolina Threatened, Endangered, and Species of Concern	Hope Sutton/NCWRC	<i>Tricolor Bat status</i>	State listed as endangered	<i>Updated table.</i>
25.	4-25	Section 4.5 Species At-risk Management Objectives and Actions	Hope Sutton/NCWRC	<i>OBJECTIVE SARI:</i>	Consider including Action 4-11 under this objective. Sharing data related to at-risk species will also support conservation of these species, contribute to SSA, and may help avoid or minimize impacts on military training.	<i>Concur. Action 4-11 added.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
26.	5-3	Section 5.3.5 Migratory Bird Management Objectives and Actions	Hope Sutton/NCWRC	<i>OBJECTIVE MIG1: Support conservation and management of migratory birds and their habitat.</i>	Acknowledge and appreciate the sharing of migratory bird data with data repositories. Is sharing data with NCWRC as a repository of NC data included in this action?	<i>Further discussion required to determine requested data, but yes, we are open to data sharing.</i>
27.	6-5	Section 6.2.1 Restoration of the Longleaf Pine Forest	Hope Sutton/NCWRC	<i>Restoration of the Longleaf Pine Forest</i>	Acknowledge and appreciate the discussion of the importance of fire to appropriate structure and function. Acknowledge and appreciate current efforts to restore longleaf habitat.	<i>No response required.</i>
28.	9-2	Section 9.0 Wildlife and Fisheries Management	Hope Sutton/NCWRC	<i>The following five core goals were developed for the NCWAP...</i>	The acknowledgement of the NCWAP is appreciated. However, the NCWAP was revised in 2015 and these goals were replaced with updated goals and recommended objectives, as included in Appendix K of the document.	<i>Noted.</i>
29.	9-4	Section 9.1.2 Non-game Management	Hope Sutton/NCWRC	<i>Portion regarding fox squirrel</i>	Efforts to monitor and enhance fox squirrels are appreciated; however, fox squirrels remain a game species in NC.	<i>Noted. No response required.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
30.	9-6	Section 9.2 Wildlife Management Objectives and Actions	Hope Sutton/NCWRC	<i>OBJECTIVE WFMI: Provide a variety of landscapes that support ecosystem management and biodiversity conservation goals.</i>	Consider adding or expanding current actions to include management actions that would benefit wildlife in isolated wetlands (primarily amphibians) and saltmarshes (primarily secretive marsh birds). These habitats and their importance is discussed elsewhere but management actions in these habitats do not appear among these actions.	<i>Noted.</i>
31.	82	4.1.3 Herpetofauna Alligator	Deanna Noble/NCWRC	<i>Nest observed in Jack's Branch</i>	Is there data from previously observed alligators and/or nests? Is there opportunity for surveying on Cherry Point?	<i>There is no consolidated data. There are opportunities for surveys. Will coordinate with NCWRC.</i>
32.	84	4.1.5 Insects Monarch Butterfly	Deanna Noble/NCWRC	<i>Milkweed patches</i>	Are there opportunities to create pollinator habitat for multiple species in designated areas?	<i>Pollinator habitat is being addressed in Objective WFMI.</i>
33.	86	4.1.6 Birds Red-Cockaded Woodpecker	Deanna Noble/NCWRC	<i>Longleaf pine habitat</i>	Red-cockaded woodpeckers require mature open pine woodlands with little to no midstory consistent with that needed for training purposes.	<i>Concur.</i>
34.	104	5.3.4 Estuarine Emergent Scrub/Shrub	Deanna Noble/NCWRC	<i>Estuarine communities</i>	Are prescribed burns adjacent to these areas allowed to burn into the marsh? Are islands such as Raccoon Island burned to create diverse vegetation?	<i>Yes, the marsh at Piney Island is routinely burned. Raccoon Island has not been in recent years.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
35.	111	6.3.3 Timber Stand Improvements	Deanna Noble/NCWRC	<i>Removing undesirable understory vegetation</i>	Are the TSI's primarily focused in the pine stands or are there opportunities to do CTR around high quality hardwoods? Have canopy gaps been used to enhance vertical structure in hardwood forests?	<i>TSI has been conducted in both pine and hardwood stands.</i>
36.	131	9.1.1 Game Management	Deanna Noble/NCWRC	<i>Deer biological and harvest data</i>	Can CWD sampling be added to data collection? Can data be collected from other game species? Hunter surveys? Sample waterfowl for AI? Other disease monitoring?	<i>CLEOs can take any samples of value to NCWRC. Our BASH team routinely does additional disease sampling.</i>
37.	132	9.1.1 Game Management	Deanna Noble/NCWRC	<i>Planting of wildlife openings with wildlife food plants</i>	Are there cool and warm season plantings? Are there areas maintained in native vegetation/early successional habitat?	<i>Yes. Plantings are seasonal and native.</i>
38.	133	9.1.2 Non-game Management	Deanna Noble/NCWRC	<i>Understanding the diversity and distribution of wildlife resources</i>	Are there opportunities to increase the inventorying/surveying efforts of additional species?	<i>Funding is requested annually to further survey efforts.</i>
39.	135	9.1.5 Nuisance Wildlife Control	Deanna Noble/NCWRC	<i>Wildlife that feed in and around homes</i>	Can we incorporate BearWise to help people live more responsibly with bears?	<i>Will coordinate with NCWRC to further this effort.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
40.	7	1.2.8 INRMPs, the NDAA, and Critical Habitat Designation	Chris Kent / NCWRC	<i>American alligator (Alligator mississippiensis) is the only federally listed species known to occur</i>	American Alligators are the only federally listed species known to occur on Cherry Point lands? What about RCW, Eastern Black Rail, and multiple listed bat species? No records of these animals being present?	<i>Removed statement. Appendix C will be updated.</i>
41.	21	2.0 MCAS CHERRY POINT CURRENT CONDITIONS AND USE – Section 2.2 Fauna	Chris Kent / NCWRC	<i>Common herpetofauna include box turtle (Terrapene spp.), common garter snake (Thamnophis sirtalis), eastern diamondback rattlesnake (Crotalus adamanteus), timber rattlesnake (Crotalus horridus), and American alligator (Alligator mississippiensis).</i>	I would not include eastern diamondback rattlesnake as a common fauna species on Cherry Point MCAS.	<i>Concur. Removed.</i>

Comment Response Matrix

MCAS Cherry Point Draft Integrated Natural Resources Management Plan (INRMP) Review 9 Jun 2023

#	Page #	Line, Section, Figure or Table	Comment By (Name/Org.)	Document Text	Comments	Discussion / Response
42.	113	6.4 WILDLAND AND PRESCRIBED FIRE MANAGEMENT	Chris Kent / NCWRC	<i>The Wildland Fire Management Plan (WFMP) is the primary guidance outlining MCAS Cherry Point's activities for meeting these goals.</i>	Suggest including annual prescribed burn acreages / locations in a table. Some sort of tracking measures.	<i>Tracking of acreage is updated in annual reports, not in INRMP.</i>
43.	135	9.1.5 Nuisance Wildlife Control	Chris Kent / NCWRC	<i>Discussion of nuisance wildlife control...</i>	Is it possible to implement the www.bearwise.org program on base?	<i>Will coordinate with NCWRC to further this effort.</i>
44.	136	OBJECTIVE WFM2: Provide a variety of hunting opportunities to authorized recreational users.	Chris Kent / NCWRC	Action 9-02 – Provide a quality hunting program through support and management of game species.	Continued support of NCWRC deer herd management and wildlife disease monitoring through CWD sample collection with support from NCWRC field biologists.	<i>Concur. No response required.</i>

This page intentionally left blank.

APPENDIX B

INRMP Actions and Monitoring

This page intentionally left blank.

Table B-1. INRMP Course of Action and Monitoring Table, MCAS Cherry Point Complex.

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
4-01	Fully incorporate all “actions to reduce adverse effects” to sea turtles as proposed in 2002 Section 7 Biological Assessment.	TES1	1) Not applicable (N/A) 2) N/A	1) Documented compliance with marine mammal and sea turtle monitoring requirements, 2001 Biological Opinion (BO), and 2010 Incidental Harassment Authorization (IHA) 2) Monitoring and survey actions summarized and incorporated into Integrated Natural Resources Management Plan (INRMP) updates
4-02	Compliance with “reasonable and prudent measures,” “terms and conditions,” and “conservation recommendations” outlined in BO dated 27 September 2002 (National Marine Fisheries Service [NMFS] 2002).	TES1 TES2 TES3	1) N/A 2) N/A	1) Documented compliance with marine mammal and sea turtle monitoring requirements and 2001 BO 2) Monitoring and survey actions summarized and incorporated into INRMP updates
4-03	Fully comply with the conditions outlined in the IHA dated 18 November 2010 (NMFS 2010).	TES1 TES2 TES3	1) N/A 2) N/A	1) Documented compliance with marine mammal and sea turtle monitoring requirements and 2010 IHA 2) Monitoring and survey actions summarized and incorporated into INRMP updates
4-04	Survey and monitor species at-risk and their habitats.	SAR1 MIG1	1) # of species at-risk and habitats surveyed and monitored (if required) 2) N/A	1) Collection of field and geographic information system (GIS) data for all known and potentially occurring at-risk species 2) Survey and monitoring activities for species at-risk incorporated into INRMP updates
4-05	Create a GIS database for locations of known species at-risk and their associated habitats for MCAS Cherry Point.	SAR1 MIG1	1) N/A	1) GIS data collected for Action 4-04 incorporated into MCAS Cherry Point GIS database
4-06	Implement ecosystem management practices that support the conservation and management of species at-risk.	SAR1 MIG1	1) # of INRMP Projects implemented	1) Implementation of INRMP Projects that may have a direct or indirect benefit to at-risk species, as required or as funding allows

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
4-07	If other dead or injured wildlife are observed during post-exercise sweeps conducted by search and rescue helicopters in the BT-9 and BT-11 areas, these will be reported to NCWRC as appropriate.	SAR1 MIG1	1) N/A	1) Monitoring and reporting actions beyond what is required for threatened an endangered species will be incorporated into INRMP updates
4-08	When consistent with the military mission, avoid and minimize impacts to at-risk species through the NEPA process.	SAR1 MIG1	1) # of proposed actions reviewed	1) Review of all proposed actions that will disturb 1 or more acre of land, using an interdisciplinary approach
4-09	MCAS Cherry Point will complete surveys for all federally listed species on the air station and all outlying fields, where appropriate.	TES4	1) # of surveys completed	1) Surveys completed for all federally listed species
4-10	MCAS Cherry Point will implement protective measures for federally listed species and their habitats.	TES4	1) # of protective measures implemented	1) Protective measures documented and implemented
4-11	MCAS Cherry Point will contribute data to relevant data repositories (NA Bat, Avian Knowledge Network, etc.), when appropriate.	TES4 SAR1	1) # of surveys input into data repositories	1) Full participation and data entry into relevant data repositories
5-01	Annual participation in International Migratory Bird Day summer bird count.	MIG1	1) # of International Migratory Bird Day bird counts conducted 2) # and types of informational outreach	1) Participation in annual International Migratory Bird Day bird counts. 2) Information distributed to MCAS Cherry Point residents about the opportunity to participate in International Migratory Bird Day counts
5-02	Conduct coordinated waterfowl and shorebird surveys in support of South Atlantic Migratory Bird Initiative (SAMBI).	MIG1	1) # of SAMBI surveys conducted 2) N/A	1) SAMBI surveys completed in support of the military mission 2) SAMBI details incorporated into INRMP updates

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
5-03	Implement relevant bird conservation measures in support of the military mission, and as outlined in the Partners in Flight (PIF) North American Land Bird Conservation Plan for the South Atlantic Coast Plain, North American Waterfowl Management Plan (NAWMP), U.S. Shorebird Conservation Plan (USSCP), North American Waterbird Conservation Plan (NAWCP), and North American Bird Conservation Initiative (NABCI).	MIG1	1) #of bird conservation measures implemented 2) N/A	1) Implement bird conservation efforts as recommended by PIF North American Land Bird Conservation Plan for the South Atlantic Coast Plain, NAWMP, USSCP, NAWCP, and NABCI that support of the military mission 2) Incorporate bird conservation efforts into INRMP updates
5-04	Promote restoration of native warm season grass habitats in association with restoration of longleaf pine forest habitats, as feasible.	MIG1	1) # of acres restored	1) Restoration of additional areas of MCAS Cherry Point with warm season grass habitat
5-05	Continue point count surveys to monitor population trends.	MIG1	1) # of point counts conducted	1) Completion of routine point count surveys
6-01	Align forest management with the military mission, such as providing accessibility and recreation.	FMP1 WFM2	1) N/A 2) # and methods of disseminated information	1) Forest recreation and accessibility options that support the military mission incorporated into INRMP updates 2) Information distributed to MCAS Cherry Point residents about forest access and the opportunity to participate in forest recreation activities

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
6-02	Use prescribed fire and mechanical and chemical (if necessary) control methods to manage stands to promote forest health and growth.	MIG1 FMP1 WFM1	1) # and extent of prescribed fires conducted for forest stand management and to promote forest health and growth 2) # and extent of mechanical and chemical controls used for forest stand management and to promote forest health and growth 3) N/A	1) Managed stands of MCAS Cherry Point are healthy and are thriving 2) Managed stands of MCAS Cherry Point are healthy and are thriving, with limited use of chemical controls 3) Forest management activities (including use of prescribed fire, and mechanical and chemical controls) incorporated into INRMP updates
6-03	Restore longleaf pine habitat in historic locations designated as priority restoration sites.	FMP1 WFM1	1) # of priority sites and # acres restored to longleaf pine habitat 2) N/A	1) Completion of longleaf pine restoration projects at priority sites 2) Details of longleaf pine restoration of priority sites incorporated into INRMP updates
6-04	Monitor and improve forest health for pests and disease.	FMP1 WFM1	1) # of forest stands assessed and managed (if necessary) for southern pine beetle 2) N/A	1) Continued monitoring and control (if needed) of southern pine beetle infestations 2) Monitoring and control activities for southern pine beetle incorporated into INRMP updates
6-05	Manage forests to maintain a sustainable flow of forest products.	FMP2	1) Annual amount of timber (by size class) extracted	1) Continued harvesting of forests at levels that are sustainable
6-06	Maintain a forest inventory, prescriptions, and sales database.	FMP2	1) # of forest stand inventories, prescriptions, and sales entered into database	1) Forestry database updated annually with forest stand inventory, prescriptions, and sales data

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
6-07	Develop a Timber Management Plan to guide harvest decisions.	FMP2	1) Timber Management Plan prepared for use	1) Execution of timber harvests as prescribed in Timber Management Plan where practicable
6-08	Develop, execute, and monitor timber harvests to ensure they are done sustainably and in accordance with existing guidelines.	FMP2	1) # of harvests executed	1) Continued development, execution, and monitoring of timber harvests
6-09	Promote effective carbon sequestration with reforestation and understory management.	FMP1	1) # of reforestation and revegetation projects implemented 2) # of understory management projects	1) Ensure reforestation and revegetation projects are programmed appropriately to ensure compliance with DoN commitment to achieve net-zero by 2050 2) Ensure understory management projects are implemented to increase carbon sequestration
6-10	Restore and promote bottomland hardwood habitat and wetland sites.	FMP1	1) Acreage of restored bottomland hardwood and wetland sites	1) Continued restoration of suitable sites
6-11	Implement fire suppression, preparation, documentation, and cooperative activities in accordance with the Wildland Fire Management Plan (WFMP).	FMP3	1) N/A	1) Continued implementation of the WFMP
6-12	Implement annual prescribed burn plan.	FMP4	1) Acreage of prescribed burns	1) Continued implementation of annual burn plans.
7-01	Support new wetland delineations and renewal of existing jurisdictional determinations to identify aquatic resource limits and jurisdiction.	WET1	1) N/A	1) Boundary and jurisdiction of all aquatic resources are determined prior to initiating any ground disturbing activities
7-02	Comply with Section 404 of the Clean Water Act (CWA) and any CWA and State authorizations in regard to water resource protection.	WET1	1) N/A	1) Continued MCAS Cherry Point compliance with all State and federal water resources protection regulations

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
7-03	Identify suitable wetland restoration areas and monitor sensitive wetland areas.	WET1	1) # and extent of wetland restoration and sensitive wetland monitoring projects identified 2) # and extent of wetland monitoring projects completed 3) N/A	1) Identification of potential wetland restoration and sensitive wetland monitoring projects completed for MCAS Cherry Point 2) Routine monitoring of all sensitive wetland areas identified for MCAS Cherry Point 3) Wetland restoration and monitoring details incorporated into INRMP updates
7-04	Ensure BMPs recommended in the MCAS Cherry Point Stormwater Pollution Prevention Plan (SWP3) and Integrated Contingency Plan (ICP) are implemented appropriately, and that the SWP3 and ICP are updated periodically to reflect current management issues.	WET1 and SOI1	1) N/A 2) SWP3 or ICP updates	1) Continued MCAS Cherry Point compliance with SWP3 and ICP requirements and implementation of recommendations 2) SWP3 and ICP are updated as needed to reflect current management issues
7-05	Where practical, create and expand riparian and wetland buffers beyond mandated protection requirements.	WET1	1) # of riparian or wetland buffer projects implemented 2) N/A	1) Implementation of projects that result in creation or expansion of riparian or wetland buffers 2) Summary of projects incorporated into INRMP updates
8-01	Monitor training effects on inland soils and in coastal areas and use results to provide recommendations for soil protection during training.	SOI1	1) # of erosion control inspections of training areas 2) # of soil protection recommendations identified for training sites	1) Inspection of training areas to identify erosion control issues 2) Erosion control issues identified in erosion control inspections are addressed in an adequate and timely manner

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
8-02	Close, restore, and reopen selected eroded sites to training.	SOI1	1) # of training sites stabilized	1) Stabilization of training sites identified to contain erosion problems through closure, restoration, and reopening
8-03	Use an interdisciplinary approach to review proposed actions at MCAS Cherry Point and its properties.	SOI1 RES3	1) # of proposed actions reviewed	1) Review of all proposed actions that will disturb 1 or more acre of land, using an interdisciplinary approach
8-04	Prepare necessary erosion and sedimentation control plans for qualifying projects	SOI1	1) # of erosion and sedimentation control plans prepared and implemented	1) Preparation and implementation of erosion and sedimentation plans for qualifying projects
8-05	Consider Department of Defense (DoD) guidance for ecosystem management of landscape and vegetation when implementing projects.	LVM1	1) N/A	1) Continued implementation of requirements outlined in MCO 5090.2 Chapter 11 in all MCAS Cherry Point landscaping and vegetation management projects
8-06	Support ecosystem services focused initiatives.	LVM1	1) # of initiative meetings attended 2) # of projects initiated that directly support ecosystem focused initiatives	1) Continued participation in ecosystem focused initiatives 2) Summary of projects initiated that directly support ecosystem focused initiatives.
9-01	Implement wildlife habitat improvement projects (e.g., wildlife openings, nest boxes).	WFM1	1) # of wildlife habitat improvement projects implemented 2) N/A	1) Wildlife habitat improvement projects, including those identified in the INRMP, implemented 2) Details of all wildlife habitat improvement projects included in INRMP updates
9-02	Provide a quality hunting program through support and management of game species.	WFM2	1) # of game species being actively managed	1) Continued implementation of MCAS Cherry Point hunting program to include multiple game species
9-03	Provide hunting opportunities for wounded warriors through participation in the Wounded Warrior Project.	WFM2	1) # of Wounded Warrior Project activities hosted at MCAS Cherry Point 2) N/A	1) Continued hosting of Wounded Warrior Project activities in association with the MCAS Cherry Point hunting program 2) Wounded Warrior Project activities included in INRMP updates

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
9-04	Maintain NCWRC Wildlife Cooperator Agent status for reporting harvest data.	WFM2	1) N/A	1) NCWRC Cooperator Agent status maintained
9-05	Support general, sensitive, and indicator species surveys.	WFM3	1) # of species surveys conducted 2) N/A	1) Surveys completed for general, sensitive, and indicator species 2) Details of all general, sensitive, and indicator species surveys completed included in INRMP updates
9-06	Support reintroduction programs as necessary to restore native fauna.	WFM3	1) # of native fauna reintroductions 2) N/A	1) Successful reintroduction of native fauna projects 2) Details of reintroduction projects included in INRMP updates
9-07	Implement Bird/Wildlife Aircraft Strike Hazard (BASH) Program.	WFM4	1) N/A	1) Continued implementation of the BASH Program
9-08	Coordinate wildlife damage control measures with the Bird Hazard Working Group (BHWG).	WFM4	1) N/A	1) Continued coordination of wildlife damage control measures with BHWG
9-09	Maintain updated Migratory Bird Depredation, Special Airport Depredation, and Bald Eagle Depredation permits to address wildlife damage control situations.	WFM4	1) # permits	1) Updated permits are maintained to allow MCAS Cherry Point to address wildlife damage control situations
9-10	Integrate wildlife damage control measures with the hunting program, when feasible, to reduce potential for aircraft strikes with deer, waterfowl, and other wildlife.	WFM4	1) N/A	1) Integration of wildlife damage control measures with the hunting program to reduce the potential for aircraft strikes with wildlife
9-12	Prioritize and treat existing invasive species populations.	WFM5	1) N/A 2) # of invasive species populations treated	1) Priority list of invasive species removal projects completed for MCAS Cherry Point 2) Treatment of invasive species included on MCAS Cherry Point priority list completed
9-13	Survey for new infestations of invasive flora and fauna.	WFM5	1) # and extent of new invasive species surveys completed 2) N/A	1) Surveys for new infestations of invasive flora and fauna completed 2) New invasive species survey details included in INRMP updates

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
9-14	Monitor treated populations.	WFM5	1) # and extent of monitoring projects completed for invasive species treatment areas	1) Continued post-restoration monitoring of invasive species treatment areas, as needed to document success
9-15	Implement recommendations of the MCAS Cherry Point Invasive Plant Species Survey and Management Plan (Naval Facilities Engineering Command Atlantic 2010).	WFM5	1) # of invasive species management recommendations completed	1) Continued implementation of recommendations included in the MCAS Cherry Point Invasive Plant Species Survey and Management Plan
9-16	Participate in, as appropriate, DoD initiatives related to invasive species management and control.	WFM5	1) # and type of DoD initiatives related to invasive species management and control implemented	1) Include summary in INRMP updates of DoD initiatives related to invasive species management and control that MCAS Cherry Point participated in
9-17	Align fisheries management with the military mission, such as providing accessibility and recreation opportunities (e.g., boat ramp and shoreline maintenance, Kids Day Tournament).	WFM6	1) N/A	1) Continued management of fisheries with the military mission, to include marina, boat ramp and shoreline maintenance, hosting of Kids Day Tournaments, and enforcement of fishing laws and regulations.
9-18	Provide a quality recreational fishing program through support and management of sport fish (e.g., stocking program, biological control).	WFM6	1) # of sport fish (by species) stocked in managed freshwater ponds of MCAS Cherry Point as part of the stocking program 2) # and type of biological controls applied to surface waters in support of sport fish management	1) Continued annual stocking of sport fish in the managed freshwater ponds of MCAS Cherry Point 2) Continued application of biological controls, as needed, to maintain MCAS Cherry Point's quality sport fish management program

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
9-19	Develop plans to implement recommendations of the MCAS Cherry Point Essential Fish Habitat (EFH) Study.	WFM7	1) # of MCAS Cherry Point EFH Study recommendations implemented 2) N/A	1) Implementation of MCAS Cherry Point EFH Study recommendations, in support of the military mission 2) Details of EFH recommendations implemented incorporated into INRMP updates
9-20	Ensure EFH is considered in all action evaluations.	WFM7	1) N/A	1) Continued MCAS Cherry Point consideration of EFH and EFH Study recommendations for all actions that may impact EFH
9-21	MCAS Cherry Point will consult with NMFS for any potential project or action that may adversely affect EFH under their jurisdiction.	WFM7	1) N/A	1) Consultation with NMFS for impacts to EFH as required for any project or action that may adversely affect EFH under MCAS Cherry Point jurisdiction
10-01	Promote general public awareness of conservation-based recreational opportunities at MCAS Cherry Point.	REC1	1) # and types of initiatives in place for promoting public awareness of conservation-based recreational opportunities 2) N/A	1) Continued promotion of public awareness of conservation-based recreational opportunities at MCAS Cherry Point 2) New initiatives enacted to promote public awareness of conservation-based recreational opportunities included in INRMP updates
11-01	Continue to fund the Conservation Law Enforcement (CLE) program positions.	ENF1	1) N/A	1) Continued funding in place for CLE positions at a level that is sufficient to enforce all relevant environmental rules and regulations
11-02	Provide Federal Law Enforcement Training Center Land Management Police Training to new CLE Officers.	ENF1	1) N/A	1) Continued funding in place to support adequate and up-to-date training of CLE officers involved with natural resources management on current regulations, management issues, and techniques
11-03	Provide Federal Law Enforcement Training Center Land Management Police Training through annual In-Service CLE activities and other training courses as necessary to support conservation management and the military mission.	ENF1	1) # and types of training sessions held	1) Continued funding in place to support adequate and up-to-date training of CLE officers involved with natural resources management on current regulations, management issues, and techniques

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
11-04	Cooperate with state, local, and federal enforcement authorities on joint enforcement operations consistent with Navy Marine Corps Directive 5090.4A within jurisdictional limits.	ENF1	1) N/A	1) Cooperation with state, local, and federal enforcement authorities on joint enforcement operations consistent with Navy Marine Corps Directive 5090.4A within jurisdictional limits
12-01	Continue participation in North Carolina Onslow Bight Conservation Forum (OBCF) meetings.	CON1	1) # of meetings attended	1) Continued participation in OBCF meetings to ensure issues and concerns of OBCF are translated to conservation actions at MCAS Cherry Point that are consistent with the forum's mission and the military mission
12-03	Participate, as appropriate, in sub-committees of the OBCF to ensure military training requirements are factored into regional conservation planning.	CON1	1) N/A	1) MCAS Cherry Point participation in sub-committees of the OBCF, as relevant to ensure military training requirements are factored into regional conservation planning
12-04	Collaborate with OBCF participants and other regional representatives to identify encroachment partnering opportunities.	CON1	1) # of collaborations events attended, and participants involved in discussion of encroachment partnering opportunities	1) Successful collaboration and implementation of encroachment partnerships in support of the military mission
12-05	Participate in local Encroachment Control Planning Team and assist with development of REPI projects when required.	CON1	1) # of events attended, and participants involved in discussion of local encroachment control planning	1) Successful collaboration and implementation of encroachment control planning actions in support of the military mission
13-01	Design and implement an environmental outline for training and education opportunities for each stage of a Marine's career at MCAS Cherry Point.	EDU1	1) N/A	1) Implementation of environmental training and educational program for MCAS Cherry Point Marines

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
13-02	Develop procedures for educating visiting military units of MCAS Cherry Point's conservation goals and objectives prior to their use of facilities.	EDU1	1) N/A 2) % of visiting military units that received educational training that provides an overview of MCAS Cherry Point conservation goals and objectives	1) Completion and implementation of educational program that provides an overview of MCAS Cherry Point conservation goals and objectives 2) 100% of visiting military units received educational training that provides an overview of conservation goals and objectives prior to use of MCAS Cherry Point facilities
13-03	Cooperate with State and federal agencies on development of a natural resources-based recreational guide for military/civilian personnel.	EDU1	1) N/A	1) Development of a natural resources-based recreational guide for military/civilian personnel
13-04	Cooperate with USFS representatives to develop an information packet or handout that can be provided to new Marines that identifies proper use and restrictions associated with National Forest lands, including Croatan National Forest.	EDU1	1) N/A	1) Development of an information packet or handout for new Marines, that identifies proper use and restrictions associated with National Forest lands, including Croatan National Forest.
13-05	Sponsor a Conservation Volunteer Program.	EDU2	1) N/A	1) Sponsorship and implementation of a MCAS Cherry Point Conservation Volunteer Program completed
13-06	Continue to promote participation in the MCAS Cherry Point Hunting and Fishing Program, and National Public Lands Day (NPLD) activities.	EDU2	1) # of hunting, fishing, and NPLD activities hosted	1) Continued promotion of hunting, fishing, and NPLD activities.
14-01	Complete resilience evaluations and vulnerability assessments of all MCAS Cherry Point properties.	RES1 RES2 RES4	1) Number of resilience evaluations and vulnerability assessments completed.	1) Implementation of recommendations for resilience evaluations and vulnerability assessments
14-02	Utilize tools provided by DoD to increase local knowledge of threats due to potential climate change.	RES1	1) N/A	1) Periodic review of available tools to ensure awareness and increase knowledge

Action ID	Action Description	Objective ID	Unit of Measure	Measure of Success
14-03	Ensure information sharing throughout Facilities and other Directorates.	RES1	1) N/A	1) Periodic review of available information to ensure awareness and increase knowledge
14-04	Ensure project designs adequately incorporate resilience and the ability to adequately respond to potential changes.	RES1 RES3	1) # of proposed actions reviewed	1) Review of all proposed actions that will disturb 1 or more acre of land, using an interdisciplinary approach
14-05	Implement projects and management techniques recommended through resilience evaluation and vulnerability assessments.	RES4	1) # of projects implemented	1) Program and execute projects (both inside and outside the fenceline) to increase resilience
14-06	Develop projects in partnership with local partners to capitalize on funding opportunities (e.g. OLDCC grants, etc).	RES4	1) # of projects implemented	1) Program and execute projects outside the fenceline to increase resilience

This page intentionally left blank.

APPENDIX C

INRMP Benefit to Listed Species and Species At-Risk

This page intentionally left blank.

**APPENDIX C: INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
(INRMP) BENEFITS TO FEDERALLY LISTED SPECIES AND SPECIES AT-RISK
KNOWN OR WITH THE POTENTIAL TO OCCUR AT MARINE CORPS AIR STATION
(MCAS) CHERRY POINT.**

Federally Listed Species

Plants

There are no direct management actions in place and no species-specific management actions for the federally listed plant species that could potentially occur at MCAS Cherry Point (Table C-1). Rare plant surveys for these species are recommended, and if any populations are identified additional protection would be provided through National Environmental Policy Act (NEPA) review of individual projects and subsequent Section 7 consultation, if necessary. Rare plant survey requirements for these species include:

- Conducting surveys in high-probability habitat for federally listed plant species with have the potential to occur at MCAS Cherry Point during the appropriate flowering period (Table C-1);
- Collection of geographic information system (GIS) location data for any populations of federally listed plant species identified during rare plant surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of all federally listed plant species identified as occurring at MCAS Cherry Point.

Table C-1. Species-Specific Habitats and Flowering Periods for Federally Listed Plant Species with the Potential to Occur at MCAS Cherry Point Complex.

Species	Survey Window	Comments on Habitat
Roughleaf loosestrife (<i>Lysimachia asperulifolia</i>)	May–Jun	Low pocosins, high pocosins, stream-head pocosins, savanna-pocosin ecotones, and sandhill-pocosin ecotones
Seabeach amaranth (<i>Amaranthus pumilus</i>)	Jun–Jul	Sea beaches, fore-dunes, island end flats, rarely on sound-side beaches
Sensitive joint-vetch (<i>Aeschynomene virginica</i>)	Jul–Oct	Fresh to brackish tidal marshes and adjacent ditches, fields, and disturbed areas

Sources: UNC Herbarium 2010, USFWS North Carolina Ecological Services 2011

Fish

Shortnose sturgeon (*Acipenser brevirostrum*)

There are no direct management actions in place and no species-specific management actions are proposed for shortnose sturgeon. Protection for this species would be provided through NEPA-initiated individual project review and subsequent Section 7 consultation, if necessary.

Continuation of measures that protect aquatic resources will provide an indirect benefit to this species.

Herpetofauna

American alligator (*Alligator mississippiensis*)

There are no direct management actions in place and no species-specific management actions are proposed for American alligator, as this species is considered fully recovered and is listed as threatened due to similarity in appearance with federally endangered American crocodile (*Crocodylus acutus*). In addition, actions that may affect the American alligator do not trigger USFWS Section 7 consultation. Protection for this species would be provided through NEPA-initiated individual project review. Continuation of measures that protect aquatic resources will provide an indirect benefit to this species.

Atlantic hawksbill sea turtle (*Eretmochelys imbricata imbricata*), **green sea turtle** (*Chelonia mydas*), **Kemp's ridley sea turtle** (*Lepidochelys kempii*), **leatherback sea turtle** (*Dermochelys coriacea*), and **loggerhead sea turtle** (*Caretta caretta*)

The Biological Assessment (BA) submitted by MCAS Cherry Point to the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) in March of 2002 as part of formal consultation requirements for potential impacts to federally protected sea turtles (and marine mammals) resulting from ongoing delivery of ordnance at BT-9 and BT-11 concluded that such activities would have “no effect” on Atlantic hawksbill sea turtle. A “may effect, but not likely to adversely affect” determination was made for leatherback sea turtle, and a “may effect, and likely to adversely affect determination was made for the green, Kemp's ridley, and loggerhead sea turtles. Subsequently, NMFS issued a Biological Opinion (BO) providing concurrence with this determination, except for the leatherback sea turtle, which it concluded would likely be adversely affected by the action. After review of the current status, environmental baseline data, proposed action, MCAS Cherry Point's actions to reduce adverse effects, and cumulative effects NMFS concluded that the proposed action will not likely jeopardize the continued existence of the green, Kemp's ridley, and loggerhead sea turtles.

The NMFS conclusion including an understanding that “take” of endangered sea turtles may occur incidentally and therefore an Incidental Take Statement (ITS) was included in the NMFS BO. The ITS includes reasonable and prudent measures and terms and conditions for which compliance is required to ensure protective coverage under the ESA. To address the terms and conditions of the BO and ITS, MCAS Cherry Point prepared a Marine Mammal and Protected Species Monitoring Plan (Appendix D) (USMC 2010c). The plan has been coordinated with NMFS and provides a summary of requirements of the consultations that have occurred to date with NMFS in regards to sea turtles (and marine mammals).

Routine monitoring for sea turtles and marine mammals in the BT-9 and BT-11 bombing areas is conducted as outlined in the MCAS Cherry Point Marine Mammal and Protected Species Monitoring Plan (Appendix D) (USMC 2010c) and in accordance with the BO as follows:

- Monitoring activities are conducted prior to initiation of bombing exercises by contracted aircraft and specially trained pilots. Bombing target sweeps are conducted prior to any

planned bombing exercises to ensure bombing areas are clear of fisherman, other personnel, and protected sea turtle and marine mammal species. Sweeps are flown at 100–300 ft above the water surface, at airspeeds of 6–100 knots, and normally cover both bombing areas.

- As time, safety conditions, and mission requirements allow, the aircraft observing an animal within the bombing area, will remain insight of the animal(s), until they are observed leaving the area. Information on animal sightings and observations of animals leaving the bombing area are immediately provided to range operators through a direct communication channel.
- Post-exercise sweeps are conducted the morning after an exercise for training conducted Monday–Thursday, and on the following Monday for training taking place on a Friday. Weekly monitoring sweeps include a maximum of five pre-exercise, and four post-exercise sweeps. The maximum time that may elapse between pre- and post-exercise monitoring sweeps is 3 days; normally associated with weekends.
- In addition to monitoring sweeps performed by contracted aircraft, pilots performing bombing exercises also conduct a visual check of the area. Prior to delivery of ordnance, pilots conduct a low, “cold” pass of the bombing area to ensure it is clear of boats, personnel and protected sea turtles and marine mammals. Range operators also reference video feeds from several remotely controlled, tower-mounted cameras installed around the bombing target area to make sure the area is clear, before authorizing pilots to conduct a “hot” pass of the bombing target for delivery of ordnance. Several recently installed cameras are equipped with night vision and infrared capabilities, to assist with monitoring of the area during night-time bombing exercises. If range operators determine that the bombing area is not clear, or if they have received information on the presence of sea turtles, marine mammals, boats, or personnel, they will deny the pilot authorization to conduct a “hot” pass of the bombing target.
- Additional measures employed to ensure visual identification of protected sea turtle and marine mammals includes the requirement for all small boat operators and other personnel to take Marine Species Awareness Training. Pilots conducting range sweeps are also instructed on the appropriate marine mammal observation techniques during routine Range Management Department briefings.

Of the environmental and training factors analyzed in the NMFS BO, boat strike, direct hit from ordnance, and concussive effects from live ordnance explosions were determined to be the most likely factors to impact sea turtles species most likely to occur in the BT-9 and BT-11 training areas. NMFS determined a likelihood of up to one sea turtle (of any species) being struck by boat (either manned or remotely operated) every 10 years. Direct hit by ordnance for a 10-year period was determined to be 0.206 turtles at BT-9, and 0.167 turtles at BT-11 from modeling and analysis of data (impact area, sea turtle density data, shell surface area averages for turtles, and ordnance drop data). NMFS rounded these results to a whole turtle, and determined that over a 10-year period up to a total of one turtle may be impacted by a direct hit from ordnance. Modeling and data analysis performed by NMFS also determined up to three turtles could die from extensive lung

hemorrhage, up to one sea turtle could suffer slight (recoverable) lung injury, and no more than 21 sea turtles would experience disruption of hearing-based behaviors as a result of temporary threshold shifts resulting from concussive effects from live ordnance explosions (NMFS 2002). Overall the BO determined that MCAS Cherry Point training activities at BT-9 and BT-11 would not have a significant effect on the four sea turtle species of interest.

Neuse River waterdog (*Necturus lewisi*)

Forestry or military operations that move sediment into streams and water bodies could negatively affect the Neuse River Waterdog. To maintain exemption under the 4(d) rule, operations must follow all state forest practice guidelines for water quality and riparian buffer rules. Channel restoration projects must have surveys completed, prior to restoration action, to determine presence of Neuse River waterdog. If located, waterdogs must be relocated prior to project implementation. Native species vegetation includes woody and herbaceous species appropriate for the region and habitat conditions. These methods will not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures.

Birds

Five federally listed bird species have the potential to occur at MCAS Cherry Point (Table C-2). Surveys for these species are recommended, and if discovered additional NEPA-initiated individual project review and subsequent Section 7 consultation would afford protection to any federally listed bird species identified as occurring at MCAS Cherry Point.

Implementation of ecosystem management practices in support of the conservation and management of the black rail is ongoing. Prescribed fire activities on Piney Island are limited to outside of the nesting season. Wildfires started by munition or flare delivery are allowed to burn naturally and typically result in mosaic burns.

MCAS Cherry Point is currently actively managing forest habitat to promote establishment of longleaf pine wiregrass ecosystem, which indirectly benefits the red-cockaded woodpecker (*Picoides borealis*). MCAS Cherry Point will continue to manage for the longleaf pine wiregrass ecosystem and promote discovery of RCW populations through survey of suitable habitat.

There are no direct management actions in place in regard to the piping plover, roseate tern, and rufa red knot, however shorebird surveys in areas of suitable habitat are recommended. Surveys for federally listed bird species that have the potential to occur at MCAS Cherry Point include:

- Conducting surveys in high-probability habitat for federally listed bird species that have the potential to occur at MCAS Cherry Point in appropriate habitats (Table C-2);
- Collection of GIS data (location and habitat) for any federally listed bird species identified during surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of all federally listed bird species identified as occurring at MCAS Cherry Point.

Table C-2. Species-Specific Habitats for Federally Listed Bird Species with the Potential to Occur at MCAS Cherry Point Complex.

Species	Comments on Habitat
Eastern Black rail (<i>Laterallus jamaicensis</i>)	High salt marsh and shallow freshwater marshes, as well as wet meadows and other flooded grassy communities; ground-nesters
Piping plover (<i>Charadrius melodus</i>)	Nests situated above the high tide line of coastal beaches, dunes, sandflats, and ends of sandspits and barrier islands
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Longleaf pine habitats
Roseate tern (<i>Sterna dougallii</i>)	Nests typically located on small offshore islands inlets, rocks, cays; nests near vegetation or jagged rocks, close to the waterline of narrow ledges of emerging rocks, open sandy beaches, or among coral rubble
Rufa Red Knot (<i>Calidris canutus rufa</i>)	Tidal mudflats

Sources: USMC 2001, USMC 2009d

Mammals

Fin whale (*Balaenoptera physalus*), **humpback whale** (*Megaptera novaeangliae*), **North Atlantic right whale** (*Eubalaena glacialis*), **sei whale** (*Balaenoptera borealis*), **sperm whale** (*Physeter macrocephalus*), and **West Indian manatee** (*Trichechus manatus*)

The BA submitted by MCAS Cherry Point to NMFS in March of 2002 as part of formal consultation requirements for potential impacts to federally protected marine mammals (and sea turtles) resulting from ongoing delivery of ordnance at BT-9 and BT-11 concluded that such activities would have “no effect” on the fin, humpback, sei, and sperm whales. A “may effect, but not likely to adversely affect” determination was made for the North Atlantic right whale. Subsequently, NMFS issued a BO providing concurrence with this determination. The (ITS) included in the NMFS BO includes reasonable and prudent measures and terms and conditions for which compliance is required to ensure protective coverage under the ESA. However, the ITS did not provide authorization for the incidental take of marine mammals, and as a result MCAS Cherry Point coordinated with NMFS to obtain an Incidental Harassment Authorization ([IHA] issued 18 November 2010 for the period of 1 December 2010 through 30 November 2011; Multiple IHA renewals or Letters of Authorization have been issued since that time for activities at the BTs.

The routine monitoring conducted in the BT-9 and BT-11 bombing areas described for sea turtles above also includes monitoring for marine mammals, following the guidance outlined in MCAS Cherry Point’s Marine Mammal and Protected Species Monitoring Plan (Appendix D) (USMC 2010c) and in accordance with the IHA.

West Indian manatee falls under the jurisdiction of the USFWS. An Environmental Assessment (EA) prepared by MCAS Cherry Point concluded that range operations would not adversely impact

this species (USMC 2009d), and USFWS provided concurrence with the EA determination in a letter dated 15 May 2009. Additional protection is afforded to West Indian manatee through NEPA-initiated individual project review and subsequent Section 7 consultation, if necessary.

Northern Long Eared Bat (*Myotis septentrionalis*), and **Tricolored Bat** (*Perimyotis subflavus*)

To ensure installation activities are consistent with the 4(d) rule, the following management strategies have been implemented: avoid to the maximum extent practicable the cutting of timber during pup season (1 June – 31 July) or breeding season (15 May – 15 August), limit removal of tree snags to only those that pose a safety concern and protect contiguous forested corridors for forage. Creating snags can be done by girdling trees if an area is lacking snags. Prescribed fire may also increase snags and canopy gaps therefore increasing solar radiation reaching roosts.

Species at-Risk

Plants

Management actions in place for at-risk plant species with the potential to occur at MCAS Cherry Point (Table C-3) include establishment of a monitoring program, to include rare plant surveys. Additional protection for at-risk plant species known to occur at MCAS Cherry Point would be provided through NEPA-initiated individual project review and agency consultation, if necessary. Monitoring and survey requirements for at-risk plant species of MCAS Cherry Point include:

- Establishing a monitoring program for all known at-risk plant species populations;
- Conducting surveys in high-probability habitat for new locations of at-risk plant species known to occur at MCAS Cherry Point during the appropriate flowering period (Table C-3);
- Collection of GIS location data for any populations of at-risk plant species observed during rare plant surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of all at-risk plant species known to occur at MCAS Cherry Point.

Table C-3. Species-Specific Habitats and Flowering Periods for At-Risk Plant Species of MCAS Cherry Point Complex.

Species	Survey Window	Comments on Habitat
Baldwin's Nutrush (<i>Scleria baldwinii</i>)	June-July	Depressions in wet pine savannas and flatwoods, often with Pond Pine and Pond Cypress.
Beach Morning-glory (<i>Ipomoea imperati</i>)	June-Oct	Upper beach, in dunes, or in sandy areas behind dunes.
Blue Witch Grass (<i>Dichanthelium caeruleascens</i>)	May-Oct	Maritime wet grasslands and margins of interdune marshes, wet pine savannas

Species	Survey Window	Comments on Habitat
Branched Gerardia (<i>Agalinis virgata</i>)	Sep-Oct	Wet pine savannas, but it also occurs in a few high diversity Carolina bay-like depression ponds.
Calcium-fleeing Sedge (<i>Carex calcifugens</i>)	Apr-June	Maritime evergreen and maritime deciduous forests; on the mainland, mesic forests where underlying marl influences the soil.
Carolina Spleenwort (<i>Asplenium heteroresiliens</i>)	Apr-Oct	Rock-obligate species, limited in NC mostly to cracks in vertical banks of creeks and rivers, where marl is exposed. Habitats are mostly shaded and somewhat humid.
Chapman's Arrowhead (<i>Sagittaria chapmanii</i>)	May-Sep	Limited mainly to limesink ponds, very rarely in scrapes and ditches.
Chapman's Redtop (<i>Tridens chapmanii</i>)	Aug-Oct	Mesic or loamy sandy soil of Longleaf Pine--Wiregrass slopes and flats, mafic soil of oak-hickory-pine ridges, openings in maritime forests.
Coastal Beaksedge (<i>Rhynchospora pleiantha</i>)	July-Sep	Exposed bottoms of sinkhole ponds, visible during low-water cycles.
Coastal Goldenrod (<i>Solidago villosicarpa</i>)	Sep-Oct	Dry to mesic pine-deciduous forests and woodlands (collectively called maritime evergreen forest), especially along edges and openings of such woodlands.
Comfortroot (<i>Hibiscus aculeatus</i>)	June-Aug	Damp but sandy margins of maritime forests and openings; but it can also be found in ditches and along the margins of damp forests.
Drooping Bulrush (<i>Scirpus lineatus</i>)	May-July	Bottomlands and other forests along wooded streams, usually in soils derived from calcareous rock or coquina.
Dune Bluecurls (<i>Trichostema nesophilum</i>)	Aug-Frost	Coastal species of dunes, sand flats, and other sandy soil on barrier islands, such as in sandy openings in Maritime Scrub or edges of Maritime Forests.
Eaton's Witch Grass (<i>Dichantheium spretum</i>)	May-Sep	Seasonally ponded natural depressions, powerlines through wet savannas, wet meadows, and alluvial woods.
Estuary Pipewort (<i>Eriocaulon parkeri</i>)	July-Oct	Intertidal zone of coastal streams and rivers, and possibly oligohaline marshes.
Flaxleaf Seedbox (<i>Ludwigia linifolia</i>)	June-Sep	Limesink ponds and pools, and less so in ponded areas in cypress savannas.
Florida Adder's-mouth (<i>Malaxis spicata</i>)	July-Oct	Maritime swamps and wet spots within maritime forests, but also in damp forested areas over marl, such as along creeks or pool margins in hardwood stands.

Species	Survey Window	Comments on Habitat
Florida Yellow-eyed-grass (<i>Xyris floridana</i>)	July-Sep	Wet Longleaf Pine-Wiregrass savannas and flatwoods.
Four-angled Flatsedge (<i>Cyperus tetragonus</i>)	July-Sep	Maritime evergreen forests, especially in small openings and along trails; edges of brackish marshes.
Fragrant Beaksedge (<i>Rhynchospora odorata</i>)	July-Sep	Maritime wet grasslands, interdune marshes, wet pine savannas.
Georgia Sunrose (<i>Crocanthemum georgianum</i>)	Apr-May	Openings in maritime forests.
Giant Spiral Orchid (<i>Spiranthes longilabris</i>)	Oct-Dec	Savannas, and even within savannas it favors the wettest portions.
Globe-fruit Seedbox (<i>Ludwigia sphaerocarpa</i>)	June-Sep	Quiet fresh water, and it grows mainly in the edges of lakes (natural). ponds, and in pools. It also grows in interdune depressions, but rarely in ditches or marshes.
Godfrey's Sandwort (<i>Mouria paludicola</i>)	Apr-June	Marl substrates, but in several habitats. It grows mainly on banks of tidal creeks and rivers, as well as into adjacent marshes; it also has been found in seepage areas in marl forests.
Grassleaf Arrowhead (<i>Sagittaria weatherbiana</i>)	Apr-June	Shallow water and muddy situations, preferably where shady. It occurs in cypress-gum swamps, fresh to brackish marshes and tidal swamps and edges, and various other pools and pond margins.
Green Flatsedge (<i>Cyperus virens</i>)	June-Oct	Margins of marshy beaver ponds, margins of peatland pocosins, peaty roadsides.
Gulfcoast Spikerush (<i>Eleocharis cellulosa</i>)	July-Oct	Brackish to fresh marshes, interdune marshes, lagoon borders.
Harper's Beaksedge (<i>Rhynchospora harperi</i>)	July-Oct	Brackish to fresh marshes, interdune marshes, lagoon borders.
Harper's Yellow-eyed-grass (<i>Xyris scabrifolia</i>)	July-Sep	Blackwater streamhead ecotones and Sandhills seeps; ecotones between wet pine savannas and pocosins of the outer Coastal Plain.
Hooker's Milkwort (<i>Polygala hookeri</i>)	June-Aug	Pine savannas, found mostly where the habitat is burned every few years to keep savannas relatively free of competing woody vegetation.
Lace-lip Ladies'-tresses (<i>Spiranthes laciniata</i>)	May-Aug	Generally a pool or pond species -- found in cypress depressions, margins of natural lakes and ponds, interdune marshes, and other wet ground where the waters are not flowing.
Lanceleaf Seedbox (<i>Ludwigia lanceolata</i>)	Aug-Sep	Interdune ponds, open wet areas.
Leconte's Thistle (<i>Cirsium lecontei</i>)	June-Aug	Wet Longleaf Pine savannas and flatwoods, pitcher-plant seepages.

Species	Survey Window	Comments on Habitat
Many-flower Grass-pink (<i>Calopogon multiflorus</i>)	Apr-June	Pine savannas in NC, though it may occur along edges of savannas and wetter parts of pine flatwoods.
Mudbank Crown Grass (<i>Paspalum dissectum</i>)	July-Oct	Exposed shores (often muddy) of ponds, natural lakes (Pungo Lake), reservoirs, impoundments, rivers.
Peelbark St. John's-wort (<i>Hypericum fasciculatum</i>)	May-Sep	Shallow standing water, typically in pools, pond margins (including beaver ponds), clay-based Carolina bays (at least under cypress), and various wet spots in pinelands.
Pickering's Dawnflower (<i>Stylisma pickeringii</i> var. <i>pickeringii</i>)	May-Aug	Dry sandhill praries.
Pinebarren Sunrose (<i>Crocanthemum corymbosum</i>)	Apr-May	Sandy soil around the margins of, or in openings within, maritime forests.
Pineland Yellow-eyed-grass (<i>Xyris stricta</i>)	July-Sep	Wet Longleaf Pine-Wiregrass savannas, ditches through this habitat.
Pondspice (<i>Litsea aestivalis</i>)	Mar-Apr	Limesink ponds, but also is found in other isolated natural ponds and pools, such as in some Carolina bays.
Raven's Seedbox (<i>Ludwigia ravenii</i>)	Jun-Oct	Shallow ponded places, such as pools, pond margins, and swampy places.
Rich-woods Sedge (<i>Carex oligocarpa</i>)	May-June	Rich mesophytic hardwood forests or mixed with pine, in calcareous or mafic soils.
Robbins' Spikerush (<i>Eleocharis robbinsii</i>)	June-Sep	Natural sinkhole ponds or depression ponds, blackwater stream impoundments and beaver ponds.
Savanna Indian-plantain (<i>Arnoglossum ovatum</i> var. <i>lanceolatum</i>)	Aug-Oct	Wet longleaf Pine-Wiregrass savannas and flatwoods, often over marl or coquina limestone.
Savanna Milkweed (<i>Asclepias pedicellata</i>)	May-July	Moist to mesic Longleaf Pine habitats -- mostly in the drier portions of pine savannas, but also present in pine flatwoods.
Seabeach Knotweed (<i>Polygonum glaucum</i>)	May-Nov	Ocean beaches, especially at the high tide line (wrack like); sand flats, sand margins of brackish sounds.
Shadow-witch (<i>Ponthieva racemosa</i>)	Sep-Oct	Found in the shade (or even dense shade) of hardwoods, such as in bottomlands, swamp margins, and edges of forested creeks.
Shoreline Sea-purslane (<i>Sesuvium portulacastrum</i>)	May-Frost	Sand flats, beaches, dune swales, edges and drawdowns of coastal ponds and impoundments, and other sunny and open coastal sites.
Slender Sea-purslane (<i>Sesuvium maritimum</i>)	May-Frost	Sand flats, beaches, sandy damp soil of drawdown zones of ponds and impoundments,

Species	Survey Window	Comments on Habitat
		and margins of brackish marshes along the coast.
Small Butterwort (<i>Pinguicula pumila</i>)	Apr-May	Savannas, less so in wet pine flatwoods and in powerline clearings that mimic a savanna.
Small-flowered Buckthorn (<i>Sageretia minutiflora</i>)	Sep	Found only over shell deposits or other marl/coquina substrates that occur along the edges of maritime forests or in maritime thickets, typically very close to a salt marsh edge.
Small-leaved Meadowrue (<i>Thalictrum macrostylum</i>)	May-June	Damp seepages, damp bottomlands or openings in swamps, marsh edges, and damp glades and barrens.
Snowy Orchid (<i>Platanthera nivea</i>)	May-Sep	Wet savannas, and similar habitat in powerline clearings.
Southern White Beaksedge (<i>Rhynchospora macra</i>)	July-Sep	Wet blackwater streamheads and ecotones, seepages with pitcher-plants, boggy margins of impoundments and beaver ponds.
Spring-flowering Goldenrod (<i>Solidago verna</i>)	May-June	Moist to seasonally moist Longleaf Pine-Wiregrass flatwoods, drier parts of savannas, blackwater streamhead ecotones, mesic to moist powerlines, and roadsides through former habitat. Responds well to recurring fire.
Thin-wall Quillwort (<i>Isoetes microvela</i>)	May-July	Blackwater rivers/creeks, on emergent banks, especially those underlain by marl.
Venus Flytrap (<i>Dionaea muscipula</i>)	May-June	Wetter portions of pine savannas, as well as in seepages.
Viviparous Spikerush (<i>Eleocharis vivipara</i>)	July-Sep	Blackwater stream impoundment ponds (often with peat moss), sinkhole ponds, floating peat mats along blackwater creeks.
Widow Sedge (<i>Carex basiantha</i>)	Apr-June	Mesic forests and bottomlands over calcareous rocks or in calcareous-influenced soils. The NC sites are in rich low forests over marl deposits.
Yellow Fringeless Orchid (<i>Platanthera integra</i>)	July-Sep	Savannas, growing under scattered Longleaf Pines, or in nearby powerline clearings that mimic savannas.

Source: NC Parks 2023

Invertebrates

Graceful clam shrimp (*Lynceus gracilicornis*)

Graceful clam shrimp inhabit temporary wetlands and vernal pools. Management actions for graceful clam shrimp include establishment of a monitoring program for known populations of this species at MCAS Cherry Point. Additional protection would be provided through NEPA-

initiated individual project review and agency consultation (if necessary), and continuation of measures that protect aquatic resources will provide an indirect benefit to this species.

Monitoring requirements for graceful clam shrimp include:

- Establishment of a monitoring program for all known populations of graceful clam shrimp at MCAS Cherry Point;
- Conducting spring surveys in high-probability habitat for new locations of graceful clam shrimp at MCAS Cherry Point;
- Collection of GIS location data for any populations of graceful clam shrimp identified during spring surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of graceful clam shrimp populations at MCAS Cherry Point.

Fish

Habitats associated with at-risk fish known or with the potential to occur at MCAS Cherry Point are included in Table C-4. Monitoring and survey requirements for these species include:

- Establishment of a monitoring program for all known populations of at-risk fish species;
- Conducting surveys in high-probability habitat for new occurrences that may be present at MCAS Cherry Point (Table C-4);
- Collection of GIS location data for any populations of at-risk fish identified during surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of at-risk fish species known to occur at MCAS Cherry Point.

Additional protection for at-risk fish known to occur at MCAS Cherry Point would be provided through NEPA-initiated individual project review and agency consultation, if necessary.

Table C-4. Species-Specific Habitats and for At-Risk Fish Species of MCAS Cherry Point Complex.

Species	Comments on Habitat
Bridle Shiner (<i>Notropis bifrenatus</i>)	Variety of aquatic habitats from small, warm-water streams and ponds to large lakes and rivers with clear water where the forage primarily on microcrustaceans and aquatic insects.
Least Brook Lamprey (<i>Lampetra aepyptera</i>)	Sandy bottom, slow moving, slightly acidic Coastal Plain streams.

Herpetofauna

Habitats associated with at-risk herpetofauna known or with the potential to occur at MCAS Cherry Point are included in Table C-5. Monitoring and survey requirements for these species include:

- Establishment of a monitoring program for all known populations of at-risk herpetofauna species;
- Conducting surveys in high-probability habitat for new occurrences that may be present at MCAS Cherry Point (Table C-5);
- Collection of GIS location data for any populations of at-risk herpetofauna identified during surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of at-risk herpetofauna species known to occur at MCAS Cherry Point.

Additional protection for at-risk herpetofauna known to occur at MCAS Cherry Point would be provided through NEPA-initiated individual project review and agency consultation, if necessary.

Table C-5. Species-Specific Habitats for At-Risk Herpetofauna Species of MCAS Cherry Point Complex.

Species	Comments on Habitat
Carolina Gopher Frog (<i>Rana capito</i>)	Stump holes, root tunnels and mammal and crayfish burrows. Breeding occurs in upland ephemeral ponds in longleaf pine savannas.
Carolina pigmy rattlesnake (<i>Sistrurus miliarius miliarius</i>)	Pine flatwoods and sandy, open woodlands with pines, wiregrass, and scrub oaks, and frequently observed near cypress ponds and other waterbodies
Carolina Swamp Snake (<i>Seminatrix pygaea paludis</i>)	Cypress ponds, swamps, Carolina bays, and other shallow water bodies with dense aquatic vegetation.
Carolina watersnake (<i>Nerodia sipedon williamengelsi</i>)	Brackish marsh/salt marsh habitats; occurs on nearby terrestrial habitat when basking, non-aquatic foraging, resting, and probably over-wintering
Diamondback terrapin (<i>Malaclemys terrapin terrapin</i>)	Brackish marsh/salt marsh habitats and tidal channels of sounds and estuaries that are bordered primarily by <i>Spartina</i> spp.
Eastern Chicken Turtle (<i>Deirochelys reticularia reticularia</i>)	Canals, marshes, cypress, ponds, and other bodies of still or sluggish water.

Four-toed Salamander (<i>Hemidactylium scutatum</i>)	Forests surrounding swamps, bogs, marshes, and temporary bodies of water which are free of fish.
Mabee's Salamanger (<i>Ambystoma mabeei</i>)	Savanna pine barrens in soil near bogs, ponds, and swamps.
Mimic Glass Lizard (<i>Ophisaurus mimcus</i>)	Pine flatwoods and open woodlands.
Southern Chorus Frog (<i>Pseudacris nigrita</i>)	Pine flatwoods, wet meadows, forested wetlands and wet roadside ditches.
Southern Hognose Snake (<i>Heterodon simus</i>)	Sandy fields and forests.
Timber rattlesnake (<i>Crotalus horridus</i>)	Forested areas, especially cane thickets and swamps.

Sources: Conant and Collins 1998; Petranka 1998; USMC 2001, USMC 2009a

Birds

Management actions in place for at-risk bird species known or with the potential to occur at MCAS Cherry Point (Table C-6) include establishment of a monitoring program, to include bird surveys. Additional protection for at-risk bird species known to occur at MCAS Cherry Point would be provided through NEPA-initiated individual project review and agency consultation, if necessary. Monitoring and survey requirements for at-risk bird species of MCAS Cherry Point include:

- Establishment of a monitoring program for all known populations of at-risk bird species;
- Conducting surveys in high-probability habitat for new occurrences that may be present at MCAS Cherry Point (Table C-6);
- Collection of GIS location data for any populations of at-risk bird species identified during surveys, and including this data in the MCAS Cherry Point GIS database; and,
- Implementing ecosystem management practices that support the conservation and management of at-risk bird species known to occur at MCAS Cherry Point.

Table C-6. Species-Specific Habitats for At-Risk Bird Species of MCAS Cherry Point Complex.

Species	Comments on Habitat
American Oystercatcher (<i>Haematopus palliatus</i>)	Beaches, sandbars, spoil islands, shell rakes, salt marsh, and oyster reefs.
Bachman's sparrow (<i>Aimophila aestivalis</i>)	Mature pine woodlands (historically); open habitats, including clear-cuts and right-of-ways that have a grassy understory; overgrown fields; grassy orchards; and restored pine forests.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Forage primarily on fish; nest in large pine trees.
Black skimmer (<i>Rhynchops niger</i>)	Forage on shore for fish; ground-nesters in large colonies.
Common tern (<i>Sterna hirundo</i>)	Build ground-nests of dead vegetation on islands, marshes, or beaches adjacent to lakes or ocean.

Glossy Ibis (<i>Plegadis falcinellus</i>)	Marshes, swamps, rice fields, lagoons, and riverbanks.
Gull-billed tern (<i>Gelochelidon nilotica aranea</i>)	Nearshore in upper beach community; nests on gravelly or sandy beaches.
Henslow's sparrow (<i>Ammodramus henslowii</i>)	Large fields with tall, dense grass layer absent of woody vegetation; and drier areas of salt marshes.
Least Bittern (<i>Ixobrychus exilis</i>)	Freshwater and brackish marshes.
Least Tern (<i>Sternula antillarum</i>)	Open sand, including beaches, dredge material islands, and sometimes, on gravel-covered rooftops.
Little blue heron (<i>Egretta caerulea</i>)	Aquatic systems including swamps, estuaries, rivers, ponds and lakes; nest in colonies with other herons in trees or shrubs.
Loggerhead Shrike (<i>Lanius lludovicianus</i>)	Open, tall grassy fields, overgrown hedge rows and agricultural areas.
Painted Bunting (<i>Passerina ciris</i>)	Scrub–shrub and open woodlands along the Atlantic Coast but are also found in hedges and yards where they forage on invertebrates and seeds.
Snowy egret (<i>Egretta thula</i>)	Freshwater and saline marsh communities.
Tricolored heron (<i>Egretta tricolor</i>)	Marsh communities; nest in trees in mixed-species colonies.
Wayne's Black-throated Green Warbler (<i>Setophaga virens waynei</i>)	Mixed hardwood forests.
Wilson's Plover (<i>Charadrius wilsonia</i>)	Sand flats, mainly near inlets, but it also nests on dredge islands and some natural estuarine islands.

Sources: Cornell Lab of Ornithology 2011, Dunning 2006

Marine Mammals

Common bottlenose dolphin (*Tursiops truncatus*)

Common bottlenose dolphins are commonly observed in the offshore waters of BT-9 and BT-11 and have also been observed in the Neuse River and Hancock and Slocum Creeks at MCAS Cherry Point. Monitoring described above for sea turtles and marine mammals in the bombing target areas also includes monitoring for the presence of common bottlenose dolphins. In addition to this routine monitoring, MCAS Cherry Point has also developed a passive acoustic monitoring program (PAM) in cooperation with Duke University, to determine their usage of BT-9 and BT-11 bombing target areas (Secretary of Defense and Secretary of the Navy 2008, Laura 2009). Phase I of the PAM program involved development of a software program that could be used to recognize dolphin whistles within the area of these targets. Results of this program were successful in determining that a real-time automated device could be used to indicate when dolphins were present in the area due by detection of audible whistles. Phase II of this project is currently underway which includes 2 units installed at BT-9 and one at BT-11 for continuous receipt of dolphin activity within the area.

This page intentionally left blank.

APPENDIX D

Marine Mammal and Protected Species Monitoring Plan

This page intentionally left blank.



United States Marine Corps, Marine Corps Air Station Cherry Point

USMC Cherry Point Range Complex

Marine Mammal and Protected Species Monitoring Plan

Introduction

This Monitoring Plan for the USMC Cherry Point Range Complex has been developed to provide marine mammal and sea turtle monitoring as required by the Endangered Species Act and Marine Mammal Protection Act (MMPA). The monitoring program described herein applies to the organic facility assets and training activities under the control of Marine Corps Air Station (MCAS) Cherry Point and taking place on land and waters within Pamlico Sound and inshore waters adjacent to MCAS Cherry Point facility assets.

Consistent with Section 10(a)(5)(a) of the MMPA and its implementing regulations, MCAS Cherry Point has coordinated this monitoring plan with the National Marine Fisheries Service and has both a Biological Opinion related to threatened and endangered species and an Individual Harassment Authorization related to marine mammals. This monitoring plan covers the terms, conditions, and timelines of the Biological Opinion and Individual Harassment Authorization. This monitoring plan shall be dynamic to future required coordination with NMFS.

Protected Species within the USMC Cherry Point Complex

There is one (1) marine mammal species, bottlenose dolphin, expected to occur regularly within the inshore waters of Pamlico Sound. A second species of marine mammal, the West-Indian manatee, occurs with limited frequency. There are four (4) species of threatened and endangered turtles that have been recorded within the inshore waters of Pamlico Sound. These species, the green sea turtle, kemp's ridley, loggerhead, and leatherback sea turtle have potential to forage or transit through range areas. The potential presence of both marine mammals and sea turtles on USMC Cherry Point range areas creates a monitoring requirement to ensure the means of affecting the least practicable impact on these species is appropriately administered and implemented.

Monitoring Plan

MCAS Cherry Point will collect data related to marine mammal and threatened and endangered species sightings and observations during routine monitoring of the bombing targets areas pre- and post exercise as described below. Information shall be collected during monitoring activities only when the collection of data does not interfere with safety of operations taking place, observers, aircraft or water vessels in operation, national security, or the conduct of the military training taking place.

To the extent practical, data shall be collected in a manner that facilitates retrieval for reporting and potential analyses. Data is currently being collected via verbal, written, and



other information transfer from observers and observation platforms. Information currently being collected includes date, time, geographic location (lat/long, utm, other), number of animals seen/encountered, direction of travel, weather information, air temperature, and sea surface state.

MCAS Cherry Point has contracted for the development of a web-based information system (database, web-interface, report generator) which will function as the interface between observers and the physical environment. The features of the interface include a spatial component which will automatically display observation information on-screen and will permit heads-up digitizing of observation data when exact locational (lat/long, other) information is not available. When the web-based system is completed, this monitoring plan will be updated.

Monitoring Plan Updates

Military training within the MCAS Cherry Point Complex is dynamic and subject to change based upon mission requirements and real-world engagements. The most notable changes take place when new technology and weapon systems are developed and placed into operation. The basic components of this monitoring strategy will remain unchanged unless the timing, intensity and duration of military training activities exceed projected levels or new monitoring capabilities are proposed to enhance data collection and improve the mean of affected the least practical impact on protected species. The monitoring plan will be re-evaluated annually and updated as necessary to meet this objective.

Range Status

Cherry Point Bombing Target (BT) 11 (Piney island) and BT-9 (Brandt Island Shoal) are active ranges and access is tightly controlled. The Code of Federal Regulations (33 CFR 443.420) establishes the use restrictions applicable to the public. These regulations are enforced by the Commanding Officer, Marine Corps Air Station Cherry Point as it relates to trespass by non-participating civilians.

An active range is considered “fouled” and not available for use if non-participating vessel traffic or civilians are anywhere on the range, or protected species (marine mammals and sea turtles) are present within 1000 yards of the target area at BT-9 or anywhere within Rattan Bay (BT-11). The ranges are monitored by various means to ensure the safety of marine species and civilians.

Monitoring

Search and Rescue Aircraft Range Sweeps

The VMR-1 squadron, stationed at MCAS Cherry Point, includes three specially equipped HH-46D helicopters. The primary mission of these aircraft, known as PEDRO, is to provide search and rescue for downed 2^d Marine Air Wing aircrews. The squadron



also provides search and rescue support to the Coast Guard and other local authorities. Pedro aircraft fly an average of 100 missions each year in search of boaters in distress, lost hunters, and other people in trouble.

On-board are a pilot, co-pilot, crew chief, search and rescue swimmer, and a medical corpsman. Each crew member has received extensive training in search and rescue techniques, and is therefore particularly capable at spotting objects floating in the water.

Pedro normally conducts a range sweep (pre-exercise) every weekday morning prior to the commencement of range operations (in addition to their emergency missions mentioned previously). The primary goal of the pre-exercise sweep is to ensure that the target area is clear of fisherman, other personnel, and protected species. The sweep is flown at 100-300 feet above the water surface, at airspeeds between 60-100 knots. The path of the sweep runs down the western side of BT-11, circles around BT-9 and then continues down the eastern side of BT-11 before leaving. The sweep typically takes 20-30 minutes to complete.

Recording sightings of marine mammals and turtles was incorporated into this range sweep in June of 2000. The Pedro crew has not reported any sightings of turtles, but has reported numerous bottlenose dolphin sightings. The Pedro crew is able to communicate directly with range personnel and can provide immediate notification to range operators. The Pedro aircraft would remain in the area of a sighting until clear if possible or as mission requirements dictate. The aircraft must maintain a minimum of one hours fuel supply. An observation early in the range sweep with subsequent loiter, and return to normal sweep pattern could threaten the safety of the flight crew.

Post-exercise monitoring shall be conducted concomitant to the next regularly scheduled pre-exercise sweep. Weekly monitoring events would include a maximum of five (5) pre-exercise and four (4) post-exercise sweeps. The maximum number of days that would elapse between pre- and post-exercise monitoring events would be approximately 3 days, and would normally occur on weekends.

Range Standard Operating Procedures

Air to Surface and Ground Activities

Standard operating procedures include a visual check by pilots (rotary wing and fixed wing) prior to ordnance delivery to ensure the target area is clear of unauthorized civilian boats and personnel, and protected species such as turtles and marine mammals. This is referred to as a “cold” pass. Pilots requesting entry onto the targets are directed to do a low, cold first pass (a pass without any release of ordnance). The ability of pilots operating tactical aircraft to detect animals in the water, even at a low level is much less than that of the Pedro crew (described above in SAR sweeps).



When aircrews request a “First Pass Hot” on waterborne targets, range personnel have made every effort to clear the target area by both visual and remotely operated camera operations. If the target is not fouled per the criteria stated above, then clearance for First Pass Hot is granted. Under all other conditions, the Range Controller may deny or approve First Pass Hot clearance as conditions warrant.

Surface To Surface (Small Boats)

In addition to search and rescue range sweeps by VMR-1, operators of small boats will be knowledgeable of marine mammals, protected species, and visual cues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training (Version 2.) maintained and promoted by the Department of the Navy. This on-line training resource, while not specifically tailored to small boat operations, has added value related to impact mitigation on USMC Cherry Point ranges.

Range Cameras

To increase the safety of persons or property near the targets, Range Operation and Control personnel monitor the target area through tower mounted safety and surveillance cameras. It is not possible to see down into the water with these cameras, so submerged species are not detectable. However, it is possible to see animals breaking the surface of the water. Range personnel report that the camera resolution is sufficient that they can clearly see ducks floating on waters near the target.

A new, enhanced camera system has been purchased and installed on one BT-11 tower and on one tower at BT-9. The new camera system has night vision (IR) capabilities with resolution levels almost as good as during daytime. Lenses on the camera system have a focal length of 250 mm to 1500 mm, with view angle of (2.2°x1.65° in wide-view) and (.55°x41° in narrow-view) respectively. Using the night-time capabilities, with a narrow view, a 1 x 1 m target can be identified out to three kilometers.

In the event that a protected species is sighted within 1000 yards of the BT-9 target, or anywhere within Rattan Bay, the target is declared fouled. Operations commence in the fouled area after the animal(s) have moved 1000 yards from the BT-9 target and/or out of Rattan Bay.

Night-Time Operation Procedures

Night-time monitoring procedures mirror day time operations related to “cold” pass requirements by all participating aircraft as noted above. In addition to these procedures, the following operational procedures are being implemented to enhance night-time detection capabilities for marine mammals at water-based targets.

As appropriate, range personnel (Test Range Trackers (TRT)) will utilize the Infrared (IR) capability of surveillance cameras to scan target areas during nighttime operations.



The target 'area' is identified as a 1000 yard ring surrounding the target at BT-9 and the South Bay of Rattan Bay for BT-11. TRT's shall 'pan out' to obtain screen view of approximately 500 yards (5 x target length) for the BT-9 target once the target user checks in. The initial 'pan out' will serve as the initial starting point for scanning and then the TRT will scan 500 yards right and left. The scanning technique will vary depending upon surface conditions of the target area and shall occur concurrently with the user 'cold pass'. Routine 'pauses' are incorporated into the scan to allow for camera auto-focus. Procedures for declaring a range "fouled" are the same for night-time operations.

APPENDIX E

List of Native and Locally Adapted Plant Species

This page intentionally left blank.

Table E-1. Native and Locally Adapted Tree, Shrub, and Vine Species.

Common Name	Scientific Name	Type	Light	Soil Moisture ¹
Small Trees (0–25 ft)				
Serviceberry	<i>Amelanchier arborea</i>	Deciduous	Full/part-sun	Mesic/sub-xeric
Devil’s walkingstick	<i>Aralia spinosa</i> ²	Deciduous	Full / part-sun	Hydric/xeric
Paw paw	<i>Asimina triloba</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
American hornbeam	<i>Carpinus carolina</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Chinquapin	<i>Castanea pumila</i>	Deciduous	Full-sun/shade	Sub-xeric/xeric
Eastern redbud	<i>Cercis canadensis</i>	Deciduous	Full-sun/shade	Mesic/xeric
Fringe tree	<i>Chionanthus virginicus</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Pagoda dogwood	<i>Cornus alternifolia</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Flowering dogwood	<i>Cornus florida</i>	Deciduous	Sun/shade	Mesic/xeric
Washington hawthorn	<i>Crataegus phaenopyrum</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Persimmon	<i>Diospyros virginiana</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Carolina silverbell	<i>Halesia carolina</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Common witch-hazel	<i>Hamamelis virginiana</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
American holly	<i>Ilex opaca</i>	Evergreen	Full-sun/shade	Mesic/sub-xeric
Red cedar	<i>Juniperus virginiana</i>	Evergreen	Full-sun/part-sun	Sub-xeric/xeric
Umbrella tree	<i>Magnolia tripetela</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Hop-hornbeam	<i>Ostrya virginiana</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Sourwood	<i>Oxydendrum arboreum</i>	Deciduous	Full-sun/shade	Sub-xeric/xeric
Hoptree	<i>Ptelea trifoliata</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric

Common Name	Scientific Name	Type	Light	Soil Moisture ¹
American plum	<i>Prunus americana</i>	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Pin cherry	<i>Prunus pensylvanica</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Common sassafras	<i>Sassafras albidum</i> ²	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Blackhaw viburnum	<i>Viburnum rufidulum</i>	Deciduous	Full-sun/shade	Mesic/xeric
Large Trees (> 25 ft)				
Red maple	<i>Acer rubrum</i>	Deciduous	Full-sun/shade	Hydric/xeric
Sugar maple	<i>Acer saccharum</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Yellow buckeye	<i>Aesculus flava</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Yellow birch	<i>Betula alleghaniensis</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Sweet birch	<i>Betula lenta</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
River birch	<i>Betula nigra</i>	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Bitternut hickory	<i>Carya cordiformis</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Pignut hickory	<i>Carya glabra</i>	Deciduous	Full-sun/shade	Sub-xeric/xeric
Yellowwood	<i>Cladrastis kentuckea</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Beech	<i>Fagus grandifolia</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Tulip tree	<i>Liriodendron tulipifera</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Cucumber tree	<i>Magnolia acuminata</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Black tupelo	<i>Nyssa sylvatica</i>	Deciduous	Full-sun/shade	Mesic/xeric
Sycamore	<i>Platanus occidentalis</i>	Deciduous	Full-sun/part-sun	Hydric/mesic
Red spruce	<i>Picea rubens</i>	Evergreen	Full-sun/shade	Mesic/sub-xeric
Black cherry	<i>Prunus serotina</i> ²	Deciduous	Full-sun/part-sun	Mesic/xeric
White oak	<i>Quercus alba</i>	Deciduous	Full-sun/part-sun	Mesic/xeric

Common Name	Scientific Name	Type	Light	Soil Moisture ¹
Chestnut oak	<i>Quercus montana</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Red oak	<i>Quercus rubra</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Post oak	<i>Quercus stellata</i>	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
American linden	<i>Tilia americana</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Canadian hemlock	<i>Tsuga canadensis</i>	Evergreen	Full-sun/shade	Mesic/sub-xeric
Carolina hemlock	<i>Tsuga caroliniana</i>	Evergreen	Full-sun/shade	Mesic/sub-xeric
Low Shrubs (< 4 ft)				
New Jersey tea	<i>Ceanothus americanus</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Sweetfern	<i>Comptonia peregrina</i>	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Snowhill hydrangea	<i>Hydrangea aborescens</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Shrubby St. John's wort	<i>Hypericum prolificum</i>	Deciduous	Full-sun/part-sun	Hydric/xeric
Drooping leucothoe	<i>Leucothoe fontanesiana</i>	Evergreen	Part-sun/shade	Mesic/sub-xeric
Carolina rose	<i>Rosa carolina</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Swamp rose	<i>Rosa palustris</i>	Deciduous	Full-sun/part-sun	Hydric/mesic
Cranberry	<i>Vaccinium macrocarpon</i>	Evergreen	Full-sun/part-sun	Hydric/mesic
Lowbush blueberry	<i>Vaccinium pallidum</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Maple-leaf viburnum	<i>Viburnum acerifolium</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Mid-size Shrubs (4–10 ft)				
Red chokeberry	<i>Aronia arbutifolia</i>	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Black chokeberry	<i>Aronia melanocarpa</i>	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Sweetshrub	<i>Calycanthus floridus</i>	Deciduous	Part-sun/shade	Hydric/sub-xeric
Cinnamonbark	<i>Clethra acuminata</i>	Deciduous	Full-sun/part-sun	Sub-xeric/xeric

Common Name	Scientific Name	Type	Light	Soil Moisture ¹
Silky dogwood	<i>Cornus amomum</i>	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Hazelnut	<i>Corylus americana</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric
Bush-honeysuckle	<i>Diervilla sessilifolia</i>	Deciduous	Full-sun/shade	Mesic/xeric
Hearts-a-bustin	<i>Euonymus americanus</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Large fothergilla	<i>Fothergilla major</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Dense hypericum	<i>Hypericum densiflorum</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Common winterberry	<i>Ilex verticillata</i>	Deciduous	Full-sun/shade	Hydric/mesic
Virginia sweetspire	<i>Itea virginica</i>	Deciduous	Full-sun/shade	Hydric/sub-xeric
Mountain laurel	<i>Kalmia latifolia</i>	Evergreen	Full-sun/part-sun	Sub-xeric/xeric
Spicebush	<i>Lindera benzoin</i>	Deciduous	Part-sun/shade	Mesic
Sweet azalea	<i>Rhododendron aborescens</i>	Deciduous	Full-sun/shade	Hydric/mesic
Flame azalea	<i>Rhododendron calendulaceum</i>	Deciduous	Part-sun/shade	Mesic/sub-xeric
Carolina rhododendron	<i>Rhododendron carolinianum</i>	Evergreen	Part-sun/shade	Mesic/sub-xeric
Mountain rosebay	<i>Rhododendron catawbiense</i>	Evergreen	Full-sun/shade	Mesic/sub-xeric
Pink azalea	<i>Rhododendron periclymenoides</i>	Deciduous	Part-sun/shade	Hydric/sub-xeric
Pinkshell azalea	<i>Rhododendron vaseyi</i>	Evergreen	Full-sun/part-sun	Mesic/sub-xeric
Elderberry	<i>Sambucus canadensis</i> ²	Deciduous	Full-sun/shade	Mesic
Coral berry	<i>Symphoricarpus orbiculatus</i> ²	Deciduous	Full-sun/shade	Mesic/xeric
Hobblebush	<i>Viburnum alnifolium</i>	Deciduous	Part-sun/shade	Mesic
Highbush blueberry	<i>Vaccinium corymbosum</i> ²	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Deerberry	<i>Vaccinium stamineum</i>	Deciduous	Full-sun/part-sun	Mesic/xeric
Witherod viburnum	<i>Viburnum cassinoides</i>	Deciduous	Full-sun/shade	Mesic/sub-xeric

Common Name	Scientific Name	Type	Light	Soil Moisture ¹
Large Shrubs (> 10 ft)				
Tag alder	<i>Alnus serrulata</i> ²	Deciduous	Full-sun/part-sun	Hydric/mesic
Mountain winterberry	<i>Ilex montana</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Mock orange	<i>Philadelphus inodorus</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Rosebay rhododendron	<i>Rhododendron maximum</i>	Evergreen	Part-sun/shade	Mesic/sub-xeric
Smooth sumac	<i>Rhus glabra</i> ²	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Silky willow	<i>Salix sericea</i>	Deciduous	Full-sun/shade	Hydric/sub-xeric
Arrowwood	<i>Viburnum dentatum</i> ²	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Vines				
Dutchman's pipe	<i>Aristolochia macrophylla</i>	Deciduous	Part-sun/shade	Mesic/xeric
Crossvine	<i>Bignonia capreolata</i>	Evergreen	Full-sun/shade	Hydric/sub-xeric
Virgin's bower	<i>Clematis virginiana</i> ²	Deciduous	Full-sun/shade	Mesic/xeric
Climbing hydrangea	<i>Decumaria barbara</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Coral honeysuckle	<i>Lonicera sempervirens</i>	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Passion flower	<i>Passiflora incarnata</i>	Deciduous	Full-sun/part-sun	Mesic/xeric

Source: North Carolina Native Plant Society (NCNPS) 2008.

¹ Refer to NCNPS 2008 for soil moisture definitions.

² Plants can be vigorous growers and may need more management to control.

This page intentionally left blank.

Table E-2. Native and Locally Adapted Herbaceous Plant Species.

Common Name	Scientific Name
Ferns	
Maidenhair fern	<i>Adiantum pedatum</i>
Ebony spleenwort	<i>Asplenium platyneuron</i>
Lady fern	<i>Athyrium felix-feimina</i> ssp. <i>Asplenoides</i>
Hay-scented fern	<i>Dennstaedtia punctiloba</i>
Wood fern	<i>Dryopteris marginalis</i>
Sensitive fern	<i>Onoclea sensibilis</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Interrupted fern	<i>Osmunda claytoniana</i>
Royal fern	<i>Osmunda regalis</i>
Christmas fern	<i>Polystichum acrostichoides</i>
New York fern	<i>Thelypteris noveboracensis</i>
Chain fern	<i>Woodwardia areolata</i>
Common woodsia	<i>Woodsia obtusa</i>
Grasses and Sedges	
Big bluestem	<i>Andropogon gerardii</i>
Broomsedge	<i>Andropogon virginicus</i>
River cane	<i>Arundinaria gigantea</i> ssp. <i>Gigantea</i>
Pennsylvania sedge	<i>Carex pensylvanica</i>
Plantain-leaved sedge	<i>Carex plantaginea</i>
River oats	<i>Chasmanthium latifolium</i>
Oat grass	<i>Danthonia compressa</i>
Bottle brush	<i>Elymus bystris</i>
Switch-grass	<i>Panicum virgatum</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Indian grass	<i>Sorghastrum nutans</i>
Eastern gamma grass	<i>Tripsacum dactyloides</i>
Mesic for Full Sun	

Common Name	Scientific Name
Butterfly weed	<i>Asclepias tuberosa</i>
New England aster	<i>Aster novae-angliae</i>
Curtis aster	<i>Aster curtisii</i>
Hairy coreopsis	<i>Coreopsis pubescens</i>
Joe-pye weed	<i>Eupatorium fistulosum</i>
Blazing star	<i>Liatris spicata</i>
Cardinal flower	<i>Lobelia cardinalis</i>
Bee balm	<i>Monarda didyma</i>
Wild blue phlox	<i>Phlox carolina</i>
Blackeyed susan	<i>Rudbeckia hirta</i>
Mesic for Shade	
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Wild ginger	<i>Asarum canadense</i>
Trout lily	<i>Erythronium americanum</i>
Sharp-lobed hepatica	<i>Hepatica acutiloba</i>
Alumroot	<i>Heuchera americana</i>
Partridge berry	<i>Mitchella repens</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Solomon's seal	<i>Polygonatum biflorum</i>
Christmas fern	<i>Polystichum acrostichoides</i>
Oconee bells	<i>Shortia galactifolia</i>
Foamflower	<i>Tiarella cordifolia</i>
Ground Covers	
Pussy's toes	<i>Antennaria plantaginifolia</i>
Wild ginger	<i>Asarum canadense</i>
Wintergreen	<i>Baultheria procumbens</i>
Green-and-gold	<i>Chrysogonum virginianum</i>
Mouse-eared coreopsis	<i>Coreopsis auriculata</i>
Wild strawberry	<i>Fragaria virginiana</i>
Little brown jugs	<i>Hexastylis arifolia</i>

Common Name	Scientific Name
Dwarf crested iris	<i>Iris cristata</i>
Partridge berry	<i>Mitchella repens</i>
Allegheny spurge	<i>Pachysandra procumbens</i>
Phacelia	<i>Phacelia bipinnatifida</i>
Chalice phlox	<i>Phlox amoena</i>
Wild blue phlox	<i>Phlox divaricata</i>
Creeping phlox	<i>Phlox stolonifera</i>
Golden aster	<i>Pityopsis graminifolia</i>
Christmas fern	<i>Polystichum acrostichoides</i>
Oconee bells	<i>Shortia galacifolia</i>
Blue-eyed grass	<i>Sisyrinchium mucronatum</i>
Foamflower	<i>Tiarella cordifolia</i>
Yellow-root	<i>Xanthorhiza simplicissima</i>
Wildflowers	
Doll's eyes	<i>Actaea pachypoda</i>
Blue star	<i>Amsonia tabernaemontana</i>
Thimbleweed	<i>Anemone virginiana</i>
Wild columbine	<i>Aquilegia canadensis</i>
Green dragon	<i>Arisaema dracontium</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Goat's-beard	<i>Aruncus dioicus</i>
Swamp milkweed	<i>Asclepias incarnata</i>
Butterfly-weed	<i>Asclepias tuberosa</i>
White wood aster	<i>Aster divaricatus</i>
Late purple aster	<i>Aster patens</i>
False goatsbeard	<i>Astilbe biternata</i>
Wild indigo	<i>Baptisia tinctoria</i>
Blue cohosh	<i>Caulophyllum thalictroides</i>
Pink turtlehead	<i>Chelone lyonii</i>
Black cohosh	<i>Cimicifuga racemosa</i>

Common Name	Scientific Name
Coreopsis	<i>Coreopsis pubescens</i>
Bleeding heart	<i>Dicentra eximia</i>
Shooting star	<i>Dodecatheon meadia</i>
Joe-pye weed	<i>Eupatorium fistulosum</i>
Wild geranium	<i>Geranium maculatum</i>
Sunflower	<i>Helianthus resinosus</i>
Sharp-lobed hepatica	<i>Hepatica acutiloba</i>
Alumroot	<i>Heuchera americana</i>
Jewelweed	<i>Impatiens capensis</i>
Blazing star	<i>Liatris spicata</i>
Turks-cap lily	<i>Lilium superbum</i>
Cardinal flower	<i>Lobelia cardinalis</i>
Lobelia	<i>Lobelia puberula</i>
Great lobelia	<i>Lobelia siphilitica</i>
Fringed loosestrife	<i>Lysimachia ciliata</i>
Bishop's cap	<i>Mitella diphylla</i>
Bee balm	<i>Monarda didyma</i>
Carolina phlox	<i>Phlox carolina</i>
Carolina phlox	<i>Phlox carolina</i>
Garden phlox	<i>Phlox paniculata</i>
Solomon's seal	<i>Polygonatum biflorum</i>
Blackeyed susan	<i>Rudbeckia hirta</i>
Bloodroot	<i>Sanguinaria canadensis</i>
Fire pink	<i>Silene virginica</i>
Winkle-leaf goldenrod	<i>Solidago rugosa</i>
Bush pea	<i>Thermopsis villosa</i>
New York ironweed	<i>Vernonia noveboracensis</i>

Source: North Carolina Native Plant Society (NCNPS) 2008.